Abstracts from the 3rd International Conference on Prevention and Infection Control (ICPIC 2015)

Geneva, Switzerland. 16-19 June 2015

Edited by Didier Pittet, Stephen Harbarth and Andreas Voss

Published: 16 June 2015

These abstracts are available online at http://www.aricjournal.com/supplements/4/S1

INNOVATION ACADEMY PRESENTATIONS

I1 Evaluation of the performance of a chlorhexidine gel containing CVC dressing in a clinical environment

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Introduction: Although infection risk associated with central venous catheters (CVC) has reduced in recent years, the use of CVC are still associated with relatively large number of infections, leading to increased patient morbidity and healthcare costs. A major source of microbial colonisation and infection of short term CVC is the patients’ endogenous skin microorganisms located at the catheter insertion site.

Objectives: To evaluate the introduction and performance of a chlorhexidine (CHG) gel CVC dressing in a critical care environment.

Methods: Following Ethical committee and Trust approvals and staff training, a transparent film-dressing incorporating an aqueous CHG gel was introduced to critical care patients over a 9 month period. Skin reactions to the dressings and performance characteristics of the dressings were monitored. Any adverse events were determined as per standard clinical practice. Healthcare workers’ perceptions of the performance of the dressing were evaluated at the end of the study period.

Results: There were no reports of severe contact dermatitis associated with the CHG or standard dressings. Close assessment of skin condition at the CVC site was evaluated in 273 patients who had given their consent. Following dressing removal, mild redness under the adhesive was reported in one standard dressing group patient (0.7%, n=137) and in seven CHG dressing group patients (5.1%, n=136). Only one patient presented with mild redness under the CHG gel part of the dressing (0.7%, n=136). All the above symptoms resolved within 24 h following dressing removal. A questionnaire was distributed to critical care nursing staff and clinicians in theatres, who had experience handling and observing both the standard CVC (Tegaderm IV dressing) and CHG gel containing CVC dressing (CHG Tegaderm). In total, 71 nurses and 10 clinicians responded to the survey. Staff was satisfied with the performance of the CHG dressing, with 97.5% of the respondents rating the overall performance of the CHG gel dressing as: the same as (11.1%), better (35.8%) or much better (50.6%) than the standard CVC dressing.

Conclusion: The CHG gel CVC dressing was well tolerated by patients and performed effectively in the critical care environment.

Disclosure of interest: T. Karpanen Grant/Research support from: received funding for attending the ICPIC (2015) conference, A. Casey: None declared, T. Whitehouse: None declared, P. Nightingale: None declared, I. Das: None declared, T. Elliott Speaker’s bureau of: received honoraria for presentations at symposia, Consultant for: has received honoraria for attendance at advisory board meetings.

I2 Structure-based optimization and discovery of novel 1,3,5-triazine derivatives as bacterial translation inhibitor with favourable metabolic fate

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Introduction: We have recently moved into an era not just of multiple resistant bacteria but of totally resistant pathogens, which now include vancomycin-resistant enterococci, carbapenem-resistant Acinetobacter baumannii, vancomycin-resistant MRSA and, very recently, NDM-1. Thus, increased incidence of bacterial resistance to currently available antibiotics necessitates the discovery and introduction of new and effective drugs. In our earlier studies, we have discovered a potent antibacterial lead molecule from 1,3,5-triazine (first generation) and its subsequent optimization till its tenth generation results much more advanced analogue with enhanced activity and less toxicity [1].

Objectives: Present study deals with the advancement of novel derivatives of 1,3,5-triazines to increase its efficacy and potency to make them viable drug candidate (eleventh generation).

Methods: The synthesis of analogues was achieved by means of S$_8$Ar reaction utilizing distinguished amines. These molecules were then subjected to antibacterial screening against pathogenic Gram-positive and Gram-negative micro-organisms. MetaPrint2D-React from University of Cambridge, UK was utilized for the prediction of metabolites of the compounds.

Results: Entire set of derivatives demonstrated excellent antibacterial activity (1.56 - 25 μg ml$^{-1}$), and in some instance found equipotent to cefixime as standard. The molecular docking study on eubacterial ribosomal decoding A site (Escherichia coli 16S rRNA A site) confirmed the stability of target compounds into the inner groove of active site by making close H-bonds with highly conserved residues, e.g. Ade38, Gua37, Ade39, and Gua40. Moreover, the most active compound 7e, in MetaPrint2D-React study was not found to be deactivated by human metabolic process, which conform the utility of designed molecules.

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Conclusion: We have discovered another novel 1,3,5-triazine analogs as potent antibacterial agent through structure-based optimization of our defined lead.

Disclosure of interest: None declared.

Reference

13

In vitro evidence for the anti-staphyloccocal activity of a cationic polymer compound—preliminary results
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Introduction: In the context of a clinical trial, we observed a surprisingly high methicillin resistant S. aureus (MRSA) eradication rate of a placebo solution containing a cationic polymeric compound (CPC). The most active compound altering bacterial growth was identified by testing individually all molecules entering the composition of the commercial solution.

Objectives: To assess the inhibitory capacity of a decolonisation solution and determine the in vitro time kill curves of Prontoderm® (containing polyhexanide plus CPC) versus CPC alone and versus a control solution containing only excipients and emollients.

Methods: Minimal inhibitory concentrations (MIC) of all compounds entering in the composition of a decolonization solution were assessed by a macro-method in liquid medium, on MRSA strains from the prevalent lineage isolated in our institution. A constant and calibrated inoculum of MRSA was exposed to adapted concentrations (4-fold MIC) of inhibitory compounds in liquid medium. Aliquots were sampled serially at time 15 to 240 min and diluted before plating on nutrient agar medium. Survival cells were enumerated after 20 h incubation at 37°C.

Results: In addition to polyhexanide, the decolonisation solution contained another compound showing activity on MRSA growth. Polyhexanide was rapidly bactericidal for all tested MRSA strains; a rapid decrease of >5 logs in 15 min was generally observed. CPC showed also a significant effect on MRSA development. The killing was slower than that observed with polyhexanide but reached 4 to 5 logs after 2 h exposure.

Conclusion: In addition to the active bactericidal compound, decolonization solution contains additives altering bacterial growth. The choice of a reliable placebo solution for comparison purposes in clinical trials should be adapted. Susceptibility of other relevant bacterial species, particularly multi-resistant pathogens, to the CPC should be evaluated.

Disclosure of interest: P. Francois: None declared, C. Landelle: None declared, A. Arndt Employee of: B-Braun Medical AG, E-J. Bonetti: None declared, A. Renzoni: None declared, D. Pitter: None declared, S. Harbarth Grant/Research support from: B-Braun Medical AG.

14

Development of antimicrobial peptides for catheter-related bloodstream infection prevention
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Introduction: Central venous catheters are used in many medical procedures to deliver critical and lifesaving treatments, such as antibiotics and chemotherapy agents. However, central line-associated bloodstream infections (CLABSSIs) associated with these devices negatively impact over 100,000 patients per year and are extremely expensive to treat. When infections arise on implanted biomaterials, they are treated with systemic antibiotics, debridement, and implant removal. Unfortunately, the high local antibiotic concentrations needed to kill colonized bacteria are only achieved over a short time, cause cytotoxicity, and can promote antibiotic resistance. Therefore, it is currently believed that proactive methods of infection management will be superior to reactive methods. As an alternative to traditional antibiotics or to device removal, antimicrobial peptides (AMPs) represent a novel way to prevent and treat infections. AMPs are short, cationic molecules found naturally in the innate immune systems of many species, and they have broad spectrum antimicrobial activity. AMPs use fundamentally different mechanisms to kill bacteria than conventional antibiotics, reducing the threat of bacterial resistance.

Objectives: The objective of our overall research program is to improve biomedical devices using a therapy based on surface-tethered AMPs. Although AMPs are highly active against bacteria when free in solution, immobilization of AMPs to a surface significantly reduces antimicrobial activity.

Methods: Antimicrobial peptides are tethered to biomaterial surfaces using flexible chemical linkers. We are currently investigating the role of the linker size in influencing the efficacy of the antimicrobial peptide. Activity against Gram-negative and Gram-positive bacteria is being quantified. We are also studying the cytotoxicity and long-term stability of the tethered peptides.

Results: We have shown that modified antimicrobial peptide, chrysophitin-1, can be chemically tethered to a biomaterial surface using polyethylene glycol as a spacer. Killing was observed for Staphylococcus aureus and Escherichia coli.

Conclusion: The expected outcome of this project is a surface modification on catheters can be used to help mitigate catheter-related bloodstream infections.

Disclosure of interest: None declared.

15

Investigation into combination of an antimicrobial peptide with existing antibiotics against antibiotic resistant clinical isolates of Escherichia coli
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Introduction: Bacterial infections remain the leading killer worldwide which is worsened by the continuous emergence of antibiotic resistance. In particular, antibiotic resistant Gram-negative bacteria are prevalent and extremely difficult to treat. Therefore, rejuvenating the therapeutic potentials of existing antibiotics represents an attractive novel strategy. Antimicrobial peptides have been of great focus recently. Newly derived synthetic lipopeptides have been shown to exhibit antimicrobial activity against bacteria and fungi.

Objectives: In this study, we investigated the ability of an antimicrobial peptide, PA-KKKK, to enhance the potency of currently used antibiotics against antibiotic-resistant clinical isolates of Escherichia coli and a NDM-1 producing strain.

Methods: Antibiotic susceptibility was investigated by determining the minimal inhibitory concentration (MIC) using a broth dilution method. To study the combined interactions between PA-KKKK and the antibiotics, checkerboard titrations were performed. Time-kill assays were then carried out to prove the effect of synergistic activity against the tested bacterial strains. Transmembrane potential depolarisation assays and ATP levels were determined to understand the mechanism of action of PA-KKKK.

Results: NDM-1 producing strain was extremely resistant to all antibiotics tested. The factorial inhibitory concentration index (FICI) was calculated to show the peptide synergised with rifampicin against the NDM-1 strain, while it synergised with rifampicin, colistin, ceftazidime and aztreonam against antibiotic-resistant clinical isolate of E. coli. Time-kill analysis demonstrated significant synergistic activities when a low level of PA-KKKK was combined with rifampicin and colistin. PA-KKKK had a membranolytic effect on cytoplasmic membrane and in combination, decreased ATP levels of cells in a dose-dependent manner.

Conclusion: We have demonstrated that PA-KKKK acts as an antibiotic enhancer and therefore accelerates the bactericidal activity of drugs against antibiotic-resistant E. coli. This novel treatment regimen can have major clinical implications in our fight against Gram-negative bacterial infections.

Disclosure of interest: None declared.
16 Inactivation of Pseudomonas aeruginosa by zinc oxide nanoparticles in aqueous solution

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):86

Introduction: Since ZnO nanoparticles (ZnO-NPs) exhibit strong antibacterial activities on a broad spectrum of bacteria the aim of this study was to evaluate the antimicrobial activity of ZnO-NPs against Pseudomonas aeruginosa as a model for gram-negative bacteria.

Methods: The average size of ZnO-NPs was 20 nm, as determined through scanning electron microscopy. Muller Hinton broth was used as a growing medium for Pseudomonas aeruginosa. Photocatalytic experiment was carried out in a laboratory-scale batch reactor with low pressure ultraviolet irradiation (380 nm). Different experimental parameters such as amount of ZnO-NPs, contact time, inorganic and organic substances and pH on photocatalytically inactivating of Pseudomonas aeruginosa cells have been studied. An initial Pseudomonas aeruginosa concentration of 10^7 CFU/mL was used for all experiments.

Results: Result showed that, almost all the initial Pseudomonas aeruginosa cell (10^7 CFU/ml) was inactivated in 60 min in the presence of 2 g/l ZnO-NPs. Photocatalytic inactivation of bacteria was found to follow first order kinetics. The initial pH of the water did not play an important role on the inactivation rate within a range of 6–8 pH units. The amount of photocatalyst also plays an important role in photocatalytic inactivation rate. As the result showed increasing the photocatalyst amount provided more rapid inactivation.

Conclusion: Addition of some inorganic ions to the suspension affects the sensitivity of Pseudomonas aeruginosa and caused to retard the inactivation rates. Since the sensitivity of Pseudomonas aeruginosa to photocatalytic treatment was fairly good, it is therefore, recommended to use this nano-particle for water treatment.

Disclosure of interest: None declared.

17 QED disinfection of Ebola and drinking water in the developing world

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):87

Introduction: The UV disinfection protocol for Ebola and drinking water in the West [1] is not only too complex and expensive to be used in the developing world but requires sources of electricity usually not available.

Objectives: To provide people in the developing world with a means to disinfect both the Ebola virus and drinking water themselves using UV-C disinfection. To provide a simple solution for the disinfection of drinking water, which is not hindered by problems of energy source or disposal of waste.

Methods: QED induced UV-C radiation from hand-held nano-coated bowls powered only by body heat. QED disinfection is based on quantum electrodynamics (QED) and electromagnetic energy. By this theory, heat from the hand cannot increase the coating temperature because its heat capacity vanishes by quantum mechanics. Instead, body heat is conserved in the nano-coating by QED. QED induced UV-C radiation having wavelength λ depending on the coating thickness d and refractive index n, i.e., λ = 2nd. For example, a bowl comprising a thin-walled aluminum half-sphere (100 mm diameter x 50 mm high) that fits in the palm of one hand is provided on the inside surface with a 53 nm zinc-oxide coating having n = 2.4 to produce the UV-C. Humans produce body heat of about 6 mW/cm^2. Since the UV-C intensity necessary to disinfect [3] the Ebola virus is 0.4 mJ/cm^2, the protocol is to move an empty inverted hand-held bowl over the area to be disinfected in < 1 second scans. Water disinfection requires 16-38 mJ/cm^2 of UV-C [4] means filling the bowl with water and waiting 3 to 6 seconds before drinking.

Results: Preliminary results expected for the ICPC conference.

Conclusion: QED induced UV-C radiation from hand-held nano-coated bowls allows people in the developing world to rely on themselves to disinfect the Ebola virus and drinking water. Costs of the bowls are minimal and may be distributed freely by West African governments to their people. Support and funding in the development and testing of UV-C disinfection of Ebola and drinking water by the Innovation Academy is requested.

Disclosure of interest: None declared.

References

18 Infection prevention and patient safety improvement in developing countries thanks to sodium hypochlorite production devices

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):88

Introduction: The technology developed by Antenna Technologies has allowed reaching some promising results. In Guinea Conakry, the sales of Sodium Hypochlorite (SH) flasks in a limited zone (target population for 2014: 7218882) represent a calculated coverage ratio of 27.5% (2014: 3’390’637 flasks sold at very low price to lowest income group). In Burkina Faso, the excellent results obtained by a pilot study under the auspices of the Health Ministry suggests that a scaling-up phase with the ambition to equip 63 health districts and 9 regional hospitals should be undertaken in a close future.

Objectives: To demonstrate that devices, through the electrolysis of saltwater, can locally produce high-standard quality SH at a very low cost and without prior scientific knowledge. This SH allows to significantly improve public health and patient safety (disinfection) particularly in developing countries.

Methods: Antenna Technologies (AT) assesses, through experiences and data from the field, the usefulness of its devices (WATA) and chemical reagents (WataTest, WataBlue) by considering growing demand for its technology and its demonstrated substitutive capacity.

Results: AT’s devices are now used in thirty countries. Laboratory empirical studies and data gathered on the field have shown that such devices are able to produce on a regular basis a SH equivalent to 6g/L of active chlorine. This concentration is in line with recommendations of CDC for the disinfection in health centers in the Ebola context (CDC, 2015) and with the recommendations of the WHO regarding infection control in health care facilities (WHO, 2004). HS is also recognized as an efficient disinfectant for drinkable water. Water quality is expected to have a huge influence on the prevalence of waterborne diseases. Cholorination is identified as the most cost-effective disinfection solution.

Conclusion: SH production process is very low-cost and easy to learn/train. The produced SH meets high-quality standards. According to CDC and WHO, the SH is an efficient and convenient disinfectant/antiseptic for health facilities and water, especially in developing countries. SH is also relevant for the washing and disinfection of the wounds (Dakin solution).

Disclosure of interest: None declared.

19 Use of an innovative colour-based personality-profiling (PP) tool to guide culture-change strategies among different healthcare worker (HCW) groups

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):89
Introduction: Most current infection control (IC) culture-change programs are standardised and do not take into account possible differences between HCWs.

Objectives: 1. Identify PP features among various HCW categories to inform the development of a personality-based educational culture-change “blueprint” to improve uptake of IC initiatives.
2. Compare the accuracy of PPs derived from the Human Resources (HR) database at 5 Australian hospitals (HR-Ps) with those derived from direct participant surveys (PS-Ps) from these sites.
3. Use findings to develop targeted marketing strategies for each HCW group.

Methods: We used an innovative colour-based PP tool (ColourGrid; framework based on Hofstede’s Cultural Dimensions Theory) to identify PPs using: Basic HR data (gender, age, home postcode and suburb, employment status, HCW category) and ColourGrid surveys completed by HCWs at the 5 sites. HR-Ps and PS-Ps were compared for 3 HCW categories – Doctors (D), Nurses/Allied (N-A) and Support staff (SS). Among Ds, PS-Ps were compared for senior hospital clinicians (full-time (SMO) vs part-time (VMO)) and junior staff (intens/fellows (HMO)).

Results: HR data was obtained for 34 243 HCWs, with 1045 completing a ColourGrid survey. HR-Ps suggested that HCWs are substantially different to the general Australian population, being more affluent; established; well informed; likely to adopt new technology and new experiences; often cynical about advertising messages; challenging to others who do not share their interests or concerns; want to make a difference and leave a heritage of success. HR-Ps and PS-Ps were highly concordant for all 3 HCW categories (D, N-A, SS) – with both suggesting a need for messaging differences. Overall, Ds exhibited more individualism, lower power distance and less uncertainty avoidance, but PS-Ps were different for SMO vs VMO vs HMO suggesting targeted messaging strategies are critical.

Conclusion: PP identified major differences among D, N-A and SS; and a need for targeted marketing strategies. Among Ds, subtle but important, differences also exist that need consideration if culture-change initiatives are to be successful.

Disclosure of interest: None declared.

110 Teaching good infection control practices with fun: impact of the serious game Flu.0
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):110

Introduction: Flu outbreaks usually reveal that practices and knowledge about the diagnosis of influenza, its treatment and infection control measures must be improved. A serious game, “Flu.0”, was created to teach the 8 key points to know and do when facing one or more patient infected by influenza.

Objectives: To evaluate the impact of playing to ‘Flu.0’ on the knowledge and practices of nurses and physicians.

Methods: Flu.0 is free and can be played online or downloaded; A call for participation to play and evaluate the game was performed. Players were asked to complete a questionnaire before and after the game to give their opinion on sentences about flu, to write what they learned with the game and the main thing they would do differently. A descriptive analysis was performed and the evolution of the answers was analysed.

Results: Physicians were 264 to participate (including 213 fellows), senior nurses 62 and nurses students 577; 95% learnt at least something. The main knowledge acquired was about rapid test for influenza (32%) and additional precautions (19%). Significantly, players agreed more after the game that seasonal flu is a not benign disease, that flu vaccination of health care workers is useful, knew more about antiviral treatment and felt better prepared to face a flu case (p<0.001). Thanks to the game 47% of physician/senior nurses and 80% of nurses students declared they would perform better additional precautions.

Conclusion: A serious game is an innovative quick and efficient tool for infection control team to improve patient safety.

Disclosure of interest: None declared.

111 Nurses’ self-improvement hand-hygiene compliance in a hospital ward: combining indoor location with gamification data presentation
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):111

Introduction: Healthcare acquired infections can be prevented by means of hand hygiene (HH) compliance. Nonetheless, leading busy healthcare workers to comply with HH remains puzzling. Recognized hurdles are lack of time, forgetfulness, wrong technique, lack of motivation and awereness about compliance.

Objectives: This study aims at exploring the use of gamification to promote nurses’ HH compliance self-awareness and action. Real-time data collected from an indoor location systems will provide feed-back information to nurses working in a ward.

Methods: A design science approach is used to design and test a solution [1]. Gamification was selected as the solution (Osyrish) to the compliance problem to engage and motivate people to achieve specific goals [1]. An innovative indoor system, based on Beacons (iBeacon™), is used to collect data on nurses’ position (and time) to enable both the detection of HH moments and its validation. Each nurse carry a device running an application that use the received signals to detect its proximity to the beacons, being able to know to which one it is closest to, thus knowing its relative position in the room. After this, data is collected to display, in anonymous way, nurses’ compliance in real-time.

Changes in behavior were measured.

Results: The compliance of HH in the ward was studied before and after the intervention. The system was installed and tested with significant precision. 35 Beacons were placed in the ward (in the room’s doors, in each alcohol-based hand rub container, in each sink and in each side of the bed). Even though times aren’t totally accurate, we are able to detect nurses’ movements using proximity and quantify compliance. Participant nurses approved the measure as an opportunity to improve their performance.

Conclusion: The impact of gamification on HH compliance is still under evaluation. So far the results show significant improvements in nurses’ awareness. The nurses participated from the beginning enabled a higher sense of ownership in the process, recognized as a performance enabler.

Disclosure of interest: None declared.

References

112 The use of creative and humorous designs as vehicles for health education and infection control
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):112

Introduction: ilovemicrobes.com™ was started in late 2014 by a microbiologist cum ex-lecturer at a Singapore institute of higher learning. The concept was to incorporate humour and creative designs to give a glimpse of the world of microbes and their impacts in human health and disease.

Objectives: The concept was to incorporate humour and creative designs to give a glimpse of the world of microbes and their impacts in human health and disease.

Methods: Each design is scientifically-based on microscopic or macroscopic attributes of the real image of the actual microbes magnified up thousands if not millions times over. The uniqueness of these microbes’ designs are not only to generate curiosity but also to demystify the diseases caused in a fun and approachable manner.

Microbes are known to cause disease. However, there is still a sense of complacency and resignations when it comes to infectious disease. The
failure of people to exercise appropriate precaution and infection control processes are most likely due to ignorance and the lack of awareness. Thus, the importance of a vehicle, which can capture the attention of people, especially children to be aware of the existence of these infectious agents, and to understand the way they caused infections; and finally as to how we can perform interventions to reduce the risk of infections are of significance.

Results: For viewing of the characters designed, please go to http://www.ilovemicrobes.com.

Conclusion: It is the vision of ilovemicrobes.com™ to promote Health Education and Infection Control in a fun and exciting way.

Disclosure of interest: None declared.

ORAL PRESENTATIONS

01 Rapid molecular diagnosis using femA mecA real-time PCR for staphylococcal bacteraemia improves early appropriate antibiotic prescribing: a randomised clinical trial
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O1

Introduction: Vancomycin overuse exerts a selective pressure for VRE and VISA and has been associated with poorer outcomes than beta-lactams when treating MSSA. Rapid determination of methicillin susceptibility should be particularly helpful to spare vancomycin in a setting where MRSA prevalence is low.

Objectives: To compare the time to targeted antimicrobial treatment of staphylococcal bacteraemia when using real-time PCR versus conventional microbiological work-up. To assess the impact of PCR on the need for ICU, risk of septic complications and mortality.

Methods: In this prospective single-centre study performed in 2012-2013, all blood culture vials positive for Gram positive cocci “in clusters” underwent femA_SA, femA_SE, and mecA realtime PCR testing for the rapid identification of staphylococcal species and methicillin-susceptibility, as well as undergoing conventional microbiology work-up. Patients who had only one blood culture bottle positive were excluded.

100 patients were randomized 1:1 for treating physicians being informed of PCR results as soon as available (Group A), or else waiting until results of conventional tests were available (Group B). Antibiotic therapy was classed as ideal (targeted), adequate or inappropriate. Time to ideal therapy was compared in both groups.

Results: 89 patients were included in the per protocol (PP) analysis, 48 in group A and 41 in group B. MRSA was identified in 7 patients, MSSA in 46 and CNS in 36. PCR results were concordant with standard microbiological testing.

On average, PCR results were available 3.2 hours after Gram stain transmission (28.9 hours for standard tests, p<0.001). 85.4% of group A patients were already receiving “ideal therapy” when the antibiogram became available (56.1% in group B, p = 0.004). Not surprisingly, S. aureus infections led to more complications than CNS infections (26/46 vs. 7/36; p<0.001). Septic complications did not differ between groups, nor did the need for ICU and the 28-day mortality.

Conclusion: Rapid determination of methicillin susceptibility in staphylococcal bacteraemia drastically reduces the time to targeted antibiotic therapy, thereby avoiding unneeded exposure to vancomycin.

Disclosure of interest: None declared.

02 Antimicrobial prescription behavior in 16 German intensive care units: room for improvement in pneumonia therapy
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Introduction: Antimicrobial surveillance in German hospitals is mainly based on consumption monitoring. Sparse data exist on prescription culture.

Objectives: To investigate the performance of antimicrobial prescription behavior in order to identify starting points for interventions.

Methods: 16 intensive care units (ICUs) non-university hospitals covering Germany were included. Randomly selected medical records from patients diagnosed with pneumonia in 2012 were retrospectively analyzed. Bacteriological sampling and antimicrobial therapy (AMT) were reviewed with regard to clinically relevant aspects. Immunosuppressed, pregnant and underage patients were excluded.

Results: 383 medical records were analyzed (179 community acquired and 204 hospital acquired pneumonia cases). 40.5% of empiric therapy regimens were appropriate according to national guidelines. Regimens with too broad spectrum or not recommended substances were used in 11.7%. 47.8% had formally too narrow spectra. Duration of therapy could only be evaluated in 40.7% of cases since the other patients were dismissed or died before recommended end of therapy. Within the evaluable group 31.4% of therapies were too long. Dosing was adequate in 86.6% of cases. Bacteriological sampling was performed as recommended in 23.1% of cases and incompletely in 51.2%. Performance frequencies were 49.4% for blood cultures, 41.8% for tracheal aspirate and 15.4% for bronchoalveolar lavage. Legionella antigen was tested in only 7.6%. De-escalation strategies could be evaluated in 76.0% of cases, since 24.0% were dismissed before day 4. In 90% of evaluable cases no de-escalation was performed. In 6.9% de-escalation was microbiologically guided, in 3.1% clinically guided. Documentation of the indication for AMT was not performed in 25.5%. In 61.9% the indication was placed unsystematically in the medical record. Documentation at a predefined place was only found in 12.6%.

Conclusion: Large room for improvement in AMT was detected regarding duration of therapy, performance of bacteriological sampling, de-escalation concepts and documentation. The high percentage of formally too narrow empiric AMT regimens should be interpreted carefully. Further analysis is needed to determine the best performance indicators.

Disclosure of interest: None declared.

03 Optimizing antimicrobial prescription through e-health: setting, dosing, timing and stewardship
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Introduction: Antimicrobial resistance is a major issue of healthcare and new resistances are being observed. Antibiotics should be used strictly. When prescribed, they should be selected in accordance to a diagnosis, epidemiology and other factors, requiring appropriate dosing and duration of treatment. Antibiotic prescription should be seen as a team decision, where antimicrobial stewardship plays a major role. E-health, defined as the intensive use of information and communication technologies in the health sector, should be maximized in order to help physicians in prescribing right antibiotics on the right contexts, dosing and duration.

Objectives: To optimize global antimicrobial prescription in a paper free hospital.

Methods: A new template for antimicrobial prescription was created, allowing visualization and printing of first line guidelines. When prescribing antimicrobials, context is firstly requested: surgical prophylaxis, therapeutic, others (dropoffs for all). In doing so, the usual dose and the maximum duration for the selected context automatically appear by default (1 day for SI prophylaxis; variable days for each infection, 7 days for the majority). When the selected antimicrobial is not matched and/or it belongs to a group of conditioned use (quinolones, carbapenems, vancomycin, e.g.), a pop-up message appears on the screen and justification is mandatory. An automated e-mail with those details is immediately sent to a subgroup of the ICAC and Pharmacy.

Results: Antimicrobial prescriptions are conditioned to the clinical setting. Dose and duration of antimicrobial therapy is made adequate. ICAC and
Pharmacy provide real time antimicrobial stewardship. Inadequate use of antibiotics such as quinolones and carbapenems is limited to adequate contexts. Data analysis allows feedback to prescribers.

**Conclusion:** E-health is a major tool in order to improve quality and safety of antimicrobial use, thus minimizing the emergence of resistant bacteria through improvement on prescription, antimicrobial stewardship and data analysis.

**Disclosure of interest:** None declared.

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**O4**

Preoperative prevalence of methicillin-resistant Staphylococcus aureus (MRSA) in non-hospitalized population in the Netherlands during a 5-year period

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O4

**Introduction:** The MRSA Search-and-Destroy strategy relies on active screening of high risk groups. However, not all carriers belong to known risk groups and MRSA in the community is emerging also in the Netherlands.

**Objectives:** We conducted a retrospective, observational study to determine the prevalence of MRSA carriers in non-hospitalized cardiothoracic, interventional cardiology, orthopaedic and vascular patients.

**Methods:** The study was performed in a large teaching hospital in the Netherlands. All samples of patients who were tested for preoperative S. aureus nose carriage from Mar 1, 2010 until Dec 31, 2014, were included. Nasal swabs (ESwab, Copan Diagnostics, Italy) were collected during preoperative assessments. Samples of cardiothoracic patients were tested by PCR (GeneXpert, Cepheid, CA), other samples were cultured using chromogenic agar plates. All MRSA isolates were confirmed using molecular methods. A questionnaire was conducted to ascertain potential MRSA risk factors and a linear regression analysis was used to examine trends in MRSA carriage.

**Results:** In total, 18,298 nasal swabs were obtained from 14,552 unique patients. In 329 swabs (1.8%) the GeneXpert gave an invalid result, therefore 17,969 swabs were included in our analysis. S. aureus was detected in 4604 patients (25.6% 95% CI 25.0-26.3%) of which 26 were MRSA (0.14% 95% CI 0.10-0.22%). Prevalence of MRSA carriage increased by a factor of 1.8 (from 0.12% in 2010 to 0.22% in 2014), however this increase was not significant (p=0.144 using linear regression analysis). Twelve spa types were found: 34.6% belonged to t011, 15.4% to t002, 7.7% to t015, 7.7% to t018, 7.7% to t223, and 3.8% to t024, t445, t447, t458, t688, t1154, t11784 each. Two isolates were positive for the PVL gene (7.4%). Results of the questionnaire revealed that 20/26 patients had no known risk factors for MRSA carriage (0.11% 95% CI 0.07-0.17%). In this group spa type t002 (36.4%) and t011 (36.4%) were most prevalent.

**Conclusion:** This study revealed a sustained low prevalence of MRSA carriage of 0.14% in non-hospitalized patients in a large teaching hospital, over 5 years. The high prevalence of spa type t011 in patients without livestock-associated(LA) risk factors, indicates that LA-MRSA is spreading to individuals in the community.

**Disclosure of interest:** None declared.

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**O5**

Clinical effectiveness of mupirocin for preventing S. aureus infections in non-surgical settings: a meta-analysis

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**Introduction:** A protective effect of mupirocin has been seen among surgical, nonsurgical and dialysis patients. Our aim is to summarize evidence for mupirocin decolonization for prevention of S. aureus infections in non-surgical healthcare settings.

**Objectives:** To identify the optimal setting and patient population to implement mupirocin decolonization for prevention of S. aureus infections using meta-analytic methods.

**Methods:** We conducted systematic searches in PubMed, Cochrane Library Databases, Scopus, Web of Science, and ClinicalTrials.gov to identify papers published until 2013 on effectiveness of mupirocin in healthcare settings. Two investigators independently abstracted data with a pilot-tested form.

**Results:** Of the 12,644 studies identified, 8 randomized controlled trials and 19 quasi-experimental studies met the study inclusion criteria. Mupirocin was observed to reduce the odds of S. aureus infections by 70% (cpOR=0.30, 95% CI 0.23, 0.39) and 60% (cpOR=0.40, 95% CI 0.27, 0.62) in both dialysis and non-dialysis settings, respectively. Nevertheless, there was highly significant (p=0.0009) and moderate heterogeneity (I²=46%) among studies. Studies were homogeneous (p>0.1) when stratified analyses were performed by specific clinical settings. Among the 6 studies that took place in adult intensive care units (ICUs), mupirocin decolonization was associated with a 56% reduction in the odds of S. aureus infection (cpOR=0.44, 95% CI 0.26, 0.73). There was also a protective effect of mupirocin against S. aureus exit site infections among patients undergoing peritoneal dialysis (cpOR=0.23, 95% CI 0.15, 0.36) and against bacteremia among hemodialysis patients (cpOR=0.15, 95% CI 0.06, 0.36).

**Conclusion:** Mupirocin decolonization is protective against S. aureus infections among both dialysis and adult ICU patient populations. Future studies should target other patient settings such as long-term care facilities.

**Disclosure of interest:** None declared.

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**O6**

Randomized, placebo-controlled, double-blind clinical trial to evaluate the efficacy of polyhexanide for topical decolonization of methillin-resistant Staphylococcus aureus (MRSA) carriers

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**Introduction:** Due to increasing resistance, alternatives to mupirocin and chlorhexidine for decolonization of MRSA carriage need to be evaluated.

**Objectives:** To evaluate the efficacy of polyhexanide (Prontoderm®) vs placebo in eliminating MRSA carriage at day 28 (D28) after the end of treatment.

**Methods:** In a 1,900-bed teaching hospital, MRSA-colonized patients were randomized into a double-blind, placebo-controlled superiority trial. Patients were treated with either polyhexanide (antisepctic and surface-active substances; group I) or placebo (only surface-active substances; group P) applied to the anterior nares and skin for 10 days. The primary outcome was MRSA decolonization at D28 assessed by both intention-to-treat (ITT) responder analysis and per-protocol (PP) analysis (microbiological follow-up ± 7 days and topical treatment ± 5 days). Secondary outcomes included MRSA decolonization according to nasal MRSA carriage, safety and emergence of resistance.

**Results:** Of 2590 patients screened, 146 patients (group I; 71; group P, 75) were randomized between January 2011 and July 2014. Primary outcome was missing for 11 (7.5%) patients. ITT analysis showed that 24/71 (33.8%) patients in group I vs 22/75 (29.3%) in group P were MRSA-free at D28 (risk difference, 4.5%; 95% CI, -10.6% to 19.7%; P=0.56). PP analysis confirmed the results with 19/53 (35.8%) decolonized polyhexanide-treated patients vs 17/56 (30.4%) in the placebo arm (risk difference, 5.5%; 95% CI, -12.2% to 23.0%; P=0.54). In the subgroup of MRSA nasal carriers, PP analysis showed that 6/15 (40.0%) patients in group I vs 2/11 (18.2%) in group P were decolonized (P=0.40). Nine serious adverse events occurred in group I vs 12 in group P; none was attributable to study medication. Emergence of polyhexanide resistance was not observed.
Conclusion: This study suggests that under real-life conditions a single polyhexanide decolonization course is marginally effective in eradicating MRSA carriage.

Disclosure of interest: C. Landelle: None declared, E. Von Dach: None declared, T. Haustein: None declared, A. Agostinho: None declared, G. Renzi: None declared, A. Renzoni: None declared, D. Pittet: None declared, J. Schrenzel: None declared, P. François: None declared, S. Harbarth Grant/Research support from: a peer-reviewed research grant funded by Pfizer, Consultant For: the advisory boards of Destiny Pharma, bioMerieux, Novartis, and DaVolterra.

O7 Evaluation of the efficacy of nasal application of silver sulfadiazine for decolonization of patients with methicillin-resistant Staphylococcus aureus in hospitals
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Introduction: Previous nasal colonization is an important risk factor in the pathogenesis of infections caused by MRSA. Moreover, the formulation of mupirocin available in Brazil is inadequate for mucous membranes application, often causing intolerable side effects. Objectives: Evaluate the efficacy of intranasal application of silver sulfadiazine for decolonization of hospitalized patients carrying MRSA.

Methods: This is a double-blind randomised study conducted at a tertiary-care university hospital, with approximately 700 beds. Adult in-patients from clinical and surgical wards were potentially eligible to the study if they had any Methicillin-Resistant Staphylococcus aureus isolated from any clinical specimen on the microbiology laboratory of the study facility. Exclusion criteria consisted of pregnant women, age <18 years, osteomyelitis, infections with implants and cystic fibrosis. Nasal colonization by MRSA was confirmed by means of a nasal swab selective culture. Patients were randomised by a pharmacist not involved in the data collection, and submitted to application intranasal of silver sulfadiazine 1% or placebo twice a day plus bath with clohexidine-detergent daily for five consecutive days. Nasal swab was repeated next day after end of decolonization. The rate of nasal MRSA decolonization were compared using the Fisher exact test.

Results: Twenty-five patients were included. The median time from the day of hospitalization and inclusion in the study was 27 days (ranging from 7 to 85 days). The patient’s age median was 55.9 years old (ranging from 19 to 89 years), 16 male and 9 female patients. From the 25 patients initially included, 20 completed the full course of the study medication and had their cultures available after decolonization. Among the patients, 5/12 (41.7%) patients in the silver sulfadiazine and 3/8 (37.5%) of the placebo group had negative nasal swab after decolonization (p = 0.74).

Conclusion: According to these preliminary findings, silver sulfadiazine was not successful for decolonizing hospitalized patients carrying MRSA.

Disclosure of interest: None declared.

O8 Ten years of MRSA surveillance in Switzerland: similarities and differences with Europe
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Introduction: The global epidemiology of methicillin-resistant Staphylococcus aureus (MRSA) is heterogeneous. Objectives: The objective of this study was to evaluate the epidemiology of MRSA in Switzerland over a 10-year period.

Methods: We conducted a descriptive analysis of individual patient-level and aggregate MRSA data from the ANRESIS from 2004 to 2013. We also performed a time series analysis to characterize trends of MRSA and non-multidrug-resistant MRSA (Nm-MRSA, as a potential marker for community-associated MRSA, which was defined as being susceptible to at least three of the following agents: ciprofloxacin, clindamycin, tetracycline and trimethoprim-sulfamethoxazole (TMP/SMX) with stratification by Swiss regions, age-group and patient location.

Results: Overall, 13,675 MRSA isolates were included. Although the proportion of MRSA among S. aureus (from 14% in 2004 to 10% in 2013 and the MRSA incidence decreased over time from 0.98 in 2004 to 0.58 per 1,000 discharged patients in 2013), an increasing trend of NmMRSA (+0.84% per quarter) was observed. Variation in the geographical distribution was noted, with a decrease in the proportion of MRSA among S. aureus in the Western region and Ticino (from 25% in 2004 to 18% in 2013 and from 20% to 15%) and stable and low prevalences (3-5%) in the Eastern and Central regions. We observed an increase in MRSA among S. aureus in outpatients (+0.044% per quarter) and a decrease in inpatients (-0.13% per quarter). Further analysis showed an increase in MRSA rates among S. aureus in younger age groups (2-15y, +0.11% per quarter) compared to decreasing MRSA rates in S. aureus for older age (>65 years ~0.29% per quarter). Resistance to ciprofloxacin, clindamycin, gentamicin and erythromycin in MRSA strains decreased. Conversely, resistance to tetracycline, TMP/SMX, fusidic acid and rifampicin remained almost stationary and low over the study period.

Conclusion: The proportion of MRSA among S. aureus in Switzerland decreased overall. The Ticino and West regions have moved from having a hyper-endemic MRSA prevalence comparable with neighboring countries, to lower levels of prevalence. MRSA appears to be an increasing problem in the younger population and in outpatients. The increased susceptibility to several antibiotic classes other than β-lactams suggests dissemination of strains, which have classically been reported as community-associated.

Disclosure of interest: None declared.

O9 Secular trends of methicillin-resistant Staphylococcus aureus (MRSA) at Geneva University Hospitals (HUG) over a 14-year period
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Introduction: Controlling MRSA has been a challenge for Geneva University Hospitals (HUG), particularly after the introduction of ST228 SCCmec hyperendemic clone in 1999.

Objectives: To describe HUG’s secular trends of MRSA, infection control measures and predominant MRSA clones using Staphylococcal chromosomal cassette (SCCmec) genotyping.

Methods: A multifaceted MRSA prevention program initiated in 1993 included patient screening, decontamination, surveillance, contact isolation, an alert system and a hospital-wide hand hygiene campaign (HHC); subsequently strengthened by: an educational campaign (2003), routine MRSA SCCmec genotyping (2005), a 2nd HKC, periodic audits and feedback (2006). The intensive care unit performed MRSA screening on admission, discharge and weekly since 2004. Surveillance included: (1) incidence rates (IR) of hospital acquired (HA)-MRSA infection or colonization; (2) HA-MRSA bloodstream infections (BSI); (3) proportion of MRSA/S aureus BSI; (4) IR of MRSA clinical cultures; (5) proportion of SCCmec in MRSA strains, assessed by routine multiplex PCR assay. Representative isolates were grouped in MLVA clusters to evaluate genomic diversity and subjected to MLST.

Results: At HUG, from 2000-2014, 12,543 patients were MRSA-colonized or infected (incl. >75% screening swabs; 530 BSI). From 2000-2007, annual rates of all indicators showed an increasing trend, declining since 2008. New HA-MRSA cases per 100 admissions increased from 1.36 to 2.00 (2006), and then declined to 0.29 (2014). Trends expressed by incidence density of cases per 1000 hospital-days: HA-MRSA, from 0.92 to 1.36 (2007) to 0.21 (2014); ICU-acquired HA-MRSA from 2.3 (2002) to 10.5 (2006) to 1.31 (2014); MRSA-CC rates from 0.68 to 1.44 (2008), to 0.24 (2014); HA-BSI from 0.049 to 0.07 (2009), to 0.016 (2014). The proportion of MRSA/S. aureus BSI remained around 34% (2000-2009), declining to 18% (2014). SCCmec strains declined from 83% (2005) to 32% (2014); SCCmecII and SCCmecIV were higher in non-acute settings.
Conclusion: A multifaceted prevention program and possible changes in biologic fitness of the ST228 SCCmec clone helped to decrease endemic MRSA rates for the last 7 years.

Disclosure of interest: None declared.

O10 Baseline evaluation of infection prevention and control (IPC) in the context of Ebola virus disease (EVD) in nine healthcare facilities in the city of Conakry, Guinea
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O10

Introduction: As a means to contribute to the response to the Ebola virus disease (EVD) epidemic and support health system strengthening, Jhpiego, with funding from USAID, committed to strengthening health service capacity in IPC.


Methods: The assessment was conducted between September 4 and November 11, 2014. The assessment was conducted using the Infection Control Assessment Tool (ICAT) between September 4th and 11th 2014. Each response was scored between 0-3. An overall score of ≥75% was graded as good while <75% was poor. Data was analysed with SPSS Version 20. Ethical statement: This study was conducted during the time of the Nigerian 2014 EVD outbreak.

Results: Two tertiary, twenty four public secondary and sixty six private secondary health facilities were studied. Only one of the tertiary healthcare facilities had an IPC committee in place with a focal officer in charge. Only one hospital had an IPC policy which was not operational. None of the health facilities had a good score for both IPC materials availability and practice.

Conclusion: Gaps existed in IPC in health facilities in Rivers State, Nigeria at the outbreak of EVD. It is recommended that appropriate policy for maintaining and sustaining infrastructure and supplies essential to IPC in health facilities be developed and implemented in all healthcare facilities. Regular surveillance should be put in place to ensure that these items are always available, while hospital administrators and departmental heads must provide the necessary resources to facilitate compliance.

Disclosure of interest: None declared.

O12 IPC training in Sierra Leone- ICAN’s role in fighting Ebola
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Introduction: Thousands of people have been affected by Ebola; the crude mortality rate is estimated at around 53%. Responding to WHO, the Infection Control Africa Network (ICAN) has been at the forefront of fighting Ebola since April 2015. Two training courses were presented between February and mid March 2015 in Sierra Leone funded by the WHO & CDC.

Objectives: The training was to ensure that evidence based IPC practices were put in place to counteract rituals, myths and superstition which surrounded the community and healthcare workers (HCW) with increasing spread of Ebola; to clear the confusion created by the several organisations teaching different methods of IPC.

Methods: The Basic Ebola IPC course registered at Stellenbosch University, was delivered to 60 and 75 students for the WHO and CDC respectively. A pre and post assessment examination measured the level of knowledge gained. Didactic lectures were delivered in the morning and practical work in the afternoon. The WHO guidelines on Ebola were used as a basis for training these HCW to function at National and District level.

Both the training programmes were anonymously evaluated by the students each day.

Results: Both groups were experienced but needed support. The average increase between pre and post test knowledge was 27% for both sets of students; starting at 37% post test average was 87%. An increased level of confidence, presentation/ communication skills was 32%. By the end, evidence and risk assessment were driving their decision making. Course evaluation averaged between 87% and 92%.

Conclusion: The training provided by ICAN funded by the WHO and CDC had a major impact on the outcome of IPC in Sierra Leone. The students are confident in dealing with Ebola, carrying out appropriate risk assessments and protecting themselves, their colleagues and their patients.

Disclosure of interest: None declared.

O11 Identifying infection prevention and control gaps in healthcare facilities operating in Rivers state during the EVD outbreak in Nigeria 2014
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Introduction: The rate of infection of health care workers in the recent Ebola Virus Disease (EVD) outbreak in West Africa, including Nigeria has shown that the disease can be transmitted and amplified in healthcare settings especially when infection prevention and control (IPC) procedures are ineffective or ignored.

Objectives: The aim of this study was to evaluate the level of infection control measures operating in health facilities in Rivers state as at the time of the Nigerian 2014 EVD outbreak.

Methods: The descriptive cross sectional study was done in Rivers state one of the two states that experienced the EVD outbreak in Nigeria. Information on IPC materials and practices in health facilities in the state was collected using the Infection Control Assessment Tool (ICAT) from September 4th and 11th 2014. Each response was scored between 0-3. An overall score of ≥75% was graded as good while <75% was poor. Data was analysed with SPSS Version 20. Ethical statement: this study was conducted during the outbreak of EVD in Nigeria as part of response activities by the members of the Ebola Emergency Operation Center.

Results: Two tertiary, twenty four public secondary and sixty six private secondary health facilities were studied. Only one of the tertiary healthcare facilities had an IPC committee in place with a focal officer in charge. Only one hospital had an IPC policy which was not operational. None of the health facilities had a good score for both IPC materials availability and practice.

Conclusion: Gaps existed in IPC in health facilities in Rivers State, Nigeria at the outbreak of EVD. It is recommended that appropriate policy for maintaining and sustaining infrastructure and supplies essential to IPC in health facilities be developed and implemented in all health facilities. Regular surveillance should be put in place to ensure that these items are always available, while hospital administrators and departmental heads must provide the necessary resources to facilitate compliance.

Disclosure of interest: None declared.

O13 Efficacy of chlorine solutions used for hand hygiene and gloves disinfection in Ebola settings: a systematic review
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Introduction: Thousands of people have been affected by Ebola; the crude mortality rate is estimated at around 53%. Responding to WHO, the Infection Control Africa Network (ICAN) has been at the forefront of fighting Ebola since April 2015. Two training courses were presented between February and mid March 2015 in Sierra Leone funded by the WHO & CDC.

Objectives: The training was to ensure that evidence based IPC practices were put in place to counteract rituals, myths and superstition which surrounded the community and healthcare workers (HCW) with increasing spread of Ebola; to clear the confusion created by the several organisations teaching different methods of IPC.

Methods: The Basic Ebola IPC course registered at Stellenbosch University, was delivered to 60 and 75 students for the WHO and CDC respectively. A pre and post assessment examination measured the level of knowledge gained. Didactic lectures were delivered in the morning and practical work in the afternoon. The WHO guidelines on Ebola were used as a basis for training these HCW to function at National and District level.

Both the training programmes were anonymously evaluated by the students each day.

Results: Both groups were experienced but needed support. The average increase between pre and post test knowledge was 27% for both sets of students; starting at 37% post test average was 87%. An increased level of confidence, presentation/ communication skills was 32%. By the end, evidence and risk assessment were driving their decision making. Course evaluation averaged between 87% and 92%.

Conclusion: The training provided by ICAN funded by the WHO and CDC had a major impact on the outcome of IPC in Sierra Leone. The students are confident in dealing with Ebola, carrying out appropriate risk assessments and protecting themselves, their colleagues and their patients.

Disclosure of interest: None declared.
Introduction: Chlorine solutions (CS) have been widely used for hand hygiene (HH) in the Western African countries affected by the current Ebola outbreak. However, no HH guidelines recommend the use of CS for HH practices.

Objectives: To conduct a systematic review to assess the comparative efficacy of CS for HH or disinfecting gloves vs alcohol-based handrubs or other antisepsis products.

Methods: PubMed (including MEDLINE) and Ovid EMBASE databases were searched on 26th September 2014 with no time, age, human, language or geographical restrictions. The reference lists of relevant articles were also screened.

Results: Out of 1931 hits, no study was found on the efficacy of CS for HH or glove disinfection to reduce the transmission of filovirus or any enveloped viruses among health workers. Four articles about the efficacy of sodium hypochlorite to reduce bacterial count on hands of healthy volunteers in a laboratory setting were selected. In these studies, different concentrations of CS were used: an aqueous solution of sodium hypochlorite (Milton 1:80); a 4% sodium hypochlorite solution; 0.5% bleach; and microfiber releasing 400 ppm bleach. Many different comparators were tested, the most common being water and soap, 2% or 4% chlorhexidine gluconate, alcohol (60% isopropanol or ethanol).

Different contact times (from 10 seconds up to 5 minutes) were applied for both the CS and the comparators. These studies yielded conflicting results, some showing higher efficacy of CS and others inferiority. No study was found on efficacy of CS for glove disinfection.

Conclusion: Overall, there is very limited and very low-quality evidence to evaluate the efficacy of CS in comparison to other agents for HH and no evidence exists for glove disinfection. No manuscript evaluating the efficacy of sodium hypochlorite for (enveloped) viruses was found. In the included studies, differences in CS concentrations, contact time and microorganisms were observed. The WHO guidelines developed based on this review suggest that CS may be used in emergency situations, but strongly recommend implementing strategies to change to alcohol-based handrubs or soap and water.

Disclosure of interest: None declared.

Introduction: A single case of Ebola virus disease (EVD) in a physician returning from service with MSF in Liberia set off widespread public anxiety. The physician was asymptomatic on his return but became febrile several days later, tested positive for EVD, and required admission to a specialized facility. In the interim, he had traveled widely to public places in New York before his diagnosis.

Objectives: To describe the clinical, epidemiologic, public health and political aftermath of a single case of EVD in a physician returning from West Africa.

Methods: Describe the events surrounding this physician’s diagnosis, the media frenzy and political overreaction by state and local politicians including a confrontation between political leaders and public health authorities.

Results: The extensive preparedness and training activities by public health authorities and health care facilities, including establishment of designated EVD diagnostic facilities and treatment centers were inadequate to overcome the ensuing public panic about potential Ebola transmission manifested by fear about riding the subways, visiting public sites or facilities where the physician was alleged to have wandered in New York prior to his diagnosis, and fears about seeking or providing treatment at the facility where the physician was hospitalized. There was avoidance of the large African community in New York, irrespective of their country of origin. The political ramifications included orders by two local governors to involuntarily restrain and isolate any additional healthcare providers returning from Ebola endemic areas which had a chilling effect on recruitment efforts for replacement workers.

Conclusion: A single case of Ebola Virus disease in a returned healthcare worker caused widespread panic despite educational efforts by public health officials and healthcare facilities. These efforts were inadequate to overcome general distrust of the government, media frenzy, and initial misstatements by federal health officials. Considerable harm was also done by overzealous political figures anxious to use the public’s concerns to advance their own political agendas.

Disclosure of interest: None declared.
Methods: The UNIGE and UNF3S in collaboration with experts from different disciplines and academic or political institutions, international organisations and NGOs (37 experts from 19 institutions), have produced the first MOOC on Ebola. It was set-up on the platform FUN at the end of 2014 with a transdisciplinary program of five weeks with 57 video-lectures. A second run on Coursera will start imminently.

Results: 1988 enrolments from 66 countries. 330 of these took the final survey and 260 passed it. France and Switzerland led the number of participants with a total of 588. 526 participants came from Africa, 332 from West Africa and 120 from Central Africa. Guinea had 79 participants. 332 participants provided no data on their origin. The majority of participants were in their thirties and had a master (625) or a doctorate (466). More than 85% out of 95 participants who completed the final survey, rated the course as excellent or very good.

Conclusion: These are the first insights on the potential of MOOCs as innovative tools in health crisis. The number of enrolments may be limited by this new French platform. The second run of the MOOC on Coursera will extend these results. Although this MOOC addressed some aspects of prevention and infection control, specific MOOCs in this field are needed to train a larger number of health professionals and evaluate them to ensure that specific practices are correctly implemented where they are most needed.

Disclosure of interest: None declared.

O17 Effectiveness of a hospital-wide educational programme for infection control to reduce the rate of healthcare associated infections and related sepsis (ALERTS)
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O17

Introduction: The overarching objective of this clinical trial is to demonstrate the feasibility of an institutional programme to reduce the burden of Healthcare Associated Infections (HAIs) and related sepsis of at least 20%, without targeting only specific pathogens or hospital wards.

Methods: Prospective, quasi-experimental study covering all acute care units (27 general wards, 4 ICUs, overall 819 beds) at the Jena University Hospital. Surveillance for HAIs is performed by computerized antibiotic monitoring in patients with risk factors for HAIs (i.e. catheters, operations) on a daily basis. Following the 1st surveillance period (09/2011 to 08/2012) a multifaceted, pragmatic infection control programme, aimed at proper hand hygiene and bundles for the prevention of the four most common HAIs has been implemented. Subsequently, a 2nd surveillance phase (04/2013 to 08/2014) was conducted to measure the effect of the infection control programme.

Results: During the the first surveillance period 30,631 patients were admitted to the participating departments. According to CDC definitions we identified 1,637 HAIs, resulting in an overall incidence of 5.3 %. Based on clinical evaluation, irrespective of the CDC definitions, an additional 944 HAIs were detected (overall HAI rate, 8.4 % [n = 2581]). A substantial proportion of patients had HAI associated severe sepsis or septic shock (lower respiratory tract infection, n = 279 [37 %]; surgical site infection, n = 114 [25 %]; primary sepsis, n = 110 [32 %]; urinary tract infection, n = 46 [8 %]; other, n = 87 [22 %]). The overall surveillance period is pending, the results however will be presented at the congress.

Conclusion: Our numbers reveal that a high number of HAIs are missed using CDC-definitions and therefore the magnitude of the problem might be underestimated. Furthermore, a high percentage of HAIs progress from localized infection to severe sepsis or septic shock, requiring ICU treatment.

Disclosure of interest: None declared.

O18 Implementation of WHO multimodal hand hygiene (HH) improvement strategy to reduce healthcare-associated infections (HAI) and VAP (ventilator-associated pneumonia) caused by multi-drug resistant Acinetobacter baumannii (MDRAB) at Siloam Hospitals Surabaya (SHBS), Indonesia
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O18

Introduction: SHBS is a 160 bed private hospital in Surabaya, Indonesia. The average length of stay (ALOS) is 9.52 d. In 2010, HAi rates at SHBS were high (3.12%) and HH compliance among healthcare workers (HCW) was low (73.34%). At the same time, SHBS had MDRAB outbreak among ICU patients with VAP rate of 10.99/100-device-days. Therefore, there was a need for quality improvement to reduce HAI and VAP caused by MDRAB.

Methods: The WHO strategy was implemented in 2010 in all departments and included: 1) System change initiatives: HH policy review and ward infrastructure survey q m, dedicated budget for HH agents, evaluation of HCW tolerability and acceptability of alcohol-based handrub (ABHR) 2) Training and education: regular mandatory training for all HCW, doctor’s forum and antibiotic stewardship case study, e-learning, etc... 3) Evaluation and feedback: monthly HH compliance audit and reporting to governing body, monthly feedback, external audits. 4) Reminders in the workplace: posters in public and point of care areas, reminders via paging system, fingerprint attendance machine, etc.... 5) Institutional Safety Climate: CEO support and commitment, QI program, HH as key performance indicator, patient speak-up token in reminding doctors to perform hand hygiene.

Results: We conducted monthly HH audit compliance since 2010 with total number of 31267 opportunities during 2233 observation sessions. The overall hospital-wide compliance with HH increased significantly from 73% in 2010 to 88% in 2014 (p<0.0001). The overall consumption of ABHR increased in parallel from 16.8 L in 2010 to 34.5 L per 1000 patient-days in 2014 (p<0.002). HAIs rate decreased from 3.12 (2010) to 0.10 (2014) per 100 admissions (p=0.002). VAP caused by MDRAB decreased from 10.99/100 (2010) to 0% (2014) per 1000 device-days (p=0.002).

Conclusion: Implementation of WHO Multimodal HH Improvement Strategy that is supported and committed by CEO and all hospital staffs, increased HCW compliance and subsequently reduced HAIs hospital-wide and VAP caused by MDRAB in ICU.

Disclosure of interest: None declared.

O19 Impact of a multimodal hand hygiene improvement intervention in a 1000-bed hospital in NE Thailand: a stepped wedge clustered randomized controlled trial
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Introduction: Improving hand hygiene (HH) compliance amongst healthcare workers (HCWs) is one of the simplest and most effective measures for preventing hospital-acquired infections (HAIs). However, only a few studies have evaluated the effectiveness of interventions for improving HH compliance using strong study designs, and almost all of these have been in high income countries.

Objectives: To evaluate the impact of a multimodal hand hygiene improvement strategy on directly observed hand hygiene compliance.

Methods: Design: Prospective stepped wedge randomised controlled trial using SB in-patient hospital wards (the study clusters), and the timing of the intervention in each ward was randomly selected using a computer generated sequence.

Setting: A 1000-bed hospital located in NE Thailand between November 2013 and April 2015.
Intervention: The intervention was adapted from The World Health Organization’s Hand Hygiene Improvement Strategy. The intervention will be delivered by the infection control team and the infection control ward nurses who will receive additional training. A novel feature of the intervention is that staff on each ward were asked to actively decide how best to implement each of the five components of the WHO strategy. The primary analysis will be performed at the cluster level, with one observation of mean HH compliance within each ward for each time period and will use a generalized linear mixed model.

Results: The study is still ongoing and will finish on 30 April 2015. Results of the study are not available at the moment but will be presented at the meeting.

Conclusion: To our knowledge this study will represent one of the most rigorous evaluations of the WHO Multimodal Hand Hygiene Improvement Strategy outside a high income country, and we anticipate that it should provide outcomes that enable further refinements in HH improvement strategies and that can potentially inform health economic models. Results from this study are intended to be generalisable to other resource-constrained hospitals in Thailand and elsewhere. The possibility of contamination between clusters is a potential limitation.

Disclosure of interest: None declared.

O20 Effectiveness after 5 years of the WHO hand hygiene promotion strategy to reduce healthcare-associated infections at Hung Vuong Hospital, Vietnam

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Introduction: Hung Vuong hospital (HVH) is a 900 bed maternity hospital in Ho Chi Minh City, Vietnam, with at least 40,000 deliveries per year. In 2009, at Hung Vuong hospital (HVH), hand hygiene compliance among healthcare staff was low (8%) while the rates of neonatal hospital-acquired infections (HAIs) were quite high (15.7%). There was the need for promoting hand hygiene using the WHO strategy to improve staff compliance and possibly reduce HAIs.

Objectives: To evaluate the improvement of hand hygiene compliance and its possible impact on HAIs at HVH.

Methods: Hand hygiene promotion started in 2010 using the WHO multimodal strategy available from the WHO website. Following pilot phases between 2008 and 2009, surveys to assess HHC and monitor HAI rates have been conducted since 2010. The total amount of alcohol-based handrub used was monitored in parallel.

Results: We conducted 12 surveys between 2010 and 2014 monitoring a total of 34,415 opportunities for hand hygiene during 2,688 observation sessions (i.e. for around 714 hours). The overall hospital-wide compliance with hand hygiene practices increased significantly from 8% in 2010 to 52% in 2014 (p<0.0001).

The overall consumption of alcohol-based handrub increased in parallel from 2.2L (2010) to 11.7L per 1000 patient-days (2014). The adults’ HAIs rates were reduced from 0.63 (2010) to 0.45 (2014) per 100 admissions (p=0.002), the neonatal HAIs rates were reduced from 16.1 (2010) to 5.18 per 100 admissions (2014) (p<0.0001). The neonatal mortality was reduced from 2.35 (2010) to 1.00 (2014) per 100 admissions (p=0.015).

Conclusion: The hand hygiene promotion strategy was associated with marked improvement in staff compliance, reduction in HAIs and in overall mortality among neonates.

Disclosure of interest: None declared.
highest in pediatric (0.86) and adult cardiothoracic ICUs (0.80) and pediatric oncology wards (0.76). After adjusting for differences in ICU types, the risk of CLABSI in GCC hospitals was 146% higher than NHSN hospitals but 33% lower than INIC hospitals. Similar to NHSN hospitals, the majority of CLABSI events (81%) were diagnosed by detecting recognized pathogens in blood cultures.

**Conclusion:** The risk of CLABSI in ICU and oncology patients in GCC countries is probably much higher than the US but the risk in ICU patients is slightly lower than many developing countries. Current findings may be used as a regional benchmark.

**Disclosure of interest:** None declared.

**O23**

The epidemiology of vascular catheter-related bacteremia outside ICUs in a tertiary care centre

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**Introduction:** There have been significant changes among non-intensive care unit patients with increasing numbers of comorbidities and invasive procedures, particularly vascular catheterization.

**Objectives:** To determine the current epidemiology of vascular catheter-related bacteremia (CRB) in non-ICU patients over a period of 12 years in a tertiary care hospital.

**Methods:** Prospective surveillance of CRB at Bellvitge University Hospital in Barcelona, Spain. CRB was diagnosed through daily meetings between Infection Control Team and microbiologists. For diagnosis of CRB, CDC definitions were used, including presence of phlebitis for peripheral CRB and at least two positive blood cultures for common skin contaminants.

**Results:** From January 2003 to December 2014, 561 episodes of CRB were followed. There was a significant reduction in the incidence of CRB from 2003 (0.42 episodes/1,000 patient days) to 2014 (0.20 episodes/1,000 patient days, p<0.000).

Overall, 271 of 651 (42%) episodes were caused by peripheral venous catheter (0.10 ep/1,000 patients-day) and 380 (58%) by central venous catheter (0.14 ep/1,000 patients-day). The most frequent cause of CRB during the study period was short peripheral catheter with 177 episodes (mean days from insertion to bacteremia: 5d; SD:3d); followed by subclavian with 132 episodes (mean days from insertion to bacteremia: 18d; SD:18d).

The most frequent causative microorganism were Gram-positive cocci (GPC) (71%) followed by Gram negative bacilli (29%) and fungi (1.2%). Among GPC, 35% were **Staphylococcus aureus** followed by 28% coagulase negative *Staphylococci*. *S. aureus* caused 50% of short peripheral CRB episodes but only 31% of CVC (p<0.000). Overall mortality was 16.7%, while for patients with *S. aureus* CRB was 26.2% (p<0.000).

**Conclusion:** Although there has been a decrease in CRB cases, there remains a significant problem in non-ICU patients. *S. aureus* is the leading pathogen, particularly among patients with peripheral CRB, and is associated with a high mortality rate.

**Disclosure of interest:** None declared.

**O24**

Preventing central venous catheter-related bloodstream infections through implementation of a bundle intervention in the developing world: a quasi-experimental study

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**Introduction:** Central venous catheter-associated bloodstream infections (CVCBSI) are among the most frequent health-care associated infections worldwide.

**Objectives:** To investigate the effectiveness of a bundle intervention on reducing the rates of CVCBSI in critically ill patients admitted in a tertiary care hospital of Brazil.

**Methods:** Quasi-experimental study designed to evaluate the impact on CVCBSI rates of implementing the following measures: training program that aimed to correct practices related to CVC insertion, manipulation, and maintenance, following the guidelines of the Centers for Disease Control and Prevention (CDC). Applying a checklist for each CVC insertion, bearing in mind a) the use of maximal sterile barriers during insertion, b) appropriate hand hygiene, c) insertion site disinfection and antisepsis, d) choice of catheter insertion site and reassessing the need for the central access on a daily basis.

**Results:** We examined 123 checklists before and 155 checklists after implementation of the training program. Prior to the training, 71% of the staff members disinfected their hands using chlorhexidine 2% handwashing, 11% used alcohol hand rub based on ethanol 70%, 7% used a combination of both, and 7% performed an incorrect technique; hand hygiene was not verified for 4%. Following the training, 75, 9, and 14% of the staff used chlorhexidine, alcoholic solution, and a combination of chlorhexidine and alcoholic solution for hand disinfection, respectively; hand hygiene was not verified for 2% of the staff members. CVCBSI incidence was 9.3 and 5.1 per 1,000 catheter-days before and after the training program, corresponding to a reduction in CVCBSI by 43 episodes per 1,000 catheter-days (CI 95%: 2.27-6.35).

**Conclusion:** A bundle intervention aimed to prevent CVC-BSI proved to be effective in the ICU setting of an acute-care hospital in the developing world.

**Disclosure of interest:** None declared.

**O25**

Longterm reduction rate in catheter related bloodstream infections after implementation of a new strategy

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**Introduction:** Catheter-related bloodstream infection (CRBSI) accounts for 10% to 20% of hospital-acquired infections and is associated with both increased ICU stay and mortality. CRBSI represent a considerable toll on patients and hospital resources. A lot of effort is put into the prevention of CRBSI.

**Objectives:** The aim of the present report is to evaluate the long-term results of the implementation of the strategies for prevention of catheter related infections. Part of this strategies was also participation in PROHIBIT study. Central line insertion and care bundles were implemented together with the education about the hand hygiene according to the WHO campaign “5 moments of hand hygiene”. After the end of the PROHIBIT study we continue to perform regular surveillance of CRBSI in ICUs on daily basis together with ICU staff. Analysis of the date is done twice a year and date is returned to the ICUs. Additional education or interventions are performed as needed according to the results.

**Results:** In 2010 the mean incidence of CRBSI in our institution was 5.6 CRBSI/1000 catheter days (CD). After the implementation of strategies for prevention of catheter related infections the incidence dropped dramatically in all ICU, but there were still some differences between ICUs. The lowest combine incidence for all ICUs was 0.67 CRBSI/1000 CD. After the end of PROHIBIT study the incidence has risen slightly but after the implementation of regular surveillance the incidence dropped again and was 0.63 CRBSI/1000 CD in 2014.

**Conclusion:** Our experience in prevention of CRBSI shows it is possible to maintain low rate of CRBSI also after the study period without big expenses but with regular surveillance with feedback information and action according to the results.
Disclosure of interest: None declared.

Reference


O26

Fitness of use of Biopatch™ and Tegaderm™ CHG for protecting central venous catheters and arterial lines in critically ill patients

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O26

Introduction: Catheter bundles significantly reduce the rate of catheter-associated bloodstream infections. By continuous release of chlorhexidine around the insertion site, the use of antimicrobial devices demonstrated further decrease of the rate of infection below 1 episodes/1000 catheter-days. Objectives: To compared the fitness of use of (Biopatch™) and (Tegaderm™ CHG).

Methods: All central venous catheters and arterial lines, inserted and handled according to a written protocol in all patients admitted to a mixed ICU of 5 units of 7 beds (2000 admissions and 11’000 patients-days yearly) were protected with antimicrobial devices. Biopatch™ was used over a 60 month period from 2009. Tegaderm™-CHG was introduced in August 2011 for patients housed in 2 out 5 units and 18 months later replaced Biopatch™ in all units. Their fitness of use was compared using a structured questionnaire. The study design did not aim to compare infection rates, which was about 0.3 episodes of infections/1000 catheter days over the period of switch of the devices.

Results: Health care workers answering the questionnaires were specifically trained to provide care for ICU patients and had followed internal training for catheter handling and care, including specific sessions for the use of antimicrobial devices. Experience captured by the questionnaire run on several tens of individual catheter dressings in all possible insertion sites. Compared to those reported after 60 months of Biopatch™ use (n=24), the overall satisfaction significantly increases after 14 months of Tegaderm™-CHG use (n=42). Categories (in%) very good; good; average, bad increased from 13, 46, 42, 0 to 74, 26, 0 and 0, respectively; p<0.001. This was related to a significant improvement of the ease of installation and of the ability of Tegaderm™-CHG to cover beyond the insertion site protecting in most cases also the area of fixation of the catheter to the skin.

Conclusion: Based on the significant improvement of fitness of use by the healthcare workers, we decided to replace the Biopatch™ by the Tegaderm-CHG™ in the dressing of all central venous catheters and arterial lines for all ICU patients.


O27

There is an excess of surgical site infections in Argentina

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Introduction: Since 2003 three Surgical Site Infection (SSI) surveillance systems were consecutive implemented in our country (IRIQ Project, 2003; VALIDAR Project, 2004; VIHDA System, 2005-2013) using standard methodology (NNISs, 1992-2004; NHSN 2006-2008). These systems have generated a local benchmark for Argentinian hospitals. However, it would be appropriate to compare local data with those international standards, in order to determine if there is, in our country, an excess in the number of SSI adjusted by surgical category and risk index.

Objectives: To estimate the excess of SSI using the Standardized Infection Ratio (SIR) from three local surveillance systems compared with two external standards.

Methods: Through a retrospective analysis of data from three Argentinian surveillance systems, 16 surgical procedures were selected according to the relevance of SSI associated and the lower probability of underreporting because the lack of post-discharge surveillance. Data from each local surveillance system were compared with external standard for the same time period through SIR. SSI excess was estimated as the difference between observed and expected cases. Between Oct-Dec 2014, an anonymous survey was sent to 165 hospitals, participating in at least one local surveillance system, with the purpose to evaluate the compliance with recommended strategies (SHEA-IDSA, 2014 Update) to prevent SSI.

Results: While, for IRIQ Project, 3,186 surgeries were evaluated with an excess of 88 SSI (SIR 2.21; 95% CI 1.87–2.55; p<0.01), for VALIDAR Project, 5,762 procedures were included with an excess of 89 SSI (SIR 1.66; 95% CI 1.44–1.88; p<0.01), and for VIHDA System, 27,389 surgeries were evaluated with an excess of 462 SSI (SIR 1.91; 95% CI 1.79–2.03; p<0.01). While 68.8% of the procedures, showed a SIR significantly >1, none of the rest categories reach a SIR significantly <1. Among the surgical procedures with greater SIR were: cardiac surgery (coronary and non-coronary), craniotomy, spinal fusion, and hip and knee replacement. From the 82 centers (49.7%) who responded the survey, more than 50% failed in maintain a level of compliance above 90% for the preventive measures.

Conclusion: This study shows that in our country there is a significant excess of SSI, even after adjusting for surgical category and risk index. This deviation could be associated with failures in the implementation of recommended preventive strategies.

Disclosure of interest: None declared.

O28

Incidence of Propionibacterium acnes infection in orthopedic and trauma surgery

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Introduction: Propionibacterium acnes has been associated with late, smoldering and healthcare-associated infections of the shoulder and spine.

Objectives: The epidemiology of P. acnes with respect of other orthopedic locations and patient populations remains largely unknown.

Methods: Retrospective, single-center, descriptive and case-control studies of adult patients hospitalized for orthopedic infections from 2004-2014. We used only intraoperative microbiological samples and first clinical infection episodes. Cefuroxime (or vancomycine) was used for perioperative prophylaxis. Microbiological samples were incubated for a median of 5 days.

Results: P. acnes was isolated intraoperatively in only 37/2740 (1.35%) surgical procedures. A total of 22/37 infections were monomicrobial. Overall, 66 surgical procedures (24%) involved hardware/osteosynthesis material. P. acnes was frequently associated with other skin commensals (12/291 vs. 25/21343; p<0.01) and involved the lumbar and shoulder regions. The proportion of P. acnes among all pathogens in the spine and shoulder were 8% and 6%, respectively. In contrast, P. acnes was almost never identified (3/1021 vs. 334/1719; p<0.01) among immune-suppressed patients, in foot infections, septic bursitis, native bone and joint infections, soft tissue abcesses, prothesis joints, and tibia nails. By multivariate analysis adjusting for case-mix, the lumbar region (odds ratio 7.4, 95% CI 1.2–46.3), the shoulder (OR 9.9, 1.6-60.1) and the presence of hardware (OR 8.2, 2.4-28.4) were significantly associated with P. acnes infection; while sex, age, immune-suppression and the administration of antibiotic therapy prior to intraoperative sampling were not.

Conclusion: In our institution, P. acnes is very rarely associated with clinical orthopedic infections. It is almost never responsible for infection below the lumbar spine level. P. acnes infections are associated with less inflammatory response than other infections. P. acnes is particularly associated with plate and spondylosis infections.

Disclosure of interest: None declared.
**O29**

The effect of body mass index on the risk of surgical site infection

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1):O29

**Introduction:** Body mass index (BMI) is considered a risk factor for surgical site infections (SSIs).

**Objectives:** In this study we quantified the impact of BMI on the risk of SSI for a variety of surgical procedures.

**Methods:** We included data on SSIs collected in 2012 and 2013 in the Dutch surveillance network PREZIES. A selection of frequently performed surgical procedures across different specialisms was made: laparoscopic cholecystectomy, open colectomy, laparoscopic colectomy, abdominal hysterectomy, Caesarean section, mastectomy, lumpectomy, total hip prosthesis and total knee prosthesis. Patients were stratified into five BMI categories: underweight (BMI < 18.5), normal weight (BMI 18.5-25 kg/m²), overweight (BMI 25-30 kg/m²), obese (BMI 30-40 kg/m²) and morbidly obese (BMI >40 kg/m²). Multilevel binomial regression analyses were performed to assess the effect of BMI on the risk of SSIs while accounting for clustering within hospitals.

**Results:** Of the 62,647 included patients (ranging from 1,445 for abdominal hysterectomy to 18,575 for total hip prothesis), 1% were underweight, 31% had normal weight, 40% were overweight, 26% had obesity and 2% were morbidly obese. SSI incidence varied from 1.1% for total knee prothesis to 17.4% for open colectomy. Obese patients had an increased risk of SSI compared to the normal weight (reference) group for lumpectomy (relative risk [RR] =3.0), total hip prothesis (RR=2.9), mastectomy (RR=2.0), and laparoscopic cholecystectomy (RR=1.5) and open colectomy (RR=1.3) (all p-values <0.02). The risk of SSI in the morbidly obese group was significantly increased for abdominal hysterectomy (RR=7.6), lumpectomy (RR=7.4), total hip prothesis (RR=6.9), Caesarean section (RR=3.8), laparoscopic cholecystectomy (RR=2.9), mastectomy (RR=2.7), total knee prosthesis (RR=2.0) and open colectomy (RR=2.0). Underweight resulted only for mastectomy in an increased risk of SSI (RR=2.6; 95% CI 1.1-5.8).

**Conclusion:** We found that for most procedures obese and morbidly obese patients had an at least 1.3 times increased risk of SSI compared to normal weight patients, whereas the increased risk of SSI for underweight patients was less profound. As a result, the ever expanding prevalence of obesity will take on an increasingly important role in the prevention of SSI.

**Disclosure of interest:** None declared.

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**O30**

Do different intraoperative glove practices reduce surgical site infections? A systematic review

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1):O30

**Introduction:** The invasive nature of surgery carries high risk for the transfer of pathogens responsible for surgical site infections (SSI). This risk can be reduced by using protective barriers such as sterile gloves; however, gloving practices vary among different surgical specialties and countries.

**Objectives:** To determine whether double gloving vs single gloving, changing gloves during the operation vs retaining gloves, and using specific type of gloves reduce SSI rates.

**Methods:** We conducted a systematic literature review and searched PubMed, Cochrane CENTRAL, WHO Global Index Medicus, and reference lists of relevant papers for articles published from 1990 to 24/04/2014 in English, Spanish and French. Studies investigating the impact on SSI of the above mentioned interventions related to surgical glove use in patients undergoing surgery were selected.

**Results:** The search yielded 1049 articles and 7 were selected. Two studies comparing double gloving vs single gloving were identified. A retrospective study including 863 surgical patients showed significantly higher cerebrospinal fluid shunt infection rate in the single-gloved group compared to the double-gloved group. The second nonrandomized, “before/after” study found no significant difference in wound sepsis rates after 200 hease repairs between the double vs single-gloved group. Three randomized control trials (RCT) comparing changing surgical gloves vs retaining gloves in obstetrics were identified; no reduction of postcesarean wound infections and/or endometritis following glove change after delivery of the placenta or the fetus was found. Finally, 2 RCTs compared 3 types of gloves in orthopedic surgery: latex gloves with cotton-cloth outer gloves or latex gloves with outer “orthopedic” gloves or repel cloth gloves between 2 pairs of latex gloves vs 2 pairs of latex gloves; no SSI was reported in these trials in either group.

**Conclusion:** The available evidence to assess the effect of wearing additional gloves, intraoperative glove change or type of gloves on SSI rates is very limited and of low-quality. Our findings indicate the need for RCTs on this topic.

**Disclosure of interest:** None declared.

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**O31**

Reducing surgical site infections (SSI) in breast surgeries, including a newly identified risk for sentinel node biopsies

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1):O31

**Introduction:** In 2012, 19 infections out of 561 breast surgeries (Standardized infection Ratio (SIR) 3.372, 95% CI 2.09-5.168) led to the discovery that non-sterile radiation probes pierced their sterile sheaths. After disinfecting the probes, the SSI was 0%, then subsequently increased.

**Objectives:** The objective of this study was to identify risk factors for continued infections in 2013 and 2014.

**Methods:** Rates of SSI were calculated for each surgeon. Case control analyses identified risk factors using R version 3.1.2. Cases were observed and results shared with surgical teams.

**Results:** Of 26 surgeons, Surgeon X had 33% (386) of the 1169 procedures in 2013 and 53% (295) in 2014. After C. lori was isolated from a non-sterile probe, C. lori was isolated from the probes. After excluding surgeons X and Z, SSI rate was 3.86% (13/348), which was significantly greater than expected 0.32 from the U.S. National Health Safety Network risk adjusted control cases (SIR 3.117 (95% CI 2.73-5.20)).

Surgeon X's sentinel node biopsies in 2014 had a 9-fold increased SSI risk (OR 9.0, Fisher Exact, p=0.01); several practice variations were observed.

**Conclusion:** The rate of SSI was reduced to zero in the 4th QTR of 2014, after communicating surgeon-specific rates, possible risk factors, and peer coaching. Practice changes included high-level disinfection (HLD) of radiation probes used in surgical fields, use of disposable hair bonnets, anchoring drains, and revised prepping.

**Disclosure of interest:** None declared.

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**O32**

A hygienic intervention program to decrease post-operative wound infections following CABG

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1):O32

**Introduction:** The department of Cardiothoracic surgery at Uppsala University Hospital has 25 beds in 1-4 patient rooms and an operating suite consisting of 5 operating rooms with ultraclean air. Around 700 open heart (250 isolated Coronary artery by-pass grafting, CABG) operations are performed annually. In 2009, the numbers of deep sternal wound infections (DSWI) increased to unacceptable rates despite existing hygienic guidelines.

**Objectives:** To show how root cause analysis followed by quality improvement interventions reduced the rate of DSWI after CABG surgery.
Methods: Only isolated CABG patients requiring surgical revision due to DSWI were included. Swabs and tissue biopsies were taken during surgical revision and analysed with standard methods. DSWI were registered prospectively according to CDC definitions. A root cause analysis for infection was performed Sep 2009-April 2010. Interventions based on results of the root cause analysis and on nationally recommended practices were concluded in April 2010, and thought to have taken full effect by July 1, 2010. Air was actively sampled at ≤ 0.5 m from the sternal incision.

Results: DSSI incidence rates per CABG operations decreased from 5.1% pre- to 0.9% post- intervention. Wound cultures pre-intervention grew S. aureus 27.1% and CoNS 47.1%, post-intervention S. aureus 23.1% and CoNS 30.8%. Air counts did not exceed 5 cfu/m³.

Conclusion: Good facilities and ventilation in the operating room cannot guarantee low infection rates. Guidelines are necessary, but strong leadership among all professions is needed to ensure compliance to guidelines.

Disclosure of interest: None declared.

O33 Prevalence of asymptomatic Clostridium difficile colonization in tertiary hospital patients in Australia
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O33

Introduction: Despite the importance of Clostridium difficile infection (CDI) as a cause of hospital-acquired diarrhea, few studies have investigated the prevalence of asymptomatic C. difficile colonization in a broad cross-section of the general hospital patient population over multiple years and seasons.

Objectives: To estimate the prevalence of asymptomatic C. difficile colonization of tertiary hospitals in different Australian States during six time-periods (late summer [Feb-Mar] and late winter [Aug-Sep]) 2012-2014 and to describe the diversity of PCR ribotypes isolated from asymptomatic patients.

Methods: A three-year repeated cross-sectional study with biannual surveys of randomly selected adult patients from all care wards in tertiary hospitals in Australia was conducted. Stool specimens were cultured for C. difficile and isolates were characterized by PCR ribotyping. Overall prevalence of asymptomatic C. difficile colonization, hospital and time-period specific prevalences were calculated and compared using logistic regression.

Results: Asymptomatic C. difficile colonization was identified in 112/1417 (7.90%); 95% CI 6.55–9.43) patients during the study period. Asymptomatic C. difficile colonization prevalence was at its highest in Feb-Mar 2012 (11.95%; 95% CI 8.46-16.22), whereas the lowest prevalence was observed in Aug-Sep 2014 (5.84%; 95% CI 3.30-9.44). A seasonal pattern characterized by lower prevalence in late winter (OR 0.63; 95% CI 0.42-0.94) was identified. The majority of the isolates (77.55%) were toxigenic C. difficile strains, PCR O14 and O18 were the most frequent toxigenic strains isolated.

Conclusion: High variability of asymptomatic C. difficile colonization prevalence was observed across seasons. The majority of the asymptomatic C. difficile infected patients were colonized by toxigenic strains.

*The study was funded by a NHMRC project grant (APP1006243).

Disclosure of interest: None declared.

O34 Clostridium difficile infection in medical wards – a mathematical model
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O34

Introduction: Clostridium difficile infection (CDI) is a common and potentially fatal healthcare-associated infection. Better isolation of CDI patients may prevent transmission and reduce CDI cases.

Objectives: To determine 1) the dynamics of CDI, and 2) the association between CDI transmission and prevalence of CDI, among hospitalized patients in internal medicine wards.

Methods: Daily reports were created retrospectively to obtain the number of hospitalized CDI patients per day in the 350 beds internal medicine department for 3 years (March 2010 to February 2013; data were evaluated for stationarity and autocorrelation. A mathematical model of CDI transmission was constructed based on hospital data. The model consisted of three compartments: susceptible patients, asymptomatic carriers and CDI patients. We used the model results to assess the transmission rate from infected patients under different infection control scenarios.

Results: The number of CDI patients in the internal medicine department is stationary; the autocorrelation function of this parameter is high (i.e., 90%) for a lag time of 1 day and it decreases gradually thereafter (i.e., 56% for a lag of 7 days, and 44% for a lag of 14 days). The average number of CDI cases increases exponentially as the transmission rate increases; a major reduction in the number of CDI patients (from 18.0 to 8.5 patients per 350 beds) can be achieved by modestly lowering the transmission rate through contact isolation precautions, but further reduction in the average number of infected cases requires more substantial changes in the transmission rate. The basic reproduction rate during the study period, as derived from the model results, was calculated as 1.09 indicating endemicity.

Conclusion: Hospitals should be encouraged to improve patient isolation in order to reduce CDI cases.

Disclosure of interest: None declared.

O35 Clostridium difficile infection at a geriatric acute-care hospital in Switzerland between 2008 and 2014: a retrospective cohort study
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Introduction: Clostridium difficile infection (CDI) epidemiology has changed with an increase in incidence and severity, particularly among the elderly.

Objectives: We aim to describe CDI epidemiology and assess the effect of infection control measures in the geriatric hospital of Geneva University Hospitals.

Methods: Retrospective cohort study of CDI patients, identified via active surveillance of the infection control program, at a 300 bed acute-care geriatric hospital in 2008-2014. We analyzed CDI incidence, surveillance case definition (hospital-onset healthcare facility-associated, HO-HCFA), recurrence, demographics, antibiotic exposure, time at risk and in-hospital mortality. Positive tests ≤14 days of diagnosis were excluded. Cell cytotoxicity test was replaced by PCR detection of C. difficile toxin B in 01/2010. Infection control measures included contact precautions, environmental cleaning and single room policy. Overall antibiotic use was also analyzed.

Results: We identified 231 CDI cases resulting in mean incidence of 92.1 cases/10000 admissions. 194 cases (83.9%) were HO-HCFA. Mean age was 85 (±7.3) years; 26.4% (n=61) were male. Mean CDI incidence (cases/10000 admissions/year) was 124.7(2008), 82.9(2009), 107.9(2010), 100.4 (2011), 139.5(2012), 42.9(2013), 46.5(2014). Mean time at risk was 23.5 (IQR 6-34) days. 180 patients (77.9%) received any antibiotics and 59.3% of cases (n=137) “high-risk” antibiotics in the previous month. 46 patients (29.9%) had a recurrence at a mean of 25 days. In-hospital mortality was 34.4% (n=76). From 01/2011 to 03/2013 single-room policy for CDI cases was suspended. During this period CDI incidence was 115.6 cases/10000 admissions, compared to 39.2 cases/10000 admissions after policy
reinstatment (IRR 3.02, 95% CI 2.01-4.53). Overall antibiotic use slightly decreased from 260 DDD/1000PD in 2008 to 218 DDD/1000PD in 2013.  

Conclusion: We observed a low incidence of CDI at the acute care geriatric hospital after a peak in 2012. The decreasing trend is likely the result of multifaceted measures such as improved antibiotic use, improved environmental cleaning, hand hygiene promotion and reinstatement of a single-room policy.  

Disclosure of interest: None declared.

O36  
The determinants of C. difficile infection in long-term care facilities: a portrait of patient- and facility-level factors across 90 care regions in the veterans affairs health care system  
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Introduction: Clostridium difficile infection (CDI) is an infectious diarrheal disease that is associated with antibiotic and healthcare exposures. Although individual-level risk factors have been extensively studied, the facility-level factors that drive CDI have not.  

Objectives: To study the determinants of CDI incidence across long term care (LTC) facilities, with a specific interest in the role importation of infectious patients from acute care (AC) facilities.  

Methods: We conducted a retrospective cohort study of CDI from 2006 through 2012 across Veterans Affairs local healthcare systems (HCS) where both AC and LTC patient censuses were above an average of 10 patients per day. Our outcome was LTC-onset C. difficile lab-identified event, defined as a case with onset ≥ 3 days after admission occurring at least 1 week from a previous positive test.  

Results: We identified 90 local HCS that met our inclusion criteria. The incidence of C. difficile infection in LTC facilities was 3.6 per 10,000 patient-days. In bivariate weighted linear regression analyses, the most important predictors of facility CDI incidence were importation (R2=0.63, p<0.001) and antibiotic prescribing (R2=0.58, p<0.001). Time-series analyses revealed that increases in C. difficile case importation from AC facilities preceded increases in CDI rates for a period of up to 8 weeks. Multi-level analyses, that included individual-level covariates, revealed that C. difficile importation and facility-level antibiotic use acted independently of resident age, direct antibiotic exposure and direct proton pump inhibitor use.  

Conclusion: This is the first study showing that importation of C. difficile cases from AC facilities and facility-level antibiotic use are principal drivers of CDI in LTC facilities. A regional approach, addressing rates in AC facilities, is needed to control CDI in LTC facilities.  

Disclosure of interest: None declared.

O37  
US costs and outcomes associated with Clostridium difficile infections: a systematic literature review, meta-analysis, and mathematical model  
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O37  

Introduction: An understanding of the health and economic impact of C. difficile infections (CDI) can inform investments in prevention and treatment interventions.  

Objectives: To estimate the burden of CDI in the US using a meta-analysis and economic model.  

Methods: We searched PubMed, CINAHL, EMBASE and others for multicenter studies published in the US between 2000-2014 that evaluated CDI outcomes or costs. Studies were included in the economic analysis if they measured post-infection costs, post-infection length of stay (LOS), or propensity score-matched CDI patients to non-CDI controls. We also included studies that evaluated CDI-associated mortality with a control group. We created an economic model using TreeAgePro 2014.  

Results: When the 22 studies that evaluated mortality were pooled, CDI was associated with a 2.5-fold increase in mortality compared with other hospitalized patients (pooled RR=2.54; 95% CI: 1.89, 3.40). Only 4 low/ moderate quality studies evaluated costs of CDI. The mean CDI-attributable cost of the index hospitalization ranged from $8,426 to $48,500. The mean costs per CDI after discharge were $1,592 for outpatient visits and $14,847 for readmissions. When these values were adjusted to 2013 US dollars and included in the economic model, we found that the mean total cost of a CDI was $32,198 (SD =59,798). Of the 3 studies that evaluated LOS using propensity matching, the mean CDI-attributable LOS was 12.3 days. When this excess LOS was multiplied by an average cost per day from a private 3rd party payer perspective, CDI cost an average of $56,663 (SD =19,804).  

Conclusion: Pooled estimates from the currently available literature suggest that CDI is associated with large health and economic burdens. However, the majority of available studies were of moderate/low quality and may overestimate the outcomes. Thus, these estimates should be used with caution and higher-quality studies should be completed to guide future economic evaluations of CDI prevention and treatment interventions.  

Disclosure of interest: None declared.

O38  
Recurrence and mortality following treatment for Clostridium difficile infection with metronidazole or vancomycin  
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O38  

Introduction: Metronidazole is considered first-line therapy for patients with mild to moderate Clostridium difficile infection (CDI), but was recently shown to be inferior to vancomycin for clinical cure. The effect of treatment choice on downstream outcomes such as recurrence and risk of death is not well understood.  

Objectives: To evaluate the impact of vancomycin or metronidazole on CDI recurrence and 30-day mortality.  

Methods: A retrospective cohort study of patients with CDI who were treated with vancomycin or metronidazole in the US Department of Veterans Affairs healthcare system between 1 January 2005 and 31 December 2012. A diagnosis of CDI was based on a positive enzyme immunoassay or cytotoxin test. CDI treatment was defined as administration or dispensing of vancomycin (oral or compounded) or metronidazole (oral or intravenous) within two days before or after the positive CDI result. Each patient treated with vancomycin was matched with up to four patients treated with metronidazole on propensity score, which included comorbidity, utilization, and diagnosis of CDI in the ICU as a proxy for disease severity. Patients were followed for recurrence within 8 weeks and for mortality at 30 days after infection.  

Results: There were 2,104 CDI patients treated with vancomycin matched with 6,014 CDI patients treated with metronidazole. Overall, 1,674 (16.5%) patients experienced a recurrence and 1,177 (11.6%) of patients died within 30 days. There was no difference in the risk of recurrence by treatment group (15.8% vs. 16.7% for vancomycin and metronidazole, p=0.32), but fewer patients who received vancomycin died (8.6% vs. 12.4%, RR 0.69, 95% CI 0.59 – 0.80).  

Conclusion: Recurrence rates were similar between treatment groups, but the risk of 30-day mortality was significantly reduced among patients who received vancomycin. The choice of treatment for CDI has become increasingly complex with the number of options available, and evidence regarding clinical cure, recurrence, mortality, and cost must all be taken into consideration. If validated, our observation that vancomycin results in a lower mortality rate may justify the additional costs of treatment relative to metronidazole.  

Disclosure of interest: None declared.
O39

Probiotics prevent necrotizing enterocolitis, sepsis and mortality in preterm infants: a multicenter analysis of more than 10,000 VLBW infants in German NICUs

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Introduction: Enteral supplementation of probiotics has been demonstrated to reduce the risk of severe necrotizing enterocolitis (NEC) and all-cause mortality in preterm infants.

Objectives: This retrospective analysis aimed to assess the frequency of NEC and sepsis in preterm infants with birth weights less than 1,500 grams (VLBW infants), before and after the implementation of prophylactic enteral administration of probiotics in German neonatal intensive care units (NICUs).

Methods: This multicenter study is based on NEO-KISS, the German surveillance system for nosocomial infections in VLBW infants. All NICUs that implemented prophylactic enteral administration of probiotics with ≥ 2 strains for VLBW infants were included in the analysis. Data of VLBW infants that were admitted between 36 months before and 36 months after the implementation of probiotics were analyzed. Study period was 2004 – 2014. Interrupted time series analyses were applied to evaluate longitudinal effects of the exposition (probiotics) on the frequency of i) NEC, ii) sepsis and iii) all-cause mortality. Risk factor analyses included Cox proportional hazard regression estimating hazard ratios (HR) with 95% confidence intervals (95% CI).

Results: The data of 10,890 VLBW infants - including 4,683 infants with a birth weight below 1,000 grams (ELBW infants) - from 44 neonatal departments were included in this study. Incidences of NEC and sepsis were 2.5 % (n = 274) and 15.0 % (n = 1631) in VLBW infants; 4.6 % (n = 215) and 242 % (n = 1133) in ELBW infants. The use of probiotics significantly reduced the risk of NEC (HR = 0.48, 95 % CI = 0.39 – 0.62), all-cause mortality (HR = 0.60, 95 % CI = 0.44 – 0.83) and sepsis (HR = 0.89, 95 % CI = 0.81 – 0.98). The subgroup analysis in the ELBW infants cohort showed an even more pronounced positive effect of probiotics on NEC (HR = 0.48, 95 % CI = 0.36 – 0.64), all-cause mortality (HR = 0.59, 95% CI = 0.41 – 0.84) and even sepsis (HR = 0.83, 95 % CI = 0.71 – 0.94).

Conclusion: This large multicenter study provides evidence that prophylactic enteral probiotics administration significantly reduces complications of premature birth. Routine probiotic prophylaxis should be added to clinical practice as soon as possible.

Disclosure of interest: None declared.

O40

Reduced rate of MDROs after introducing ‘water-free patient care’ on a large intensive care unit in the Netherlands

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O40

Introduction: Environmental contamination of the patient surroundings is considered of importance in acquiring hospital-associated infections. Sinks and the proximity of water in the patient zone are associated with outbreaks.

Objectives: To evaluate whether multi-drug resistant organism (MDRO) colonization was reduced after removal of sinks from the intensive care unit (ICU) patient rooms.

Methods: In the summer of 2014, sinks were removed from all patient rooms at all intensive care units and a water-free method of patient care was introduced. We conducted a retrospective clinical intervention study and included all patients who were admitted to the ICU during a 6-month pre-intervention and a 6-month post intervention period. We analysed microbiological data of cultures that were collected during the study period. The main outcome of this study was MDR Gram-negative bacteria colonization. These rates were calculated as the number of positive culture results for each pathogen per 1000 ICU admission days.

Results: During the pre-intervention period, 815 patients were admitted to the ICU, with a total of 3603 admission days. In the post-intervention period, 762 patients were admitted to the ICU, accounting for 3386 admission days. On admission to the ICU, the overall colonisation rate with Gram-negative rods in the pre-intervention period was similar to the post-intervention period. However, when limiting the analysis to the positive results of cultures collected at least 2, 5, 7, 10 or 14 days after admission, a large statistically significant difference was demonstrated between the pre and post intervention period. When focusing on the typical hospital pathogens (including MDROs) the difference between pre- and post-intervention was even more apparent, with a rate ratio of 0.44 (95% CI 0.22-0.88; P=0.01).

Conclusion: The removal of sinks from the patient rooms and the introduction of ‘water-free patient care’ resulted in a significant reduction of colonization with MDR Gram-negative bacteria. The effect on colonization is most evident in patients admitted for longer periods at the ICU.

Disclosure of interest: None declared.

O41

Halting NDM-producing enterobacteriaceae spread with the reactive infection control strategy: a real-world experience analyzed using a novel spatiotemporal epidemiologic risk measure (Epi-score) and whole-genome sequencing (WGS)

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O41

Introduction: Guidelines recommend screening of epidemiologically linked patients to contain the spread of NDM-producing enterobacteriaceae (NDM-EB).

Objectives: We assessed the effectiveness of this strategy in controlling the spread of NDM-EB using Epi-score and whole-genome sequencing (WGS).

Methods: This study was conducted at Tan Tock Seng Hospital (TTSH) between September 2010 and December 2011. TTSH implemented a reactive infection control strategy which constituted pre-emptive cohorting and rectal surveillance of patients with epidemiological linkage (contacts) to patients with NDM-EB isolated from clinical cultures (index). A clinical transmission model was produced for NDM-EB patients both from clinical and surveillance cultures based on epidemiological relatedness. The Epi-score graded epidemiologic-relatedness from 0 (unrelated) to 4 (very related), based on spatiotemporal ward overlap (2 points), shared medical teams (1 point), and shared medical department (1 point). This was the compared with a molecular transmission model which was produced using WGS of all NDM-EB isolates with core-genome single-nucleotide polymorphism analysis after excluding recombinant sites.

Results: A total of six index clinical NDM-EB were detected (patients 1-3,5,7-8) (5 urine and 1 bile). Contact screening as part of reactive strategy involved 436 patients, of which 2 (patients 4, 6) were newly-detected NDM-EB carriers. Epi-score distributions: 3 points (patients 1-2,3,5-6); 2 points (patients 1-5,4,5), 1 point (patients 1,7,5,6-8, 8). Of the 3 point pairs, one (5-6) was confirmed direct transmission by whole-genome phylogenetic analysis (4 SNVs). None of the other patients were identified by WGS as direct transmission. In six (75%) isolates, NDM was carried on plasmid pTR3 which is unique to Singapore.

Conclusion: Only one direct ward transmission pair (confirmed by whole-genome-sequencing) was detected by the reactive strategy. The Epi-score performed well in classifying the direct ward transmission pair in the highest relatedness category. Most (75%) NDM-producing EB originated in Singapore, with possibly 25% of NDM-producing EB from overseas.

Disclosure of interest: None declared.
Regional trends in extended-spectrum beta-lactamase-producing enterobacteriaceae (ESBLE) between 2009 and 2013

O44

Introduction: Extended-spectrum beta-lactamase-producing Enterobacteriaceae (ESBLE) (especially Enterobacter cloacae and Klebsiella pneumoniae) infections have dramatically increased for the last 10 years in many countries. In France, despite control efforts with specific guidelines and promotion campaign towards hospitals, the upward trends remain ongoing.

Objectives: The aim of this work is to determine whether regional variations could be identified according to ESBLE species.

Methods: A cohort of 577 Health care facilities (HCF) from 2009 to 2013 is issued from the national monitoring network of multidrug resistant bacteria in hospital (BMR-RAISIN) implemented since 2002. HCF participated within a 3 month-period on a voluntary basis. Strains were isolated from sample issued for diagnostic purposes (a single strain of the same species per patient). Incidence of ESBLE stratified by region was calculated per 1,000 patient-days (PD) from 2009 to 2013. Poisson regression was used to estimate temporal trends.

Results: From 2009 to 2013, the incidence of E. coli increased from 0.19 to 0.32 per 1,000 PD. The same upward trends were observed for Kp (0.05 to 0.13 per 1,000 PD) and E. cloacae (0.04 to 0.06 per 1,000 PD). Conversely, the incidence of other ESBLE species including Enterobacter aerogenes tended to decrease.

Discussion of interest: None declared.
Impact of six multimodal country-wide campaigns to promote hand hygiene in Belgian hospitals

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O45

Introduction: Six campaigns sponsored by the Belgian federal government were organized to promote hand hygiene(HH) in Belgian hospitals between 2005 and 2015. The campaigns combined educational sessions for healthcare workers (HCWs), promotion of alcohol-based hand rubs, patient awareness and audits with performance feedback. Each campaign consisted of a pre-campaign data collection period, an awareness period with training and a post-campaign data collection period.

Objectives: The campaigns aimed at raising awareness on good HH practices and promoting the use of alcohol based hand rubs [1].

Methods: Using a standardised observation roster, trained infection control practitioners measured adherence to HH guidelines by direct observation. HH opportunities were counted and the actual episodes of HH were scored as no HH, HH with water and soap, or HH with alcohol-based hand rub. Compliance was stratified by indication and by type of healthcare worker. Compliance was computed as a percentage of the number of episodes divided by the number of opportunities. Each campaign had a specific message geared towards improving compliance, with the message of this year’s campaign being “Hand hygiene, together with the patient”.

Results: Participation rates were excellent for all years, with at least 79% of all hospitals participating voluntarily. National compliance rates increased from 49.6% in 2005 to 69.1% in 2015 before intervention, and from 68.6% in 2005 to 75.8% in 2013 after intervention. After intervention results of 2015 are awaited. Generally nurses performed better than physicians and compliance rates increased for all indications but was always much higher after patient and body fluid contact than before patient contact. Compliance increased according to the campaign message for instance physicians compliance increased from 37.6% in 2005 to 53% in 2011 when the campaign message was “Doctors don’t forget, it works and you have a role”.

Conclusion: There was a high participation rate in all campaigns. Comparing the effect of all campaigns over time yielded an increase in HH compliance at short and long term when campaigns are repeated regularly, with campaign messages impacting the outcome.

Disclosure of interest: None declared.

References

Implementation of the Australian national hand hygiene initiative

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Introduction: In 2008, the Australian Commission on Quality and Safety in Health Care (ACSQHC) engaged Hand Hygiene Australia (HHA) to implement the National Hand Hygiene Initiative (NHII), a national approach to hand hygiene (HH) culture change adapted from the WHO Multimodal HH Improvement Strategy.

Objectives: To achieve sustained improvements in HH performance amongst healthcare workers, reduce healthcare-associated infections, develop an effective education and credentialing system about HH and infection control, and make HH and infection control core business for all healthcare institutions.

Methods: HHA, the ACSQHC, and jurisdictional authorities collaborated to support healthcare institutions implement the NHII. At institution level, core components of the NHII are alcohol-based handrub at the point-of-care, healthcare worker education, and HH auditing with performance feedback using the WHO ‘5 Moments’ methodology. HHA developed an implementation manual, profession-specific e-learning modules, HH auditor training workshop materials, a web-based database for monitoring and reporting HH performance and other resources. Since 2011, the interim national benchmark for HH compliance has been 70%, and aggregate institution-level compliance has been reported publically online. In 2013, implementation of the NHII became a hospital accreditation requirement.

Results: The HHA e-learning modules have been completed more than 800,000 times. The number of healthcare institutions submitting HH data increased from 290 in 2009 (262 public and 28 private institutions) to 828 in 2014 (535 public and 293 private). Over the same period, HH compliance increased from 61.8% (95% confidence interval, 61.3–62.0) to 81.9% (95% CI, 81.8–82.0). In 2014, 98% (814/828) of participating institutions met the 70% national benchmark. The incidence density of healthcare-acquired Staphylococcus aureus bloodstream infection has decreased in parallel over the same period.

Conclusion: The NHII has been a successful national quality improvement program. Key contributors to this success include leadership from the ACSQHC, a standardised national approach with collaboration between federal and jurisdictional authorities, adoption of WHO methodology, incorporation into hospital accreditation, and significant efforts from frontline infection control practitioners.

Disclosure of interest: None declared.

Promoting hygienic hand disinfection as an ongoing task: results of a cluster-randomized controlled trial to (re-)raise compliance of physicians and nurses based on psychological tailoring in a tertiary intensive care setting

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Introduction: Insufficient use of psychological theory is one reason that conclusive evidence regarding hand hygiene promotion is scarce. In addition, compliance has been shown to be lower among physicians than among nurses. The PSYGIENE-project set out to draw on theoretical advances (Health Action Process Approach-HAPA) to optimise education and feedback interventions.

Objectives: To test whether psychologically tailored interventions lead to higher increases of hand hygiene compliance than usual care (German Clean Care is Safer Care-campaign).

Methods: A cluster-randomized controlled trial was conducted on intensive care and hematopoietic stem cell transplantation units of Hannover Medical School, a tertiary university hospital. Clusters were defined by classifying wards as early/late adopters by 2008-12 compliance. Tailoring targeted wards and was informed by problem-focused interviews with physicians and chief nurses (response rates: 100%) and a written survey which assessed HAPA-factors (physicians: 71%; nurses: 63%). The outcome was 2014 compliance observed by WHO-standards.

Results: In 2013, 15 education sessions for physicians (participation rate: 46%) and 39 for nurses (50%) and 12 feedback meetings with chief nurses (100%) were conducted. Overall, from 2013-14 compliance increased from 48 to 63% (physicians) and 56 to 67% (nurses). Increases on the 6 tailored wards was not greater than given usual care (10 vs. 13%, p=0.126). This held both for physicians, among whom tailoring even led to a significantly lower compliance than usual care among late adopter-wards (7 vs. 23%, p=0.046), and nurses (10 vs. 11%, p=0.590).

Conclusion: Compliance increased both in the tailored and the usual care-group. While explanations of this result (e.g. study design issues or insufficiency of psychological theories of population behaviour to explain
organisational behaviour) remain speculative, the overall increase in compliance does stress behavioural strategies to promote hand hygiene compliance as an ongoing task in which to continuously (re-)invest.

Disclosure of interest: None declared.

048
Implementation of an educational intervention among Iranian hajj pilgrims for the prevention of influenza-like illness
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Antimicrobial Resistance and Infection Control
Introduction: More than two million pilgrims from different countries around the world participate in the annual Hajj in Saudi Arabia. Respiratory diseases are the most common cause of illness among pilgrims, but infection transmission can be prevented by personal hygiene.

Objectives: To investigate the role of personal hygiene in the prevention of influenza-like illness (ILI) in Iranian pilgrims.

Methods: In a prospective cross-sectional study conducted during the Hajj season 2012, pilgrims were randomized into two groups. The intervention group received education on personal hygiene including a hygienic package containing and alcohol-based handrub (gel or spray), surgical masks, soap, paper handkerchiefs, and user instructions; the control group did not benefit from any intervention. ILI was defined as the presence of at least two of the following during their stay: fever, cough, and sore throat. Questionnaires including demographic and clinical information were distributed among trained physicians before departure from Iran.

Results: A total of 664 Iranian pilgrims were enrolled in the study; 306 in the intervention group and 358 in the control group. ILI was detected in 159 (52%) in the intervention group and 198 (55.3%) in the control group (p=0.001). ILI was observed less in pilgrims using a handrub in spray form (64: 41.4%) compared with those using a gel form (95: 61.2%).

Conclusion: Hygienic education, together with the provision of a hygiene package including surgical masks, paper handkerchiefs, soap, and a handrub can prevent ILI among pilgrims.

Disclosure of interest: None declared.

049
Hand hygiene techniques: still a requirement for evidence practice?
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O49

Introduction: Two hand hygiene techniques are promoted internationally: the World Health Organisation’s 6 step and the Centre for Disease Control’s 3 step techniques; both of which may be considered to have suboptimum levels of empirical evidence for use with alcohol based hand rub (ABHR).

Objectives: The aim of the study was to compare the effectiveness of the two techniques in clinical practice.

Methods: A prospective parallel group randomised controlled trial (RCT) was conducted with 1:1 allocation of 6 step versus the 3 step ABHR hand hygiene technique in a clinical setting. The primary outcome was residual microbiological load. Secondary outcomes were hand surface coverage and duration. The participants were medical and nursing participants (n=120) in a large teaching hospital.

Results: The 6 step technique was statistically more effective at reducing the bacterial count 1900cfu/ml (95% CI 1300, 2400cfu/ml) to 380cfu/ml (95% CI 150, 860 cfu/ml) than the 3 step 1200cfu/ml (95% CI 940, 1850cfu/ml) to 750cfu/ml (95% CI 380, 1400cfu/ml) (p=0.016) but even with direct observation with two researchers and use of an instruction card demonstrating the technique, compliance with the 6 step technique was only 65%, compared to 100% compliance with 3 step technique. Further those participants with 100% compliance with 6 step technique had a significantly greater log reduction in bacterial load with no additional time or difference in coverage compared to those with 65% compliance with 6 step technique (p=0.01).

Conclusion: To our knowledge this is the first published RCT to demonstrate the 6 step technique is superior to the 3 step technique in reducing the residual bacterial load after hand hygiene using alcohol based hand rub in clinical practice. What remains unknown is whether the residual bacterial load after the 3 step technique is low enough to reduce risk of transmission from the hands and whether the 6 step technique can be adapted to enhance compliance in order to maximise reduction in residual bacterial load and reduce duration.

Disclosure of interest: None declared.

050
Cost-effectiveness of hand hygiene promotion for MRSA bloodstream infection in ICU settings
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O50

Introduction: Multimodal interventions are effective in increasing hand hygiene compliance amongst healthcare workers, but it is not known whether such interventions are cost-effective outside high-income countries.

Objectives: To determine whether reductions in Methicillin-resistant Staphylococcus aureus bloodstream infections (MRSA-BSI) alone would make hand hygiene interventions cost-effective in intensive care units (ICUs) in a middle-income country using a model-based framework.

Methods: Transmission dynamic and decision analytic models were combined to determine the expected impact of hand hygiene interventions on MRSA-BSI incidence and evaluate their cost-effectiveness. Epidemiological and economic parameters were derived using data from a tertiary hospital in North-east Thailand. Sensitivity analyses were performed with different values for MRSA transmissibility and colonization prevalence on admission.

Results: Interventions increasing hand hygiene compliance from a 10% baseline to ≥20% are likely to be cost-effective solely through reduced MRSA-BSI. Increasing compliance from 10% to 40% was estimated to cost $US 89·1 per bed-year with 4·07 QALYs gained per 10,000 bed-days in the adult ICU. If baseline compliance is not greater than 20%, the intervention is always cost-effective even with only a 10% compliance improvement.

Conclusion: Effective multimodal hand hygiene interventions are likely to be cost-effective in ICU settings in typical middle-income countries where baseline compliance is low due to preventing MRSA-BSI alone. Where compliance is higher, the cost-effectiveness of interventions to improve it further will depend on the impact on HAIs other than MRSA-BSI.

Disclosure of interest: None declared.

051
How to get doctors to hand hygiene: nudge nudge
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O51

Introduction: The Nudge Theory has been widely used to improve healthy behavior [1,2] and works as an external cue to memory [3]. The Nudge Theory is based on behavioural economics models that has been applied to move communities towards rational targeted purchasing and ecological preferred behaviour patterns [1,2]. Consumers have been nudged successfully towards lower electricity purchasing patterns through displays of their past and current purchasing pattern.
Objectives: To engage medical staff towards improved hand hygiene compliance.

Methods: An automated hand hygiene surveillance system was installed in an Australian tertiary teaching hospital. The clinicians were taught to access a dashboard for daily compliance rates to be discussed at handover meetings and to use a seven-step approach that included nudging each other on the wards with “Doctor, take a moment”. Feedback from clinicians about nudging and rates on both wards from June 2014 to February 2015 were compared.

Results: During the run-in period prior to introducing nudging the baseline compliance rate was 18% on ward C and 37% on ward D. Preliminary results indicated one ward has improved by 32 percentage points while compliance on ward C remained stable at 15%. Clinicians on ward D reported that they were comfortable working as a team to nudge each other towards a goal of improved daily compliance and it was fun. Conversely, ward C clinicians reported a discomfort with nudging each other and were observed to have a different ward culture than ward D. We will discuss the difference in the staff and leadership on the wards that may explain the opposing attitudes towards nudging.

Conclusively compliance of nurses and doctors resulted in collegiality and developed a ‘team consciousness’ about improvement in compliance. Changing hand hygiene compliance must work with different organization cultures on wards for effective change management.

Disclosure of interest: A. Kwok Conflict with: Deb Australia, Debgroup UK provided the automated system to collect daily compliance rates. The authors declared no other conflict of interests. M.L. McLauren Conflict with: Deb Australia, Debgroup UK provided the automated system to collect daily compliance rates. The authors declared no other conflicts of interest.

References

Conclusion: The method of Salmonella Bacteriophage combined use was highly effective, harmless, non-toxic while treating patients with salmonellosis at surgical and intensive care units, it allowed performing effective disease prevention in risk groups and sanitation of staff, it was cost-effective and highly effective in decontamination of surfaces and objects in medical organization. Combined use of adapted salmonella bacteriophage allowed isolating and eliminating of long-existing effective disease area of Nosocomial Salmonellosis for 3 months from the time of bacteriophage's application.

Disclosure of interest: None declared.

OS3
Use of ward closure to control outbreaks among hospitalized patients in acute care settings: a systematic review

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):OS3

Introduction: Ward closure (WC) has been used as a strategy for controlling HAIs outbreaks but restrict patient access, are highly disruptive and expensive.

Objectives: We conducted a systematic review to identify studies describing the impact of WC as an intervention for outbreak containment.

Methods: We searched MEDLINE, EMBASE, CINAHL, the Cochrane Database of Systematic Reviews, IndMED, LILACS with all years with no language restrictions plus reference lists from retrieved articles, conference proceedings and websites. Inclusion criteria were: hospitalized patients of all ages; WC as an intervention; discussion of outbreak control; and peer-reviewed. Exclusion criteria were: WC not used; full-text N/A; and studies using design or only presenting 2nd data analyses. Study quality was assessed with a Juni components approach. Six evaluative criteria were adapted from GRADE and the Downs and Black checklist to provide a measure for confidence in the estimate of effect of the body of evidence.

Results: Of 97 observational studies none included a controlled comparison between WC vs other interventions. WC was used as part of a bundle of interventions precluding a determination of its direct impact either separately or in parallel, or in sequence. We also found no universal definition of WC which was widely accepted. The included studies were of poor to moderate quality; the nature of outbreak reports renders the use of high-quality study designs and trials unfeasible.

Conclusion: With no controlled studies identified WC remains an intervention that is not evidence-based and its use can neither be actively encouraged nor discouraged. The generalizability and applicability of WC as a control intervention could be improved by standardizing outbreak investigation reporting.

Disclosure of interest: None declared.

OS2
Combined use of adapted Salmonella bacteriophage for isolation and elimination of large outbreak of nosocomial Salmonellosis

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):O52

Introduction: One of the major concepts of modern epidemiology and disinfection theory is prevention and fighting with healthcare-associated infections (HAIs).

Objectives: Prophylaxis of HAI in Russia.

Methods: Epidemiological, statistical.

Results: It is one of the largest documented chronic outbreaks of Nosocomial Salmonellosis in the world which occurred (1994-1996) at the biggest hospital with more than 5,000 beds. The outbreak was active for approximately 3 years and more than 350 surgical and intensive care unit patients fell ill. At that point in time it was impossible to eliminate the outbreak by means of traditional antiseptics and antibiotics used for patients’ treatment.

For the first time ever in global practice adapted salmonella bacteriophage was used in a combined manner for treatment of NS patients (83 people), phagophoraphyaxis of patients admitted to the in-patient hospital, and undergoing treatment there (more than 5,000 people), sanitation and phagophoraphyaxis of staff (more than 2,500 people), and biological disinfection of more than 15,000 m² of healthcare organization areas. Phagophoraphyaxis schemes of patients found in NS effective disease area and undergoing treatment at in-patient hospital, and sanitation and phagophoraphyaxis of stuff were developed and described by the author for the first time.
data warehouse (DW). We implemented 2 cluster detection algorithms (CDA) into CP. They alert high numbers of lab results in a time series. The first algorithm is a cumulative sum (CUSUM) strategy. The second one calculates a confidence interval (CI). The user defines rules specifying the species of the microorganisms, the wards to look at and the time interval for the detection of clusters. CP scans the DW. Depending on the defined rules, CDA are executed. Detection results are presented to the user in charts and tables. To validate the system, we compared 3 conventional documented outbreaks against the findings of the algorithms.

Results: First, the conventional documentation shows a vancomycin resistant Enterococcus (VRE) outbreak on an ICU, first isolate found at 4/4/2014, totaling 3 cases. CI detected the first positive lab result at the same day and counts the 3 cases. CUSUM found the first result 6 days earlier and counts in total 7 isolates. Secondly, a multidrug resistant Acinetobacter baumanii outbreak including 3 cases, started at 10/14/2014. CI recognized the first positive isolate at 10/02/2013 and counted 4 cases. CUSUM had the same results as CI. Third, 10 cases of Carbapenem-resistant Klebsiella pneumoniae occurred on an ICU, first isolate at 02/10/2013. CI found 11 cases, starting at 02/04/2013.

Conclusion: The algorithms detected all documented clusters. They alerted in many cases earlier than the ICs. Further adjusting of alerts is necessary to avoid mis-alarming. In near future the ICs in our hospital will get a useful intranet tool for the early detection of clusters of pathogens.

Disclosure of interest: None declared.

O56 Economic analysis of veterans affairs initiative to prevent methicillin-resistant Staphylococcus aureus infections

Introduction: Methicillin-resistant Staphylococcus aureus (MRSA) is a common cause of healthcare-associated infections (HAIs) in the US. In October 2007, the Department of Veterans Affairs (VA) launched the National MRSA Prevention Initiative, a nationwide effort to reduce MRSA transmission through universal screening and isolation.

Objectives: The objective of this analysis was to evaluate the cost-effectiveness of the initiative and the budget impact of the initiative.

Methods: We developed an economic model using published data on the rate of MRSA HAIs in the VA from October 2007 to September 2010, recently generated estimates of the costs of MRSA HAIs, and the costs associated with the intervention obtained through a microcosting approach. To estimate the rate of MRSA HAIs that would have occurred if the initiative had not been implemented, we used the baseline rate of MRSA HAIs at the beginning of the initiative and two different assumptions of the rate of change: (1) no change and (2) a downward temporal trend in MRSA HAIs rates observed in other healthcare systems in the US during the same time frame. Effectiveness was measured in life-years (LYs) gained. This analysis did not incorporate changes in HAIs due to other organisms, which also may have been affected by this initiative.

Results: We found that during fiscal years 2008-2010, the initiative resulted in an estimated 2,102-3,870 fewer MRSA HAIs. The initiative itself resulted in estimated savings from prevented MRSA HAIs ranging from $528-73 million. The incremental cost-effectiveness of the initiative ranged from $1,648-8,666/LY. The overall impact on the VA's budget ranged from $20-$55 million.

Conclusion: A national MRSA surveillance and prevention strategy in VA may have prevented a substantial number of MRSA HAIs. The savings associated with the prevented infections helped to offset some but not all of the cost of the initiative.

Disclosure of interest: None declared.

O57 Middle East respiratory syndrome coronavirus (MERS-Cov) screening of exposed healthcare workers in a tertiary care hospital in Saudi Arabia

Introduction: The possibility of healthcare exposure to Middle East Respiratory Syndrome Coronavirus (MERS-Cov) has been early described. Almost one-third of the confirmed MERS-Cov cases in Saudi Arabia were among healthcare workers (HCWs).

Objectives: To describe three-season experience of MERS-Cov exposure and outcome among HCWs in a tertiary care hospital in Saudi Arabia.

Methods: Prospective surveillance was conducted in King Abdulaziz Medical City in Riyadh, Saudi Arabia for unprotected exposed HCWs, with every newly PCR-confirmed MERS-Cov case, between June 2013 and March 2015. HCWs exposed to confirmed MERS-Cov patients were examined for the presence of symptoms and nasopharyngeal (and rarely other) swab was obtained for MERS-Cov. Exposure was defined as caring of or being in close proximity (within 2 meters) of a confirmed patient, without personal protective equipment (PPE).

Results: During the duration covered, a total 32 patients with PCR-confirmed MERS-Cov were associated with exposure of 1361 HCWs. Only 328 (24.1%) of the exposed HCWs had symptoms suggestive of respiratory infection at the time of screening. MERS-Cov was confirmed in only
14 (1.03%) HCWs. MERS-CoV confirmation was roughly similar among symptomatic (3/328, 0.91%) and asymptomatic (11/1033, 1.06%) HCWs. Only 2 (14.3%) of the 14 confirmed HCWs required hospitalization. While the mortality among the confirmed patients was very high (21/32, 65.6%), none of the 14 confirmed healthcare workers died.

Conclusion: We are reporting high potential of healthcare exposure to MERS-CoV in the healthcare setting but a very low transmission rate. Proper compliance with PPEs is essential to further reduce unprotected exposure of the HCWs. In essence contact tracing and testing for all unprotected exposed HCWs to MERS CoV irrespective of symptoms remain critical measures to prevent or reduce the impact of MERS-CoV hospital outbreak till further understanding of MERS-CoV behavior is delineated.

Disclosure of interest: None declared.

OS8
Infection prevention and control strategies for the Middle East respiratory syndrome coronavirus and outcome in Oman

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):OS8

Introduction: Middle East Respiratory Syndrome Coronavirus (MERS CoV) continues to challenge health care thru the potential to cause outbreaks with fatal outcomes. This study is a description of 5 primary cases of MERS CoV in Oman during the period, October 2013 – February 2014. The initially planned infection prevention and control (IPC) strategies and their adaptations thereafter were also described.

Methods: The MERS CoV national taskforce recommendations on IPC aspects and the triage system were reviewed. Implemented steps and relevant weaknesses encountered during outbreaks were addressed. The investigations reports, monitoring and follow-up charts of the 5 MERS CoV reported cases were evaluated.

Results: There were 5 cases of MERS CoV detected in Oman since 2013. The 1st case and 2nd cases were reported on 2013 and on 2015, three additional cases were diagnosed.

The 1st case had 93 contacts (49% from family members and community and 51% healthcare workers (HCWs)). High risk contacts were 18 individuals; 9 HCWs, 6 family members and 3 individuals who buried the deceased case. The screening tests of all contacts were negative and no secondary cases were identified within 2 weeks.

The 2nd case had 44 contacts (61% in community and 37% HCWs). All contacts were screened except for 2 infants due to family denial. Within the 2 weeks, the screening tests were negative for all contacts and no secondary cases were identified.

The 3rd case was admitted with milder respiratory symptoms. The wife and uncle of the index case had mild respiratory illness, both tested negative and no further cases.

The third case was admitted with milder respiratory symptoms. Both the wife and uncle of the index case had mild respiratory illness, both tested negative and no further cases.

Conclusion: The management of 5 MERS CoV cases in Oman is a success story for IPC service as no secondary cases were reported in hospital setting. The key elements in the management of the outbreak were by improving the triage in general, however, particularly on respiratory illnesses plus the enhancement of IPC precautions with relevant HCWs awareness. The large numbers of HCWs contacts were related to ambiguity of the mode of transmission and the anxiety between HCWs.

Disclosure of interest: None declared.

OS6
Influence of observable and unobservable exposure on the patient’s risk of acquiring influenza-like illness at hospital

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):OS6

Introduction: During outbreaks of hospital-acquired influenza-like illness (HA-ILI) healthcare workers, patients, relatives, and visitors are each source of infection for the others. Quantifying the contribution of various exposures will help improve prevention and control of HA-ILI outbreaks.

Objectives: The objective was to study the influence of observable exposure to contagious patients and HCWs and of unobservable exposure to other sources on the patient’s risk of acquiring influenza-like illness at hospital.

Methods: On the basis of data from three influenza outbreaks at hospital, we used a statistical model and Bayesian inference to estimate the attributable risk of HA-ILI to each of: 1) exposure to recorded vs. unrecorded sources; 2) exposure to contagious patients vs. contagious healthcare workers; 3) exposure during observable vs. unobservable contagious period of the recorded sources; and, 4) the moment of exposure.

Results: Among recorded sources, 59% (95% credible interval: 34-83%) of HA-ILIs of patients were associated with exposure to contagious patients and 41% (17-66%) with exposure to contagious healthcare workers. Exposure during the unobservable contagious period of source patients and healthcare workers accounted for 49% (19-75%) and 82% (51-99%) of HA-ILIs, respectively. About 80% of HA-ILIs were associated with exposure one day earlier.

Conclusion: Secondary cases of HA-ILI might appear as soon as the day after the detection of a primary case highlighting the explosive nature of HA-ILI spread. Unobservable transmission was the main cause of HA-ILI outbreaks suggesting that symptom-based control measures alone might not reduce transmission. The results support vaccination against influenza of patients and healthcare workers and rapid interventions to control transmission.

Disclosure of interest: None declared.
061
Masking healthcare workers (HCW) and visitors was effective to reduce nosocomial (NOSO) influenza (I) during 2014/15 epidemic with reduced vaccine effectiveness.
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):061

Introduction: Vaccination of HCW against seasonal influenza (SI) is the cornerstone for the prevention of NOSO I in countries where vaccination cannot be made mandatory by law, an alternative exists: HCWs’ obligation to be vaccinated (VAC) or to wear a mask during SI epidemics. This is the strategy (called “Zoning”) adopted by HUG since 2009. In Switzerland, in winters 2013/14 & 2014/15, SI had similar epidemic curves but vaccine effectiveness differed. In 2014/15, the trivalent vaccine did not cover the major circulating SI H3N2 strain.

Objectives: We describe 2013/14 and 2014/15 SI epidemics and NOSO at HUG.

Methods: Suspected cases of SI (respiratory symptoms, fever with chills, muscular pain, or prostration) were screened using nasopharyngeal samples analyzed by RT-PCR. Cases were defined as NOSO when symptoms occurred >72 h after admission. Regular audits were performed to assess compliance with recommendations.

Results: In winter 2013/14, 309 patients were positive for I, 147 of which (47.6%) were NOSO. Droplet precautions with single room isolation whenever possible were implemented for 261 patients (84.5%). Of 4459 HCW observed, 78.5% were VAC or wore a mask. In winter 2014/15, “Zoning” was implemented on 31/12/2014. Early Jan 2015, a large number of SI was documented with a high proportion of NOSO: 49.2% HCW observed, 78.5% were VAC or wore a mask. In winter 2014/15, “Zoning” was implemented on 31/12/2014. Early Jan 2015, a large number of SI was documented with a high proportion of NOSO: 49.2% (92/187), in particular in internal medicine (92/28; 67.8%). At time of audit, 992/1262 (78.6%) HCW were VAC or wore a mask. Additional measures were implemented from 15th January to 20th March 2015: mandatory mask for HCW (even for VAC HCW) and visitors. Following this additional measure, 68/175 (38.8%) cases were NOSO at HUG, in particular 19/121 (15.7%) in internal medicine. Recommendations were followed by 2143/2769 (77.4%) HCWs and 430/683 (62.8%) visitors. Droplet precautions were implemented for 432/468 (92.3%) SI patients.

Conclusion: During the large 2014/15 epidemic with reduced SI vaccine effectiveness, mandatory mask wear for HCW and visitors was an effective measure to reduce NOSO I.

Disclosure of interest: None declared.

POSTER PRESENTATIONS

P1
Comparing Ebola virus disease and antimicrobial resistance outbreaks in Nigeria- a cross sectional survey of awareness level of health care workers and members of community
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P1

Introduction: Ebola virus disease (EVD) outbreak in Nigeria has raised the level of awareness of both health care workers (HCWs) and members of community (MCs) on the threat posed by infectious diseases and need for improvement on infection control practices, but awareness of dangers of increasing antimicrobial resistance (AMR) remained low.

Objectives: To compare awareness level of HCWs and MCs on dangers of EVD and AMR and their control and to give educational intervention on dangers of AMR and its control to MCs with no prior knowledge of AMR.

Methods: A cross-sectional survey of 195 HCWs and 265 MCs was conducted through structured questionnaire and interview.

Results: Majority of HCWs (95.4%) and MCs (82.8%) have recent knowledge of EVD dangers and give reasons like EVD way of killing, stigmatization, no drugs and vaccines as reason for their awareness. Only 17.2% of MCs were aware of AMR as problem, and only 3.4% of MCs and 10.3% of HCWs agreed that AMR is more deadly than EVD. However, 76.4% Drs, 95.1% nurses, 67.9% lab scientist, 66.7% pharmacists, 77.4% students and 100% of civil servants, drivers and religious leaders believed that EVD is more horrific and spread faster, while in reality its dangers is a drop in the ocean when compared with AMR. They both attributed the rapid awareness of EVD in Nigeria despite being new, to seriousness with which stakeholders and media fight EVD, the gesture AMR is yet to receive. All agreed that prevention, not treatment is the best option to tackle EVD. About 84.1% of HCWs and only 17.2% MCs believed that careful use of antibiotics can reduce cases of AMR. After short briefing of some MCs on dangers of AMR and its control through prudent use of antibiotics, a shift in belief from 17.2% to 48.7% was observed, with 64.8% civil servants, 54.1% students, 18.2% drivers 25.5% villagers and 25.0% traditional healers changed their method of control option to prevention rather than treatment.

Conclusion: Despite extreme panic over EVD, awareness on dangers of AMR and its control remained very low among MCs. Efforts put in place during EVD outbreak by all stakeholders and the media need to be double to increase the knowledge of both HCWs and MCs toward AMR.

Disclosure of interest: None declared.

P2
Experience feedback on the management of an Ebola patient in a Guinea-based healthcare facility
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Introduction: During the Ebola virus epidemic 2014-15, the case of a health facility where two doctors were contaminated was investigated to determine the reality of facts and circumstances that led to the case happening, in order to determine the causes and contributing factors to ultimately propose corrective actions.

Objectives: The aim is to raise awareness about the high risks of contamination in the facilities and to set up recommendations for all Guinean facilities.

Methods: A systematic analysis of the facts observed using the Orion method with phases of information collection and validation, followed by a variation and contributing factor analysis.

Results: The direct causes observed are mainly due to failure to comply with recommended good healthcare security practices, in particular standard and additional precautions during any healthcare. Contributing factors are mainly the lack of an infectious risk management program in general and the healthcare facility being unprepared for Ebola patient management in particular.

Conclusion: Suggested corrective actions include local administrative, organizational and technical measures to receive suspected cases and implement recommended healthcare precautions. They also relate to national measures to support healthcare facilities. This example is illustrative of the Guinean health system’s current difficulties facing the epidemic for the component of infection control in healthcare facilities without international support. Substantive long term work will be necessary to effect changes in the organization of healthcare practices, but in all healthcare facilities, there is an urgent need to set up a secure system to handle the suspected cases they are supposed to receive any time during the epidemic.

Disclosure of interest: None declared.

P3
A surveillance and control of Ebola Outbreak Disease at Télimélé, Guinea Conakry 2014
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Disclosure of interest: None declared.
Introduction: The Global Outbreak Alert and Response Network (GOARN) have been involved in infectious diseases outbreak response low-resource settings for many years. The current Ebola Virus Disease (EVD) outbreak in West Africa, originated in Conakry Guinea. Burial rituals, traditional healer practices, illegal healthcare practices, ineffective contact tracing of exposed persons, and a weak healthcare infrastructure are major contributing factors to the ongoing EVD transmission in this setting. The purpose of this study was to describe a successful attempt to stop the EVD outbreak through early, systematic isolation of affected cases. 100% of workers knew the early signs of EVD. 60% follow the news. 4(Suppl 1): 91% of workers know the early signs of EVD. 60% follow the news. National health and safety risk for workers during the outbreak is substantial. 4(Suppl 1): An attempt to stop the EVD outbreak in Africa, Malta like many other countries in Europe, stepped up efforts to prepare and train in correct procedures for safe identification and management of potential EVD cases in the main acute tertiary hospital in Malta organised and prepared for a potential confirmed or suspected case. 4(Suppl 1): Lessons learnt and challenges in adopting the ECDC and WHO Ebola guidelines at Mater Dei Hospital N Abela1, E Tartari Bonnici2, AR Parascandalo3, MA Borg4 1Infection Control Unit, Mater Dei Hospital, Siggiewi, Malta; 2Infection Control Unit, Mater Dei Hospital, B’dara, Malta; 3Infection Control Unit, Mater Dei Hospital, Nassar, Malta; 4Infection Control Unit, Mater Dei Hospital, Mosta, Malta. Conclusion: The capacities of the hospital system in Benin are underperforming for the prevention of EVD and Lassa fever. Infection prevention and control strategies must be implemented in the short term for the safety of patients and staff. Disclosure of interest: None declared.
around a ‘PPE donning and doffing competency assessment checklist’, constantly monitored by a buddy and a CCTV control system. Simulation technology was utilized through performing weekly drill exercises. Daily PPE hands-on training and demonstration were conducted (August-October 2014) in the high containment isolation unit. Each individual had the opportunity to train for more than 10 sessions. Following training, formal competency assessments were conducted for 55 HCWs (November-January 2015). A 100% compliance was necessary to be declared as competent.

Results: The checklist proved to be an important novel method ensuring the preparedness of HCWs when managing patients suspected for EVD. The sequence of buddy-assisted doffing procedure was identified as the most complicated, where HCWs generated the majority of the failing points, and necessitating more than one assessment. This exercise highlighted existing uncertainties and inconsistencies in PPE sequence, despite previous extensive training. In these situations, retraining of the HCW was undertaken and assessment repeated until a satisfactory result was obtained.

Conclusion: The PPE competency assessment method was found to be a useful tool in harmonizing the training provided with actual performance in clinical practice. The checklist provided a systematic approach to easily identify HCW’s conformance and non-conformances with the protocol. This method can easily be developed for other clinical procedures in the healthcare setting, even in backgrounds of limited resources.

Disclosure of interest: None declared.

P8
Local production of alcohol based handrub solution (ABHS) in Liberia during the Ebola outbreak
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Antimicrobial Resistance and Infection Control 2015. 4(Suppl 1):P8

Introduction: The hands transmit the major part of the infection. In addition of a low level of awareness of the Infection Prevention and Control (IPC), the lack of availability of the ABHS is usual.

Objectives: The challenges were:
Register the product at the Ministry of Health and Social Welfare (MoHSW), provide the ABHS’s kits and the consumables. Train Liberian hospital’s pharmacist, select pilot hospitals with the support of the MoHSW, produce locally ABHS based on the WHO formula, evaluate the project and to ensure sustainability.

Methods: The MoHSW has recorded the ABHS as part of the pharmaceutical product. Swiss Agency for Development and Cooperation (SDC) has provided 10 kits for the production of ABHS in addition of local provision of ethanol 95%. University Hospitals of Geneva is providing technical support. The MoHSW has selected 3 following pilot hospitals: Redemption Hospital, Monrovia, James N. Davis Jr. Memorial Hospital (JDJI), Monrovia, Phebe Hospital N’Bonga.

In November 2014, 21 pharmacists and 1 laboratory technician were trained during 2 days, training that was given 2 times (10 persons/session). After the training, the production of the ABHS began in the 3 pilot hospitals.

Results: Monitoring & evaluation criteria: The monitoring and evaluation were done based on a site’s visit and a questionnaire. The criteria covered different aspects (logistic, production, distribution, effective use of the ABHS, interaction with hospital management and the MoHSW). Interview with pharmacists, hospital staff and administration, and other agencies involved.

Effective production & distribution: The ABHS pharmacists spend 80% of their time on their regular work during a production week. ABHS is produced according to the WHO standards.

In all three hospitals, 90% of the staff approached knew about the ABHS and used it.

Conclusion: Despite the Ebola outbreak, this project has shown that it is possible to produce locally ABHS. The findings of the Monitoring & Evaluation should lead to the selection of 7 additional health facilities for the distribution of the 7 remaining ABHS kits and the ethanol.

Disclosure of interest: None declared.

P9
Skin side effects of chlorine solutions used for hand hygiene: a systematic review
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Introduction: Chlorine solutions (CS), mostly containing sodium hypochlorite (5H), have been widely used for hand hygiene (HH) in the West African countries affected by the Ebola outbreak due to unavailability of alcohol-based handrub solutions and soap, easiness of use and “fear” factors leading to (false) sense of safety given by using an easily available disinfectant. However, no HH guidelines recommend the use of CS and concerns have been raised about skin tolerability among users.

Objectives: We conducted a systematic review to investigate whether the use of CS causes skin side effects when used for HH.

Methods: PubMed and EMBASE were searched on 26/09/14 with no time, age, human, language or geographical restrictions. Contact Dermatitis journal and the reference lists of relevant articles were also screened separately.

Results: Out of 3241 hits, 14 articles about skin side effects were included; 10 case reports, 3 surveys and one comparative study. Only one case
Table 1 (abstract P8)

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report was related to the use of SH 4-6% for HH by a veterinary surgeon who developed allergic contact dermatitis (CD) with a positive patch test to SH at dilutions 100 times lower than 4-6%. In 5 case reports, CD with a variable severity was reported following use of SH for disinfection (2 papers) and for domestic cleaning (3 papers); these cases had positive patch tests for SH; conversely, their experimental control groups showed either no reaction or very low-intensity skin reactions. Two papers reported severe dermatitis related to environmental cleaning with SH, and 2 others reported unusual systemic allergic reactions with accidental exposure and bathing the foot. One comparative study showed that SH was the most irritating product even at low concentrations when compared to alcohol, chlorhexidine and iodine. Finally, one survey among 766 nurses showed that 33.5% of cases of allergic or irritant CD had a history of chlorine exposure; 2 other surveys among cleaners showed higher prevalence of hand dermatitis with SH exposure.

Conclusion: Overall, only one report described allergic CD related to use of high-concentration CS for HH. Very low-quality evidence shows that SH used for other purposes might cause skin irritations even at low concentrations following bare skin exposure.

Disclosure of interest: None declared.

P14 Influenza-related severe acute respiratory infection in the north of Vietnam: healthcare burden and economic impact

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Introduction: The disease and economic impact of seasonal influenza  is not well described for severe acute respiratory infection (SARI) patients in Vietnam.

Objectives: To describe the morbidity, mortality, and economic impact of SARI hospitals in Thai Binh province in Vietnam.

Methods: A modified WHO’s SARI definition (temperature ≥38°C, AND cough or sore throat; AND shortness of breath or difficulty in breathing; AND hospitalization) used to enroll cases in three hospitals. A standardized questionnaire used to collect data on the direct and indirect costs of hospitalization and treatment, including patient work days and caregiver days lost. A throat swab was collected for influenza virus detection by RT-PCR.

Results: There were 7,833 SARI cases in 2013. Of 1,295 (17%) SARI cases tested, 229 (18%) were positive for influenza viruses, of which 59% were male. The proportion of influenza positives by age group was 69% in 0 to <5 years, 10% in 5 to <15, 4.5% in 15 to <50, 3.6% in 50 to <65, and 13% in ≥ 65. Influenza viruses identified were A/H1N1pdm09 (41.2%), A/H3N2 (30.3%), B (26.7%), co-infection of A/H3 & B and A/H1N1pdm09 & B (1.8%). Among all SARI patients, there were 12 (0.15%) deaths, of which 2 (16.7%) were positive for influenza B. Of 1,295 cases, 3 (<1%) reported receiving an influenza vaccine during the previous 12 months. For influenza-positive SARI cases, the median hospital stay was 8 days (IQR 5–8). Economic impact included direct and indirect costs per patient of US $176, an average of 7 work days lost for the patient and 10 caregiver days lost. The household monthly income of all SARI cases surveyed is US $58, (income in Thai Binh province in 2013 estimated US $100 per person per month).

Conclusion: Influenza-related SARI is a burden to healthcare in Thai Binh province and has an economic impact on patients. The average total cost for 8 days of treatment is approximately 3 times the household monthly income. The rate of influenza vaccination was very low. The burden of SARI relative to the influenza and other respiratory viruses in Vietnam need to be studied further.

Disclosure of interest: None declared.

P16 Healthcare seeking behavior for respiratory illness in a northern province of Vietnam

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Introduction: The national sentinel surveillance (NSS) system in Vietnam captures only cases presenting to sentinel sites, limiting our understanding of burden of disease in the community.

Objectives: To identify self-reported cases of influenza-like illness (ILI) and severe acute respiratory infection (SARI) in the community and describe healthcare utilization to better estimate the burden of influenza-associated illness.

Methods: A cross-sectional survey was conducted in Thai Binh Province. A two-stage cluster sample was used to select households. Standardized
questionnaires were used to screen households for episodes of self-reported ILI in the previous month and SARI in the previous 12 months and health seeking behavior for each episode.

**Results:** We surveyed 2,100 households and 6,760 residents in May 2013, including 1,470 households and 4,666 residents in rural Kien Xuong District and 630 urban households and 2,094 residents in Thai Binh City. Overall, we identified 582 (9%, 95% CI: 6-11) of self-reported ILI and 121 (2%, 95% CI: 1-2) episodes of self-reported SARI cases. The proportions of both self-reported ILI and SARI were significantly (< 0.05) lower in Thai Binh City than in Kien Xuong. The proportion of cases of seeking healthcare outside the home for an ILI episode within the last month was 90% (95% CI: 84-94). Only 18% (95% CI: 10-27) of household members with a self-reported ILI episode sought healthcare at the ILI NSS site. The estimated proportion of SARI cases that sought healthcare within the last year at a SARI burden study site was 25%.

**Conclusion:** In Thai Binh Province the majority of cases with self-reported ILI sought healthcare outside the home. However, less than 1/5 of self-reported ILI cases came to a national ILI NSS site. Similarly, only 1/4 of SARI cases treated at a SARI burden study site. The studies depend on healthcare seeking behavior of the populations that will underestimate burden of influenza-associated disease in Vietnam. Adjustment for healthcare utilization practices will accurately estimate the incidence of influenza in the community.

**Disclosure of interest:** None declared.

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**P18**

**Influenza vaccination coverage in healthcare workers during the 2014-2015 season**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P18**

**Introduction:** In France, influenza vaccination coverage remains poor among healthcare workers (HCWs) despite annual vaccination campaigns at healthcare institutions.

**Objectives:** To evaluate the influenza vaccination coverage in HCWs in Northern France and to describe information and vaccination campaigns.

**Methods:** A descriptive study was performed in healthcare institutions during February 2015. An online questionnaire was sent to the Infection Control Teams (ICT). They were asked to indicate their influenza vaccination coverage and the institutional means used to inform and vaccinate HCWs against influenza.

**Results:** A total of 259 healthcare institutions (35%) answered. The overall influenza vaccination coverage for medical and non-medical staff reported during winter 2014-2015 was 19.7% (14.5-25.1) (n=219). The coverage was 36.3% (n=159) among doctors and midwives and 19.9% (n=169) among nurses and assistant nurses.

An information campaign was organized in 96% of healthcare institutions. Different communication mediums were used such as posters (76%), information on the hospital website (31%), individual e-mail (29%) or letter (23%), specific meetings (27%). The majority of healthcare institutions used 1 or 2 mediums (67%) whereas one third used 3 or more.

A vaccination campaign was organized in 98% of healthcare institutions. It was mostly led by the Occupational health Team (OHT) (39%) and/or the ICT (48%), but also by others (36%) such as the hospital pharmacy and the administration. The HCWs could be vaccinated directly by their colleagues (57%), the OHT (51%), a designated mobile team of HCWs (16%) and/or the ICT (9%). In 14% of cases, other options were implemented. The majority (62%) of healthcare institutions used one mean of vaccination, whereas 30% used 2 and only 8% used 3 or more.

The night staff had access to vaccination means in 66% of healthcare institutions organizing campaigns.

**Conclusion:** The influenza vaccination coverage is consistent with those previously reported in France and other countries. Despite most of the healthcare institutions organizing information and vaccination campaigns, it is far from the 75% recommended by the French health authority. Efforts should be made to enhance the vaccination coverage in order to prevent healthcare-associated influenza.

**Disclosure of interest:** None declared.

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**P19**

**Knowledge, attitudes, risk perception of influenza and influenza vaccination among final year nursing students in Singapore: an exploratory study**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P19**

**Introduction:** In Singapore, Influenza causes about 600 deaths (out of 15,000) affecting people who are over 65 years old (‘Ministry of Health: FAQs,’ 2014). Influenza vaccination benefits health-care workers (HCWs) and reduces influenza-related morbidity and mortality in high-risk patients. However, only 25% of student nurses have reported having received seasonal or H1N1 vaccination [1].

**Objectives:** To explore the relationship among final year nursing students’ knowledge, risk perception, health beliefs and their influenza vaccination behaviours and uptake in Singapore.

**Study design:** This study utilised a non-experimental, cross-sectional exploratory quantitative study design.

**Methods:** Convenience sampling was used to recruit 868 final year nursing students in Singapore from October 2013 to January 2014. Two survey forms were used to collect data: (i) Participants’ Demographic Information sheet and (ii) King’s Nurses Influenza Vaccination Questionnaire (KNIVQ).

**Results:** Student nurses’ vaccination rates were 15.7% for Seasonal Influenza vaccine and 5.4% for Influenza A (H1N1) vaccine. Findings...
revealed a relationship between vaccination uptake rates and risk perception and student nurses’ perceived health locus of control (p<0.05). The results also described the different level of student nurses’ vaccination behaviours and their vaccination recommendation to patients. Vaccinated student nurses were also more likely to recommend the influenza vaccine to their patients in the future.

Conclusion: The findings provide valuable input enabling policy makers to develop measures to improve influenza vaccination awareness and take-up rates among students, encouraging them to be patient advocates regarding importance of influenza vaccination for health prevention and promotion.

Disclosure of interest: None declared.

References

P20
Molecular characterization of potential healthcare associated respiratory syncytial virus in three referral hospitals in Kenya, 2009-2011
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Introduction: Respiratory syncytial virus (RSV) is a major cause of community-acquired severe respiratory illness in infants, immunocompromised individuals and the elderly. Limited information exists on healthcare associated RSV infections in developing countries.

Objectives: To describe hospital-acquired RSV infections in three Kenyan referral hospitals.

Methods: Ongoing surveillance for healthcare associated infections is conducted at three referral hospitals in Nairobi: Kenyatta National Hospital (KNH), Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) and Mbagathi District Hospital (MDH). We collected nasopharyngeal and oropharyngeal samples from patients with new-onset fever (>38°C) and either cough or sore throat, after being afebrile for at least three days in the wards. Specimen were tested for RSV using real time polymerase chain reaction (RT-PCR) and those positive with a cycle threshold value of 30 and below were further grouped as RSV A or B using the same method. The ectodomain of the attachment G glycoprotein was sequenced and phylogenetically analyzed.

Results: Among 255 cases tested from September, 2009 to September, 2011, 37 (14.5%) were positive for RSV, including 13 (35%) subgroup A, 6 (16%) B, 1 (3%) mixed AB and 17 (46%) could not be determined. Seventeen samples were successfully sequenced out of the twenty samples on which this was attempted. Majority of our RSV A isolates belonged to NA1 genotype prototype strain and all RSV B sequences clustered with the BAIV genotype. Three RSV A and 2 RSV B sequences from patients on the same ward at KNH were 100% identical in the G ectodomain suggesting potential common source. One RSV A positive specimen from MDH and one from JOOTRH showed 100% sequence identity.

Conclusion: Presence of identical sequences indicates potential patient to patient transmission of RSV within the hospitals. Effective and feasible infection control strategies should be enhanced in the Kenyan public hospitals.

Disclosure of interest: None declared.

P21
Cost analysis of an active surveillance strategy for Clostridium difficile using an agent-based simulation
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P21

Introduction: Clostridium difficile (CD) is one of the most common nosocomial infections in the United States. Rapid identification and isolation of hospitalized patients with CD colonization or infection is critical to preventing transmission.

Objectives: This work assesses the potential impact of an active surveillance (AS) strategy for CD via admission testing on overall costs and infections.

Methods: We designed an agent-based simulation of nosocomial CD transmission with static and dynamic components including: patients, healthcare workers (HCW), and rooms; patient admission, discharge, and transfer; interactions between HCW and patients; contamination of rooms by patients shedding CD; HCW hand carriage and removal via hand hygiene or prevention via personal protective equipment; and patient acquisition of CD following contact with contaminated rooms or HCW. Model parameters were derived from local data, literature where available, and expert opinion. The model was calibrated against local data and validated internally and externally.

Two scenarios with varying CD importation prevalence were simulated 60 times each over a one-year period. One scenario reflected the usual strategy of no admission testing, while another reflected an AS strategy with CD testing of all patients upon admission. Importation prevalence was varied in a sensitivity analysis from 0% to 30%. Cost input parameters were obtained from the literature.

Results: At moderate to high levels of CD importation (≥6%) an AS strategy is cost-saving overall, reducing costs by between $10 and $20 per patient, owing primarily to CD infections prevented. The cost savings plateaued at an importation prevalence above 12%. At low CD importation (<6%), the AS strategy costs more than no surveillance, though costs per patient are low. Up to 38 CD infections per 10,000 patient-days could be prevented with an AS strategy.

Conclusion: Despite the additional cost of testing and isolation, an inpatient AS strategy for CD may be cost-saving through the prevention of CD transmissions and infections. Given reported CD admission prevalence and infection mortality rates, further consideration of this strategy may be worthwhile.

Disclosure of interest: None declared.

P22
Surveillance of Clostridium difficile infections in Finnish acute care hospitals, 2008-2014: trends, diagnostics and control measures
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Introduction: Enhanced hospital-based surveillance of Clostridium difficile infections (CDI) started after the first detection of PCR ribotype 027 in October 2007 as part of Finnish Hospital Infection Program.

Objectives: The aim was to evaluate trends in CDI rates in relation to diagnostic methods and control measures used in participating hospitals. Participating hospitals were given 1-day training session on surveillance methods and control measures based on European guidelines. As a feedback the hospitals were anonymously ranked by the overall and nosocomial incidence rates of CDI, and prevalence of CDI among admitted patients. Laboratories serving the hospitals were asked to send isolates from severe cases and persistent outbreaks to the national reference laboratory for genotyping. A survey on diagnostic methods and infection control measures was performed in March 2015.
Results: A total of 5753 CDI cases were identified in 18 hospitals; 4165 (72%) were nosocomial. There were significant decreasing trends (p<0.05) in overall rate, nosocomial rate and prevalence at admission which decreased from 0.78/1000 patient-days to 0.40, 0.53/1000 patient-days to 0.31 and 0.72/1000 admissions to 0.23, respectively. All but one hospital had access to PCR; 10 used it as a primary detection method, others after culture or GDH test. Chlorine was used as environmental disinfecting agent in 12 hospitals and H2O2 in 6. Hand hygiene included both washing and disinfection in all but one hospital. Of all isolates sent to reference laboratory, the proportion of isolates from persistent outbreaks decreased from 47% to 13%.

Conclusion: Despite the increased usage of more sensitive methods for detecting CDI, there was a reduction in CDI rates during 2008-2014, which is likely related to increased awareness of CDI and improved control measures. When ranking hospitals the diagnostic activity should also be evaluated.

Disclosure of interest: None declared.

P25

Epidemiology and mortality of Clostridium difficile infection: a 5-year retrospective laboratory-based study in a large teaching hospital in Northern Italy

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Introduction: Clostridium difficile represents the major infective causes of hospital-acquired infectious diarrhoea and one of the most common microorganisms responsible for health-care associated infection.

Objectives: To describe incidence and mortality associated with CDI in a large northern Italy teaching hospital in a 5-year period and to analyze the association between risk factors in patients with CDI and 30-days all-causes mortality.

Methods: We performed a retrospective study at IRCCS AOI San Martino – IST, a 1,300-beds tertiary adult acute-care teaching hospital in Genoa, Italy. Between 1 January 2010 and 31 December 2014, true numbers of hospital patient-days were obtained from the hospital digital archives of patients’ clinical charts. Numbers of CDI were identified through the computerized microbiology laboratory database. Demographic, administrative and clinical data were collected for all patients included in the analysis. Annual incidence rates of CDI were calculated as the number of events per 10,000 patient-days. In addition, annual incidences of CDI were stratified according to the ward where the diagnosis of CDI was made. Finally, 30-day survivals of CDI patients were estimated and univariate and multivariate analysis was performed to identify independent risk factors associated with 30-days all-causes mortality.

Results: Between January 2010 and December 2014, we identified 388 episodes of CDI. The overall incidence of CDI during the five-years study period was 0.61/10,000 patient-days. The incidence steadily increased during the five year study period reaching the peak of 3.04/10,000 patient-days in 2014. The highest annual incidences were registered in rehabilitation units, with a peak of 10.01 CDI/10,000 patient-days in 2013. Thirty-days all-causes mortality was 26.1% and the main risk factors, independently predicting mortality, were increasing age and pathological level of albumin and creatinine at the diagnosis of CDI.

Conclusion: In our hospital we observed a marked increase in the incidence of CDI during the five-years study period. More efforts might be necessary to control the diffusion of Clostridium difficile in our hospital, because of the increasing incidence and the high mortality rate of related infections.

Disclosure of interest: None declared.
Introduction: Clostridium difficile is an infection that is associated with environmental contamination. Rapid isolation is recommended to prevent transmission. UK Guidelines state that patients with suspected infection should be isolated within two hours of the onset of symptoms [1], however they also state that the diarrhoea should not be clearly attributable to another cause. This can cause confusion and in busy clinical settings diarrhoea can be attributed to the administration of laxatives and other causes, meaning that patients may not be isolated until after a positive test result is received.

Objectives: To examine the effect of failure to isolate patients with symptoms of diarrhoea until after a positive test result.

Methods: Prospective audit of new cases of C. difficile detected after admission by a trained member of the Infection Prevention and Control Team to determine whether the patient from whom a specimen was submitted isolated in a single room facility before a positive test result was notified to the ward.

Results: There was some evidence of a correlation between higher numbers of C. difficile cases and failure to isolate prior to a positive result for C. difficile (R=−0.35). Wards that isolated the majority of cases had low numbers of cases.

Conclusion: Failure to isolate patients with symptoms of diarrhoea could be responsible for increased opportunities for transmission through environmental contamination and increased risk of hand contamination [2]. There are limitations to this work in that the wards are spread across a General Hospital with possibly differing risks of C. difficile disease. No attempt has been made to control for age or other patient-specific risks or antimicrobial use. Further large-scale studies could be undertaken to determine the level of risk presented by non-isolation of patients with potentially infectious diarrhoea until results have been obtained.

Disclosure of interest: None declared.

References

P27
Effectiveness of FMT in recurrent Clostridium difficile infection  
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Introduction: During last decades C. difficile infection (CDI) has emerged as a most frequent health-care associated cause of morbidity and mortality in developed world. In Europe about 40,000 patients die each year of CDI, in Poland rapid increase of CDI rates has been observed, reaching apr. 11,500 hospitalized cases in 2013.

Objectives: In mild cases metronidazole is the first-line therapy, with effectiveness of 66%. In severe cases vancomycin is used with cure rate about 78%. Novel therapy with fidaxomicin shows similar clinical cure rates to vancomycin with lower recurrence rates. Alternative method, fecal microbiota transplantation (FMT) for CDI treatment has been reported since 1958 with worldwide response rates of 83-94% as claimed by reviews.

Methods: We perform the first prospective, non-randomized, multicenter, observational study to estimate the effectiveness of FMT in the treatment of recurrent CDI, including 2 hospitals and one ambulatory center in Poland.

Results: Donor stool after dilution with 0.9% saline has been filtered and resulting suspension has been infused via a nasogastric tube. All patients have signed informed consent according to the written procedure. From 2013 to 2014, in total, 62 patients aged 24-90 years received FMT with resolution of clinical symptoms of 88.7%. Among 55 successfully treated patients, in 76.5% cases recovery has been observed after first FMT procedure, in 14.5% after the second, and in 9% after the third one. There were no statistically significant differences between the cure rates of related and unrelated donor or fresh and frozen samples. There were no severe adverse events observed. Mild diarrhoea, temporary constipation, nausea, flatulence and abdominal pain were most frequently reported side effects.

Conclusion: Although majority of physicians currently consider FMT as an experimental therapy, we showed that FMT is safe, well tolerated, and highly effective therapy for recurrent CDI.

Disclosure of interest: None declared.

P28
Comparing ATP values with bacterial contamination in a nursing home IT Overdevest1,2,*, I Willemse1, Y Hendriks1,2, M-R Mallaret1,2,3, P Saviuc1,3, B Allenet1,3, P Lamy1,3, M-R Mallaret1,3
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Introduction: Bacterial surface contamination is an important reservoir for micro-organisms and a potential route for transmission. ATP bioluminescence is a relatively new method to assess environmental contamination, and gives direct results.

Objectives: We compared ATP bioluminescence with aerobic colony count and presence of ESBL-producing Enterobacteriaceae.

Methods: The study was performed in a nursing home in the Netherlands during an outbreak of ESBL-producing Enterobacteriaceae, mainly Escherichia coli. During 5 consecutive surveys, ATP measurements (3M, Zoeterwoude, The Netherlands) were performed on several predefined surfaces. ATP measurements were combined with aerobic colony count, using Rodac agar plates in 2 surveys, and selective culture for ESBL-producing Enterobacteriaceae in 3 surveys. ATP bioluminescence was expressed in relative light units (RLU), AAC was expressed in cfu/cm² for the analysis. A Natural Logarithmic transformation was performed to obtain an normal distribution of the values (LnRLU and LnCFU).

Results: In total we performed 483 ATP-measurements, 197 ACC cultures and 285 ESBL-selective cultures. Toilet seats were significantly associated with higher RLU (P<0.001), higher prevalence of more than 40 cfu/cm² on aerobic colony count, but not with difference in prevalence of ESBL-producing Enterobacteriaceae (P=0.31), compared to water taps, kitchen- and living room areas.

The ATP and ACC results of the 98 paired samples showed a good correlation between LnRLU and LnCFU (r²=0.277; P<0.001). Furthermore, LnRLU of the sample sites which yielded an ESBL-producing Enterobacteriaceae was significantly higher than of other the sites (P=0.0016).

Conclusion: Our study showed that ATP bioluminescence has a good correlation with bacterial contamination determined of surfaces. Furthermore, we did find a significant correlation between LnRLU and surface contamination with ESBL-producing Enterobacteriaceae. In conclusion, ATP bioluminescence is a valid replacement for measuring the bacterial contamination of surfaces, and can be a useful tool for direct feedback to assess cleaning properties.

Disclosure of interest: I. Overdevest: None declared, I. Willemse: None declared, Y. Hendriks: None declared, C. Verhulst: None declared, J. Kluytmans Consultant for: Pfizer, biomerieux, 3M.

P29
Assessment of the quality of cleaning of surfaces in care rooms of intensive care units: feasibility of the use of ATP-metry  
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Introduction: The aim of this study was to assess the feasibility of the use of ATP-metry to evaluate the effectiveness of cleaning of surfaces in care rooms of intensive care units.

Methods: The study has been conducted in 3 hospitals and 1 ambulatory center in the Grenoble area. Surfaces were sampled 5 times using ATP mems (ATP Bioluminescence System, 3M). ATP measurements were compared with aerobic colony counts (Rodac agar plates) and presence of ESBL-producing Enterobacteriaceae.

Results: The ATP measurements were significantly associated with aerobic colony count, but not with difference in prevalence of ESBL-producing Enterobacteriaceae. The ATP measurements were expressed in relative light units (RLU), AAC was expressed in cfu/cm² for the analysis. A Natural Logarithmic transformation was performed to obtain a normal distribution of the values (LnRLU and LnCFU).

Conclusion: The ATP measurements were significantly associated with aerobic colony count, but not with difference in prevalence of ESBL-producing Enterobacteriaceae. The ATP measurements were expressed in relative light units (RLU), AAC was expressed in cfu/cm² for the analysis. A Natural Logarithmic transformation was performed to obtain a normal distribution of the values (LnRLU and LnCFU).

Disclosure of interest: None declared.

P29
Assessment of the quality of cleaning of surfaces in care rooms of intensive care units: feasibility of the use of ATP-metry  
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Introduction: Adenosine triphosphate (ATP) is the basic energy molecule for all living cells. Its presence on a surface is a sign of contamination by microorganisms. ATP-metry is an ATP detection technique based on chemiluminescence. It is used in the food industry to assess the quality of cleaning of surfaces.

Objectives: To assess the value of using ATP-metry to control the quality of cleaning of care rooms (CR) surfaces in the intensive care units of a University Hospital.

Methods: A prospective study comparing microbiological sampling of surfaces made with contact agar plates and ATP-metry of swabs throughout the intensive care units. Seven sampling points were defined in each CR (sink, middle and edge of the workbench, bottles, drug storage shelf, refrigerator, garbage collector). The criteria were the number of bacteria Colony-Forming Units (CFU) per 25 cm² agar and the number of Relative Light Units (RLU) per 100 cm² swabbed. The data were processed using Excel and a Spearman correlation (rₛ) was used (StatView).

Results: Eighty six points were sampled in 13 CR. The environment was considered well controlled in 7 CR, but cleaning needed to be improved in the others (especially drug storage shelves and sinks). Significant poor correlation (rₛ = 0.25; p = 0.02) was found between the number of CFU (median 2, range 0-300) and the number of RLU (median 70, range 8-619). The results were the same when correlating point by point.

Conclusion: In this study, the presence of ATP was not correlated to microbiological contamination. This finding may be explained by different hypotheses: the amount of ATP may be underestimated due to its intracellular localization or overestimated in case of contamination of the environment by ATP of non-microbiological origin. ATP-metry does not seem to be a technique of choice for monitoring the quality of surface cleaning in the care rooms of intensive care units.

Disclosure of interest: None declared.

P30 Monitoring hospital hygiene by luminescence methodology
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Introduction: The environment hygiene (EH) is a basic measure in the prevention of healthcare associated infection. Until recently there was no methodologies that evidenced the cleanliness of the environment, but now published studies demonstrated how to turn EH a science based on evidence.

Objectives: Monitor the effectiveness of the hygiene cleaning procedures in a hospital environment, using a bioluminescence methodology.

Methods: Acute care hospital with implemented antisepsics/disinfectants policy and specific hygiene cleaning plans in every unit. Evaluation of the effectiveness of the EH through bioluminescence methodology using the “Kikkoman Lumitester PD-20®”. In this system a surface sample is collected and, after inserted in the machine, the organic residues are measured through quantification of adenosine triphosphate (ATP), which is proportional to the light intensity generated. Healthcare units with higher risk have been chosen to be studied (intensive care units, operating rooms, radiology and medicine department). In these settings, 10 samples were collected, in different structures, before cleaning and other 10 after cleaning and process supervision by the head nurse.

Results: Before the EH, 30% of samples were considered “dirty”, 50% “clean” and 20% “intermediate”. After cleaning 20% were “dirty”, 70% “clean” and 10% “intermediate”. The results obtained were not homogeneous in the different studied units, however some showed a significant reduction after cleaning and others evidenced errors in the procedures.

Conclusion: This method allowed evidencing the EH and seems to support that validation by traditional methods (visual audits) is not enough. Since it’s a quantitative method, it allows to inform professionals of errors in the cleaning process and promotes continuous improvement.

Disclosure of interest: None declared.

P31 Modelling the risk of infection transmission due to environmental contamination in hospital single and multi-bed rooms
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Introduction: Aerial dispersion of bioaerosols and subsequent contamination of surfaces is recognised as a potential transmission route for some HCAI infections. Pathogens have been shown to accrue on health-care workers’ (HCW) hands as they touch surfaces [1] and hence can subsequently be transmitted to other patients. This research considers the question: Are single-bed patient rooms more effective than their multi-bed counterparts at reducing this risk?

Objectives: To link design of current hospital rooms with infection risk from surface contamination and HCW contacts.

Methods: Computational fluid dynamics simulations, validated through bioaerosol experiments were used to accurately predict spatial distributions of bioaerosol deposition in a single and multi-bed hospital rooms. A Markov chain Monte-Carlo model was developed using the deposition patterns in conjunction with clinical observation of HCW surface contact sequences, to predict the contamination levels of bacteria on HCWs’ hands as they perform routine patient care in the two rooms types.

Results: Hand colonisation depends on care type, room layout, the number of surface contacts and in particular on the spatial distribution of pathogens between surfaces, which is influenced by ventilation strategy. Contamination on the HCWs’ hands decreases monotonically after patient care in a single room due to hand hygiene. During care within multi-bed rooms colonisation levels increase throughout due to the spatial spread of microorganisms contaminating multiple patient surfaces caused by the ventilation strategy. Positioning infectious patients within an unobstructed path between the inlet and outlet diffuser significantly reduces cross contamination to other patients surfaces.

Conclusion: Results indicate that colonisation levels of HCWs’ hands are likely to be significantly lower after care in single patient rooms than after care in a multi-bed ward and that patient and ventilation design is vitally important in helping curtail the risk of bioaerosol spread.

Disclosure of interest: None declared.

Reference

P32 The use of educational intervention on cleaning process in a secondary hospital
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Introduction: Early in the twentieth century, health professionals became more concerned about the need to provide a clean environment and adherence to aseptic practices when caring for people’s health. In that setting, the use of chemical products for cleaning and disinfecting was widespread. For that reason, cleansing is a relevant issue in hospital infection control. By ensuring proper hygiene of hospital items and areas, cross-infection can be reduced.

Objectives: This study aims to evaluate the technique and effectiveness of the environmental cleansing performed by the hospital hygiene team.

Methods: This is a qualitative and quantitative prospective study, conducted from January to October 2014 in a 300-bed high complexity hospital, Sao Paulo, Brazil. In this study, we evaluated 2880 items in 360 observations before and after the cleaning team were trained on correct cleaning procedures. Evaluation and measurement were divided in three steps: (a) cleaning technique was monitored by using a visible signaling system with black light and by the measurement of the amount of adenosine trisphosphate (ATP) detected on the surfaces. Measurements took place before and after the environmental cleansing; (b) the intervention was applied and the team was trained on correct cleaning procedures.
Results: During the training period, measurements continued to take place with the same techniques; (c) the cleaning effectiveness was measured again after the training period. A target of 70% compliance was set by the infection control team. During the study period, the average compliance was 67.97%. Analysis before and during intervention showed 51.69% and 78.82% compliance, exceeding the set target.

Conclusion: In order to have a biologically safe hospital environment it is necessary to work with different environmental peculiarities, establish partnership with different services of the institution and staff, and implement effective actions to control the spread of microorganisms, particularly multi-resistant ones.

Disclosure of interest: None declared.

P33
Residual antiseptic efficacy of octenidine dihydrochloride versus chlorhexidine gluconate in alcoholic solutions
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)®33

Introduction: Skin antisepsis is an important measure to prevent postoperative infections. It is known that wound infections infringe the well-being of the patient and prolongs the rehabilitation significantly. At the same time additional costs will be caused in the health care system. Alcohol-based solutions containing the active ingredients chlorhexidine gluconate [CHX] or octenidine dihydrochloride [OCT] have a residual antimicrobial effect on skin. This may re-sult in a better preventative outcome than alcohol alone.

Objectives: The aim of the presented skin study was to compare the immediate and long-term efficacy of CHX and OCT.

Methods: We performed a study on the skin on the arm of 20 healthy volunteers in a cross-over design based on DGHM-standard method 13 and measured the colony forming units (cfu) of the resident skin flora after the application of the products according to Williamson and Kligman (1965). The cfu were determined directly after the application and after 24 h on 5 consecutive study days. The calculated log reduction factors were statistically evaluated with the student’s t-test.

Results: Both solutions showed as expected a significant any quick reduction of the resident skin flora and a long-term effect over 24 h. For OCT a statistically significant superior long-term effect after four applications was determined (lg reduction: 2.21 vs. 1.37; p = 0.004).

Conclusion: The presented data show that alcoholic solutions with octenidin dihydrochloride and chlorhexidin gluconate show a comparable efficacy on the resident skin flora. Alcohol-based preparations with the additional active octenidin dihydrochloride are a valid alternative for skin antiseptics to the world-wide broadly used CHX-based products.

Disclosure of interest: None declared.

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P35
Microbial deactivation properties of generation 2 and 4 poly (amidoamine) dendrimers on common bacteria found in the aqueous environment
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)®35

Introduction: The antibacterial properties of dendrimers, make them a good candidate, as a future alternative disinfectant, for water and wastewater treatment with minimal side effects. Therefore, this study was performed for evaluation of antibacterial effect of generation-2 and 4 poly(amidoamine) dendrimer (PAMAM) on the indicator bacteria found in the water resources.

Methods: Using the differential biochemical tests, bacteria were isolated and identified from water resources. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against gram-positive and gram-negative bacteria were calculated. Standard discs were prepared by different concentrations of dendrimer (0.5 to 500 μg/ml) and evaluated through the disc agar diffusion method on Muller-Hinton agar plates. Finally, the inhibition zone diameter was measured.

Results: Main isolated bacteria from water resource were Escherichia coli, Pseudomonas aeruginosa, klebsiella oxytoca, Bacillus subtilis, and staphylococcus aureus. The results showed that the MIC and MBC for each of isolated bacteria were the same for both generations and were as follows: Escherichia coli 1250 and 2500 μg/ml; klebsiella oxytoca 500 and 1250 μg/ml; staphylococcus aureus 1 and 5 μg/ml and Bacillus subtilis 2.5 and 5 μg/ml. No MIC and MBC were observed on Pseudomonas aeruginosa, respectively. Also it was found that PAMAM dendrimer was more potent towards the gram positive bacteria than the gram negative bacteria. Although amino terminated G4 PAMAM dendrimers have a more functional groups, but no significant differences were observed bacterial activity than G2 PAMAM dendrimers.

Conclusion: It can be concluded that G2 and G4 PAMAM dendrimer with amine terminations exhibited a positive impact on the removal of dominant isolates strains. It is therefore possible that in the future it could be used as an effective material for water disinfection.

Disclosure of interest: None declared.
Susceptibility of fabrics in office furniture to microbial attack: microbial burden and health implications
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P36

Introduction: Hygiene is advocated as major in the control of infectious diseases; however an area of neglect is furniture we come in contact with daily. Furniture is made of diverse materials; wood, glass, metals, plastics, rubber, clothing fabrics or their combinations. Colonization of furniture made from different types of material and possible health implications are reported.

Objectives: We investigated the associated health risk in the use of furniture made from different materials.

Methods: The office setting was used and tables and seats were sampled for presence and burden of microorganisms. Also visual inspection was made for evidence of microbial attack and degradation of fabrics. Degree of susceptibility of different materials in furniture was assessed. Sampling was done after the surface was wiped with dry cloth and after cleaning with detergent solution only and in addition disinfectant.

Results: Rubber fabrics were more susceptible to colonization while metal surfaces were least. Fungi were the predominant colonizers especially, Penicillium and Aspergillus species. Candida spp were isolated in 14% of the furniture sampled. Bacteria diversity included the Gram positive and Gram negative, but particular were the preponderance of Pseudomonas, Proteus, and Klebsiella. The use of dry cloth to wipe the surface had negligible role in reducing the burden of colonizing organisms. Cleaning with detergent solution reduced microbial burden by 35% while application of disinfectant yielded 90% reduction. Clothing fabric haboured more microorganisms but showed no visual signs of microbial attack.

Conclusion: Furniture may serve as a pool for breeding pathogenic organisms if not properly maintained. Regular cleaning with detergent and disinfectant is advocated.

Disclosure of interest: None declared.

Study of enzymatic detergents with both cleaning efficacy and disinfecting action for medical devices
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P37

Introduction: Meticulous cleaning of used medical devices with alkaline or enzymatic detergents should remove organic debris, minerals, bioburden and other contaminants. Some enzymatic detergents not only have cleaning efficacy, but with additional disinfecting action as well. Having dual performance can reduce bioburden in the first step of medical device reprocessing, as well as and can prevent the discharge of contaminated wastewater to the environment. However, as disinfecting agents are found to denature and fix proteins on medical devices, making it difficult to perform both cleaning and disinfecting at the same time.

Objectives: Enzymatic detergents with incorporated disinfecting agents were investigated for their cleaning efficacy and disinfecting action.

Methods: The cleaning efficacy was verified with cleaning indicator TO3®1, simulating dried blood, which is commonly used to evaluate the cleaning efficacy on medical devices. After immersing TO3® at 40 degrees Celsius for 30 minutes, it was visually evaluated according to the presence of residual blood. The disinfecting action was then verified with methods based on EN13727 and EN13624.

Results: When disinfecting agents were incorporated to enzymatic detergents, it was found that the cleaning efficacy decreased with increasing of disinfecting action, as observed in other commercial enzymatic detergents having dual performance. To promote balance of both cleaning and disinfecting performance, approximately thirty surfactants were investigated, and among them, two were selected as suitable cleaning agents. Incorporating the optimum amount of disinfecting agents, it is then possible to achieve the desired dual performance.

Conclusion: Generally, it is difficult to achieve both cleaning efficacy and disinfecting action in enzymatic detergents. Disinfecting agents are known to fix proteins, hindering the cleaning action of enzymatic detergents. On the other hand, increasing the amount of cleaning agents to improve the cleaning efficacy can then decrease the disinfecting efficacy. This study suggests that suitable balance of cleaning and disinfecting agents in the formulation will make it possible to achieve both the desired, effective cleaning and disinfecting performance in enzymatic detergents for medical device reprocessing.

Disclosure of interest: None declared.

Evaluation of biocompatibility of novel and commonly-used antiseptics by cell culture method
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P38

Introduction: Antiseptic agents such as chlorhexidine digluconate, polyhexamethylene biguanide, benzalkonium chloride and octenidine dihydrochloride (octenidine) has been used widely in clinical settings to prevent bacterial infection, especially for antisepsis of skin and mucous membranes. However, irritation and cytotoxic effects of these compounds on human cell has been reported.

Objectives: This study compared the biocompatibility of newly-synthesized bis-quaternary ammonium compounds and biocides that have been commonly used as antiseptics, examining their antimicrobial activity, cytotoxic effect and expression of inflammatory cytokine-related genes.

Methods: A series of new bis-quaternary ammonium compounds, including 3-(3-Hydroxy-2-(hydroxymethyl)-2-(1-diocetylpyridinium-3-yl)oxy)methyl propoxy)-1-dodecylpyridinium dibromide (3HDDMP) was synthesized. The antimicrobial activity of newly-synthesized compounds and commonly-used antiseptics were assessed by minimum bactericidal concentrations (MBC) and cytotoxic effect on normal human epidermal keratinocytes. The expression of inflammatory cytokines in normal human epidermal keratinocytes was quantified using real-time reverse transcription PCR (RT-PCR).

Results: Against Gram-negative and Gram-positive bacteria, 3HDDMP showed potent antimicrobial activity comparable to that of the octenidine. In a cytotoxic test using human epidermal keratinocytes, toxicity of 3HDDMP was equal or lower compared to that of quaternary ammonium compounds, although 3HDDMP showed higher toxicity than biguanide-based compounds. The comparison of the biocompatibility index as defined by antimicrobial activity and cytotoxic effect on human cell revealed that 3HDDMP had equal or greater biocompatibility compared with the biocides tested. Moreover, in the expression analysis of cytokine-related genes by cell culture method, increase of expression of cytokine-related genes in the cells stimulated with 3HDDMP was slower than that of existing quaternary ammonium compounds.

Conclusion: From these results, it was concluded that the series of new bis-quaternary ammonium compounds including 3HDDMP had excellent biocompatibility, and thus the availability for application to the skin surface was suggested.

Disclosure of interest: None declared.

The role of the mobile communication devices in the spread of healthcare-associated infections: a systematic review
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P39

Introduction: Mobile communication devices of healthcare workers have an invaluable feature of communication within hospital settings, and they...
may support aspects of clinical diagnosis and education. However, there may be a potential for contamination with various pathogens.

Objectives: Our objective was to systematically review the potential role of these devices in the dissemination of pathogens and the effective prevention measures.

Methods: A comprehensive literature search was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. To identify relevant publications, PubMed, Medline and ScienceDirect were searched for articles published between 1 January 2000 and 1 August 2014 in English language. Appropriate articles were accessed in full text to determine eligibility and extract data by two reviewers. Studies were stratified by pathogens and prevention measures.

Results: Our search yielded 11,824 titles published after the search period. Finally, 30 articles met our inclusion criteria. Only 8% of healthcare workers routinely cleaned their mobile communication devices which resulting a high rate of contamination (40-100%). Coagulase-negative Staphylococci and Staphylococcus aureus were the most common identified bacteria. The rest of them was methicillin resistant (10-95%).

Conclusion: This systematic review identified effective interventions to reduce bacterial contamination risks include regularly decontamination of mobile communication devices, hand hygiene and staff education.

Disclosure of interest: None declared.

P40
Effects of disinfectant wipes on sensitive healthcare surfaces
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P40

Introduction: Studies have shown that shared surfaces and devices can serve as a route for transmission of pathogens; however, proper disinfection protocols are lacking to address sensitive surfaces and equipment that can be permanently damaged by disinfectants used in healthcare environments.

Objectives: The main objectives of this study were to test commercially available disinfectant wipes on sensitive surfaces to examine antimicrobial efficacy as well as any damaging effects.

Methods: Samples were taken before and after use of a disinfectant wipe from touch screens, keyboards, and computer mice at 4 Long Term Care (LTC) facilities across the Greater Toronto Area. Pieces of mattress coverlet and touch screens were wiped approximately every hour for two months with various disinfectant wipes and examined for any damage.

Results: All surfaces sampled at LTC facilities showed marked contamination with bacteria and fungi prior to disinfection. After wiping with Product T, samples were cleared of contamination. Touch screens and mattress coverlets showed no damage after repeated wiping with Products S and T. Discoloration and damage were observed with Products C, V, and P. Some surfaces showed contamination with S. aureus and E. coli. Variable results were observed for antimicrobial effectiveness; some wipes showed complete removal of organisms while others showed some to no reduction.

Conclusion: This study further illustrates that shared surfaces and devices can be contaminated with microorganisms, stressing the importance of disinfection of these surfaces. Sensitive surfaces present a challenge to disinfection; however, we have demonstrated that products are available to effectively disinfect sensitive surfaces without causing harmful and costly damage.

Disclosure of interest: None declared.

P41
Efficacy of HyperDRYMist® technology in reducing residual environmental MDR bacterial contamination in tertiary hospital
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P41

Introduction: Environmental persistence of multidrug-resistant (MDR) organisms in hospital environment is arduous to reduce or eliminate. Efficacy’s inconsistency characterizing manual disinfection that generates high levels of residual surface contamination compounds adversities in achieving reduction.

Objectives: Study evaluated a novel no-touch disinfection technology named HyperDRYMist®, which decontaminates hard surfaces by delivering aerosolized enhanced Hydrogen Peroxide, as an addition to manual disinfection (terminal cleaning).


Results: For 8 months, prospectively identified and included 20 cases of “classic” MDR patients (see list below). After terminal cleaning, mean SA in 4 of 4 rooms, Acinetobacter environmental persistence of S.

P42
Quaternary ammonium compounds (QAC) issues encountered in an environmental services (EV) department
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P42

Introduction: QAC are the most common agents used in the United States for disinfection of healthcare surfaces. Recently, concern arose over the ability of cloths to bind QAC. Both microfiber cloths and cotton cloths are available in our facility.

Objectives: This study evaluated the reduction of QAC concentrations with 3 types of cloths used for environmental disinfection, and identified variations in QAC concentrations delivered by dispensing stations.

Methods: Three buckets were filled with a QAC solution measured at 800 parts per million (ppm). Thirty microfiber cloths were placed in one bucket, 30 cotton cloths in another, and a roll of disposable cloths in another. Three cloths were removed from each bucket every 5 minutes for the first 30 minutes, then every 30 minutes for a total time of 4 hours. At each time point, excess solution was wrung from the cloths and tested using QAC test paper and the average concentration of the solution expressed from 3 cloths was determined. In addition, a survey of 33 disinfectant dispensing stations was conducted to measure QAC concentrations delivered. Mixing stations are designed to dispense ½ ounce of concentrated QAC per gallon of water, yielding an in-use concentration of 800 ppm.

Results: After cloths had been submerged in QAC for 5 minutes, the concentration of solution expressed from the 3 types of cloths was reduced by 21% with microfiber cloths and by 50% with cotton and disposable cloths. After 30 minutes the concentration of solution expressed from the cloths stabilized and remained at that level for the following 3.5 hours: microfiber at 400 ppm, cotton at 200 ppm and disposable near zero. Of the
Efficiency of micro-nebulized hydrogen peroxide dry mist in improving disinfection of titanium and polypropylene surfaces used in the medical area

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P44

Introduction: Most hard surface cleaning and disinfection procedures adopted in healthcare facilities are not effective in inactivating bacteria where a biofilm is already formed and may be a cause of cross-contamination of clean areas. Airborne disinfection performed with micro-nebulized H2O2 dry particles may be used as additional step capable to inactivate the bacteria and prevent clean areas cross-contamination.

Objectives: To determine the efficiency of micro-nebulized hydrogen peroxide (H2O2) based dry mist in the disinfection of metallic and polymeric surfaces contaminated with a mature Pseudomonas aeruginosa biofilm.

Methods: The biofilm of was prepared according to modified ISO/TS 15883-5 Annex F. The surface cleaning and disinfection was performed according to the authorized label of the disinfectant (wiping). The wiping test was performed following CEN quantitative carrier test method with mechanical action (4-field test) where one field was contaminated with the biofilm and the other three fields left clean. The test surface was wiped with microfiber wipes impregnated with 16 ml of disinfectant starting from the contaminated area and covering one by one all the other three clean areas. The airborne efficacy tests were performed in a climatized room of 5 cubic meters with the metal and polymeric contaminated carriers placed 2.6 meters away from the micro-nebulizer.

Results: Micro-nebulized H2O2 particles showed efficacy against the biofilm if this was preliminarily treated with the detergent disinfectant. The micro-nebulization treatment caused a reduction of almost 3Logs of cfu/cm² in field one (after 20 minutes dry mist erosion and 3 hours exposure) whereas the preliminary detergent disinfection process showed a negligible reduction in field one. The cross-contamination of the clean fields which occurred during the wiping step was inactivated by the airborne disinfection step.

Conclusion: Micro-nebulized H2O2 dry mist is capable of inactivating bacterial mature biofilm if the biofilm is pre-treated with a detergent, regardless of the type of material inoculated. H2O2 airborne disinfection reduces cross-contamination of clean areas also preventing new biofilm formation.

Disclosure of interest: None declared.

References
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P45
Efficacy of copper surfaces in the healthcare environment: a systematic review

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P45

Introduction: To this date, the efficacy of copper in environmental surfaces surrounding patients to decrease bacterial load and ultimately healthcare-associated infections remains controversial.

Objectives: To determine the potential of copper surfaces to help fight against infection risk in healthcare settings, we conducted a systematic review.

Methods: A PubMed and Nosobase (French database on infection control) search was performed by two investigators with the following key words: Copper; Surface; Anti-infective; Antimicrobial; Activity. Both in vitro and in vivo studies were included, studies assessing the effects of copper outside of hospital surfaces were excluded (water, air), English, French and Spanish languages were included based on investigators’ skills. Studies encountered on Nosobase and published in non-indexed reviews were excluded.

Results: A total of 3,289 articles were retrieved with those keywords. Based on titles and after reading abstracts and articles, the investigators selected 34 articles including 24 in vitro studies and 10 in vivo (on-site environmental or clinical) studies.

In vitro studies mostly demonstrated a broad-spectrum activity of copper with a significant decrease of antimicrobial load on copper surfaces compared to control surfaces (mainly stainless steel and PVC). In vivo...
studies assessed the total flora reduction as the main outcome with an important decrease on most copper surfaces compared to controls. An important heterogeneity in the design and the results of these studies was observed, making extrapolations to a clinical impact of copper surfaces difficult. One study in particular assessed the nosocomial infections and/or colonisation with MRSA or VRE as the outcome after introducing 6 copper objects in ICU rooms using a randomized controlled trial. The authors observed a 50% decrease in healthcare-associated infections, although several methodological issues could be addressed regarding the study design.

Conclusion: Although copper surfaces gained much interest during the past few years, there is a lack of clinical studies to demonstrate a significant effect on patient outcome. Cost-effectiveness studies should also be conducted before concluding on the benefits of copper surfaced equipment for healthcare settings.

Disclosure of interest: None declared.

P46
Complex application of bacteriophages as a method of healthcare-associated infections control
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Introduction: Prevention of healthcare-associated infections is one of the global problems in modern period of healthcare system development.

Objectives: Prophylaxis of HAI in Russia.

Methods: Epidemiological, statistical.

Results: Over the past 30 years in Russia, considerable progress in theoretical evidence and practical application of bacteriophages to treat and prevent healthcare-associated infections has accumulated. The efficient use of bacteriophages in epidemic outbreaks of healthcare-associated infections has been documented in numerous representative studies of different epidemiological centers in Russia: Kemerovo, St. Petersburg, Moscow, Nizhny Novgorod, Ufa and others.

One of the important areas of application is the use of bacteriophages for the decontamination of inanimate objects and surfaces in healthcare settings. Disinfection by using bacteriophages is the most suitable in epidemiologically relevant specialized departments such as intensive care units, burn units, etc. Drugs containing phages adapted to circulating bacterial strains will be more efficient compare to their non-adapted counterparts.

Conclusion: Numerous randomized controlled trials revealed different efficacy regarding the usage of bacteriophages in the environment. The greatest effect was obtained using Pseudomonas bacteriophage: complete elimination of the pathogen was achieved within 24 hours after a single application, and there were no new cases of healthcare-associated Pseudomonas infections. This is also the case for Salmonella bacteriophage effect (15-fold incidence reduction).

Disclosure of interest: None declared.

P48
Sterilization process control in health centre Bijeljina
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Introduction: Within health care systems of less developed countries, such as Rep. of Srpska, Bosnia and Herzegovina, there is a lack of directives and guidelines within the area of infectious disease control. This especially applies to primary level institutions which are therefore required to develop and conduct measures of prevention and elimination of nosocomial infections independently.

Objectives: Our goal is to show the importance of establishing general sterilization monitoring procedures in primary health care institutions of less developed countries that lack the regulatory guidelines within this field.

Methods: The method and process of sterilization have been defined by the guidelines given in the Sterilization process, which are mandatory to all services within the institution. Steam sterilization control is conducted through four control categories: Process, Pack, Load and Equipment. Dry heat sterilization control is conducted through two control categories: process and load.

Results: Health Centre Bijeljina provides primary health care with eleven medical services, operating in the main facility and the units located in rural areas. Within the Centre 30 dry heat sterilizers and 2 autoclaves are being used. We have shown results of biological control of sterilization for period 4 years while the results of process, pack and equipment control were NAD. Load control – 842 spore-testing of dry heat sterilizers were performed and the number of positive test results was 10.57%. The cause of positive test results in 83.3% cases was the human factor, improper use of equipment and the failure to follow the complete sterilization procedure.

Load control – 182 spore-testing of steam sterilization was conducted and the number of positive test results was 0.

Conclusion: Based on the test results analysis we came to a conclusion that implementing central sterilization in primary level institutions, with the use of autoclaves, is necessary to enable more efficient and effective sterilization process. The implementation of central sterilization also allows

Antimicrobial Resistance and Infection Control 2015, Volume 4 Suppl 1
http://www.aricjournal.com/supplements/4/S1
Page 37 of 117
more reliable sterilization monitoring as well as considerable resource savings.

Disclosure of interest: None declared.

Introduction: Adequate reprocessing of reusable medical devices is vital to protecting patient safety. Therefore, inadequate or improper cleaning of reusable medical devices puts patients at risk for healthcare-associated infections (HAIs). There are few studies carried out in the field of decontamination and sterilization of reusable medical devices in Africa, thus the current situation of sterile services in Africa remains unknown.

Objectives: This study will help to establish needs in Africa for sterile services and education programmes.

Methods: This survey was conducted during March and September 2014. The questionnaire composed and emailed to all ICAN Board members and PDIC students. The questionnaire composed by 6 components: hospital general information, CSSD design, reprocessing equipment, autoclaves, testing sterilizers, Sterile storage and CSSD environmental cleaning. 53 completed forms from 11 countries returned to the investigator. Data entered into access database, and then analysed with MS Excel.

Results: 62% of CSSD is managed by Nurse, and only 17% managed by CSSD qualified manager. 68% of CSSD fall under operating theatre. Only 4% of CSSD staff are SSD qualified. 38% of surgical devices cleaned only in CSSD. 60% surgical devices are cleaned manually 47% 62% sterilizers reported as good functioning. 43% perform Leak test daily, 56% Bowie Dick test, 60% chemical indicator is placed in each pack daily, 90% autoclave tape is placed on each pack daily, 60% biological indicator is performed daily.

Conclusion: Ineffective surgical devices reprocessing, inappropriate CSSD design, lack of adequate training for CSSD staff, lack of appropriate and sufficient equipment, materials and supplies are the major obstacles to the effective CSSD service delivery in Africa. Adequate training of SSD staff should be taken as the first priority and provision of necessary equipment, supplies to be considered for better service delivery.

Disclosure of interest: None declared.

Introduction: In hospital, false ceilings are a source of Aspergillus. A huge amount of spores may be suspended specially during their demolition near immunocompromised patients who are at risk to develop severe invasive aspergillosis (IA). Airway disinfection allows the no directed spraying of a disinfectant on surfaces contained into a determined volume.

Objectives: The aim of this study was to evaluate the antifungal efficacy of a new airborne disinfectant (AD) on hospital false ceiling exposed to another AD usually used, before major deconstruction work.

Methods: The antifungal activity of the two AD was assessed in 4 rooms of an hospital ward in a building intended to be demolished. The two AD tested were based on hydroxyacetic acid for AD#1 and on peracetic acid and H2O2 for AD#2. Each AD was randomly applied in rooms as recommended by the manufacturer with comparable trial conditions (location and contact time with AD). Fungal contamination (F0) of the top of false ceiling slabs was assessed by using moisten swabs before and after application of the AD. The environmental contamination was then extracted and inoculated on YGC agar. On each plate A. fumigatus and Aniger were counted. Contamination rates (C0) were compared after logarithmic transformation by nonparametric tests.

Results: A total of 11 false ceiling tiles were sampled before and after AD in each room (a total of 88 tiles). Before disinfection, C0 of rooms were not different. For AD#1 the C0 for A. fumigatus was 1.86 before AD and 1.59 log10 after (p=0.80), for A. niger the C0 was 0.45 before and 0.24 log10 after (p=0.24). For AD#2 the C0 for A. fumigatus was of 1.69 before AD and 0.80 log10 after (p=0.01), for A. niger the C0 was of 0.60 before AD and 0 log10 after (p=0.001). Concerning AD#1, the C0 reduction was then 0.89 and 0.60 log10 for A. fumigatus and A. niger respectively.

Conclusion: The new AD#2 was the most efficient to reduce F0 of hospital false ceiling slabs before demolition. These results will be of major help to choose the best AD procedure for improving the control of A. fumigatus risk and ultimately prevent IA in our patients during construction works of our hospital.

Disclosure of interest: S. Leoffert Grant/Research support from: ANIOS Laboratories. The authors thank ANIOS Laboratories for their participation in this study by providing free of charge products. Anios was not involved in the study design, analysis results or discussion. , M.-P. Gustin: None declared. P. Cassier: None declared. P. Bouché: None declared, C. Lion: None declared, M. Massacrier: None declared. M. Peraud: None declared, P. Vanhems: None declared.

Disclosure of interest: None declared.

Introduction: The air within the healthcare environment may serve as a reservoir for microorganisms thereby contributing to the rate of infection. Regular monitoring of the microbial burden is necessary to ascertain the microbiological quality of hospital environments.

Objectives: This study was conducted to evaluate the quality of the indoor air in a university health centre.

Methods: The air microflora was assessed using the settle plate method. Air samples were taken from the waiting room, consulting rooms, nurse station, male and female wards as well as the laboratory to detect bacterial and fungal flora. The antimicrobial activity of five commonly used disinfectants was tested on some of the isolated bacteria.

Results: Thirty bacterial genera and two fungal genera were identified. The predominant bacteria were Klebsiella spp (15.7%), Bacillus spp (15.7%) and Streptococcus spp (10.5%). Among the less common bacterial isolates were Staphylococcus aureus and Clostridium spp. The fungal isolates include Aspergillus niger (50%) and Mucor spp (50%). The microbial burden was highest in the wards, followed by the consulting rooms and the waiting room. The antimicrobial activity of the disinfectants varied with the concentrations tested. Klebsiella species were resistant to two of these disinfectants at all concentrations.

Conclusion: The findings of this study revealed the presence of possible pathogens. This emphasizes the importance of regular air surveillance and proper infection control practices in hospitals.

Disclosure of interest: None declared.

Introduction: The use of mobile air purification systems in hospitals is widely accepted and even promoted by the CDC, but turns out to be quite expensive. In this study, the Hospital Infection Control Team (HICT) of the Ghent University Hospital evaluated a more cost-effective mobile HEPA filter unit.
Objective: To determine whether a compact, more cost effective, mobile HEPA filter unit was able to purify the air significantly from airborne particles and fungal spores.

Methods: A mobile HEPA filter unit ‘FilterQueen Defender’ (FQD, HMI industries) was installed in the centre of a small room (36 m²). A particle counter (HHPC-6 airborne particle counter, Art instruments) and a microbiological air sampler (MAS100, Merck) were set up in the corners of that room.

Measurements were conducted during several hours every 15 to 30 minutes, before and after activation of the FQD. After deactivation, post-measurements were performed as part of a validity check. The 3 different settings of the FQD, corresponding to an increasing ventilator speed, were evaluated during the test.

Results: In this test, the number of airborne particles measured were clearly and positively influenced by the FQD in ventilator speed settings 1 and 2. Both smaller particles (≥ 0.5μ) as well as bigger particles (≥ 5.0μ) were reduced to less than 10% (and in some cases down to 1%) of their initial load. There was however no measurable difference between settings 2 and 3. Before activation of the FQD, microbiological air sampling showed presence of fungal spores in the air (≥ 6.0 × 10⁶ cfu/m³ in 8 of 8 measurements). After activation of the FQD, the number of fungal spores was reduced to zero within 1 hour.

Conclusion: Despite its compactness and significantly lower price (80% less as compared to standard mobile HEPA filters), the FQD has shown to be highly effective in purifying air, as expressed by the lower particle count and the absence of fungal spores within 1 hour.

Based upon this experience we decided to purchase multiple FQD devices that are now routinely used throughout the hospital in high risk settings, such as during construction works or to prevent airborne infection in isolation rooms.

Disclosure of interest: None declared.

P54

A multi-site clinical field study to evaluate the effectiveness of manual cleaning for flexible gastrointestinal endoscopes

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P54

Introduction: An ATP bioluminescence assay (ATP Water Test), measuring organic bioburden including microbes, was used to monitor the cleanliness of flexible GI endoscopes after the manual cleaning step of the decontamination and disinfection process, in seven US hospitals.

Objectives: To characterize the effectiveness of the manual cleaning step during reprocessing of flexible endoscopes, from site to site as well as by type of endoscope.

Methods: Duodenoscopes, gastroscopes, and colonoscopes were tested using an ATP Water Test. The method entailed collecting and testing a sterile water sample flushed through the suction/biopsy lumen of the endoscope after completion of manual cleaning. The amount of ATP, in relative light units (RLUs), was measured with a hand-held luminometer. Cleaning failure rates based on a comparison to a published cleanliness pass-fail criterion [1,2], were determined. A total of 398 endoscopes were tested.

Results: The level of ATP contamination post manual cleaning was found to be statistically different by scope type (p<0.0005), as well as from site to site for each scope type (all p-values < 0.05). Duodenoscopes were found to have the highest mean value of ATP contamination (142 RLUs), followed by gastroscopes (83 RLUs), and finally colonoscopes (29 RLUs). The standard deviation of the mean was also largest for duodenoscopes and gastroscopes. Using the 200 RLUs value proposed in the literature [1,2] as a pass-fail cleanliness criterion after manual cleaning, the observed failure rates were found to be highest for duodenoscopes (31%, 15/48) and gastroscopes (22%, 38/168) and lowest for colonoscopes (3%, 6/182).

Conclusion: 398 endoscopes, for seven different US hospitals were measured for ATP contamination after manual cleaning. Considerably higher levels of ATP contamination were found in duodenoscopes and gastroscopes as compared to colonoscopes, leading to a significant number of cleaning failures. Given the importance of the manual cleaning step to ultimately achieve proper high level disinfection, these results suggest that protocols and methods used to manually clean upper GI endoscopes may not be adequate.

Disclosure of interest: M. Bommarito Employee of: 3M, G. Thornhill Employee of: 3M, D. Morse Employee of: 3M, H. Reuter Employee of: 3M.

References


P55

Comparison of two storage methods for flexible, thermolabile endoscopes: is there a difference in microbiological contamination?

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Comparison of two storage methods for flexible, thermolabile endoscopes: is there a difference in microbiological contamination?

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Introduction: Currently no recommendations exist to help choose between the drying and storage cabinets for heat-sensitive endoscopes (SCE) and standard non-ventilated cupboards. We hypothesize that use of the SCHE helps reduce microbiological contamination compared to the standard non-ventilated cupboards.

Objectives: To compare the level of microbiological contamination of endoscopes stored using the two different methods.

Methods: Comparative observational study conducted within the HUG (Hôpitaux Universitaires de Genève) between February and July 2014 using flexible bronchoscopes utilized in adult intensive care, stocked in SCHE, and flexible bronchoscopes utilized in the endoscopy equipment tray, stored in standard, non-ventilated cupboards. Samples were taken on day 0 (removal from the disinfecting washer), Day 3 (primary outcome), and Day 7. The samples were collected from endoscope extremes and analyzed after filtration using Millipore™ membranes 0.45 µm deposited on blood agar and incubated at 37°C. Microorganisms were identified and numbered and results expressed in the form of colony forming units (CFU) per endoscope.

Results: In total, 60 samples were collected from 10 bronchoscopes at Day 0, Day 3, and Day 7. No germ was identified among samples taken at Day 0 or Day 3. Among Day 7 samples no germ was identified on endoscopes stored in the standard non-ventilated cupboards, 1 CFU of Staphylococcus warneri was identified on a bronchoscope stored in a SCHE (contamination certain).

Conclusion: We found no microbiological difference between the bronchoscopes stored in ventilated and unventilated cupboards. Only one contaminant was detected at Day 7 on a bronchoscope stored in the SCHE. In spite of the small number of samples, current storage practices utilized at HUG are not brought into question – as long as the retreatment process is adequately followed during the early steps of manual disinfection followed by disinfection in the disinfecting washer.

Disclosure of interest: None declared.

Introduction: The contamination found in flexible gastrointestinal endoscopes was characterized at each step of reprocessing, by measuring: Adenosine Tri-Phosphate (ATP), colony forming units (CFUs), protein, and blood. Bacterial species isolated from culture positive scopes were identified.

Objectives: To understand the effectiveness of the standard cleaning and disinfection process for flexible endoscopes by quantification of multiple biological markers.

Methods: The concentrations of four markers in 27 colonoscopes and 28 gastroscopes from two different manufacturers, reprocessed in the endoscopy suite of a US hospital were measured after bedside flushing, after manual cleaning, and after high level disinfection (HLD). ATP levels in Log(RLUs) (Relative Light Units) were determined using a luminometer. Protein concentrations in µg/mL were determined using a bicinchoninic acid (BCA) assay. Total aerobic Log(CFUs) were determined by culture. Blood concentrations were determined with a colorimetric dipstick. Culture positive scopes were identified by further growth and identification of species using a bioMérieux Vitek 2 Compact system.

Results: For each reprocessing step, gastroscopes showed significantly higher ATP levels compared to colonoscopes (p<0.0001). The Log reductions in ATP contamination were found to be significant for each reprocessing step, whereas for CFUs the only significant reduction is after HLD. 11% of the gastroscopes were culture positive after HLD. Protein levels were highly correlated with ATP levels. 17% of the gastroscopes had measurable blood pre-manual cleaning and one device was also blood positive after HLD. Species from culture positive scopes identified before manual cleaning were of human origin but after manual cleaning many waterborne organisms were also found.

Conclusion: Levels of ATP, CFUs, protein and blood found in patient-used endoscopes showed different reductions by type of endoscope and reprocessing step. To define more effective reprocessing strategies and protocols for better infection prevention, understanding contamination levels as well as its composition and how it changes through each reprocessing step, requires monitoring multiple parameters.

Disclosure of interest: M. Bommarito Employee of: 3M; J. Stahl Employee of: 3M; D. Morse Employee of: 3M; H. Reuter Employee of: 3M.

Introduction: Flexible endoscopes are widely used to examine, diagnose and treat medical disorders. Despite the availability of international, national and local endoscope reprocessing guidelines, contamination and transmission of microorganisms continue to occur.

Objectives: This article presents an overview of publications in case reports and outbreaks related to contamination of flexible endoscopes.

Methods: The following search terms or combinations of terms were used to search in PubMed: endoscope, endoscope reprocessing, outbreak and infection. Studies were included if published in English from the year 2000 onwards.

Results: Thirty-two publications were included in this review. From these, eight incidents involved damaged or defective flexible endoscopes, eight were related to failures during manual endoscope reprocessing, eleven reports related to reprocessing failures where the disinfection step was carried out by an AER and five to due failure or malfunctioning of the AER.

Conclusion: To ensure quality reprocessing of flexible endoscopes, mandatory competency training and periodic auditing should take place. Early detection of contamination would be made easier if periodic microbiological testing were to be included in the guidelines. The guidelines need to include a standardized procedure, to ensure maximum effectiveness. AERs are often used for flexible endoscope reprocessing and therefore should be included in the guidelines. Periodic maintenance on flexible endoscopes and AERs should always be carried out as the manufacturers advise. Mandatory reporting of lapses will give a better overview of cross-contamination of flexible endoscopes worldwide.

Disclosure of interest: None declared.

Introduction: In 2010 the New Zealand Health Quality & Safety Commission infection prevention and control programme was established. Since 2011 the Commission has sponsored three infection prevention and control programmes; improving hand hygiene compliance, reducing central line associated bacteraemia and surgical site infections.

Objectives: The aim is to report on the progress to date of these quality improvement programmes.

Methods: Hand Hygiene New Zealand adopted the WHO ‘5 moments for hand hygiene’ approach using Front-line ownership (FLO) improvement methodology, Target CLAB ZERO used the Institute for Healthcare Improvement collaborative methodology and the National Surgical Site Infection Improvement (SSI) Programme has used an inclusive approach.
The infection control and antibiotic committee (ICAC) renews localized or systemic innovative implementation of a simple tool allowing early detection of bacteraemia, has not clearly been associated with a dedicated group of nurses and patients, understanding of their knowledge, attitudes and practices patterns with regard to the spread of NIS may provide one approach by which this health care issue would be addressed.

Introduction: Nosocomial infections (NIs) are now localized or systemic infections that develop in patients receiving medical care in a hospital or other healthcare facilities. They are caused by pathogens often transmitted by indirect and direct contact. It has been documented in the literature that at the time of graduation from their professional education, healthcare professionals have sufficient knowledge to practice safe patient-care and to follow infection control guidelines. However, the evidence suggests otherwise since healthcare professionals, across all categories, are implicated in the transmission of NIS. With nurses having the most contacts with patients, understanding of their knowledge, attitudes and practices patterns with regard to the spread of NIS may provide one approach by which this health care issue would be addressed.

Objectives: The study investigated whether differences exist between novice and experienced registered nurses regarding the spread of nosocomial infections, adherence to recommended guidelines of infection control practices, and positive attitudes. The results of correlation analysis indicated a significant positive correlation between organizational support and respondents’ knowledge; and weak but significant positive correlations between organizational support and respondents’ attitudes and practices in respective categories.

Conclusion: Registered nurses, both the novice and experienced, had good knowledge about the spread of NIS, practised safe patient-care protocols, and had positive attitudes. Additionally, results of data analysis suggest that an improvement in National Health and Medical Research Council guidelines is required to improve adherence to infection control guidelines and patient education in respective categories.

Disclosure of interest: None declared.

P60
Knowledge, attitudes and practices of registered nurses regarding the spread of nosocomial infections and the impact of organizational support
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P60

Introduction: Nosocomial infections (NIs) are new localized or systemic infections that develop in patients receiving medical care in a hospital or other healthcare facilities. They are caused by pathogens often transmitted by indirect and direct contact. It has been documented in the literature that at the time of graduation from their professional education, healthcare professionals have sufficient knowledge to practice safe patient-care and to follow infection control guidelines. However, the evidence suggests otherwise since healthcare professionals, across all categories, are implicated in the transmission of NIS. With nurses having the most contacts with patients, understanding of their knowledge, attitudes and practices patterns with regard to the spread of NIS may provide one approach by which this health care issue would be addressed.

Objectives: The study investigated whether differences exist between novice and experienced registered nurses’ knowledge, attitudes and practices; and further explored the impact of organizational support with regards to the spread of nosocomial infections.

Methods: This exploratory, cross-sectional and descriptive study was conducted using on-line survey responses from 352 registered nurses. Data was analyzed with descriptive and inferential non-parametric statistics.

Results: The participants demonstrated high levels of knowledge regarding the spread of nosocomial infections, adherence to recommended guidelines of infection control practices, and positive attitudes. The results of correlation analysis indicated a significant positive correlation between organizational support and respondents’ knowledge; and weak but significant positive correlations between organizational support and respondents’ attitudes and practices in respective categories.

Conclusion: Registered nurses, both the novice and experienced, had good knowledge about the spread of NIS, practised safe patient-care protocols, and had positive attitudes. Additionally, results of data analysis suggest that an improvement in organizational support plays pivotal role toward reducing the spread of NIS.

Disclosure of interest: None declared.
patient at in-hospital admission. It automatically generates adequate micro orders, isolation procedures and e-mails to ICAC, and ultimately allows detection of colonization/infection by Epidemiologically Important Microorganisms (MRSA, Carbapenem-resistant Acinetobacter baumannii, VRE), or infection by Clostridium difficile or pulmonary Mycobacterium tuberculosis. Regarding PT, a positive answer to the question “PT suspected or confirmed” (based on clinical judgement) generates prescriptions of respirator use and negative pressure room placement.

**Results:** On year 2014, the question regarding high risk for PT was positive in 50 cases (1,42% of 3,523 positive EEqA, 35% of 10,106 ward admissions). Adequate isolation procedures were implemented on 48 of 50 positive PT EEqA (96% of positive PT risk EEqA). PT was confirmed on 13 patients (26% of suspected PT). Positive PT risk was assumed on 12 of 13 confirmed cases (92%).

**Conclusion:** EEqA is a tool that detects the vast majority of PT patients, allowing early and adequate isolation procedures (respirator use, adequate ER and ward placement), starting on the ER, even before micro confirmation. This protects healthcare workers, students, other patients and visitors from exposure to these patients, thus minimizing the risk for nosocomial PT.

**Disclosure of interest:** None declared.

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**P62 Air contamination with A. baumannii during wound dressing change in burn patients but not in surgical patients**

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**Introduction:** A.baumannii (AB) colonisation and infection is frequent in burn patients and multiple outbreaks especially with multidrug resistant strains are described in burn units as well as in other intensive care units. The understanding of the transmission routes of AB in health care settings is eminent to control outbreaks and prevent transmission. Burn patients are suspected to spread high amounts of pathogens.

**Objectives:** Here, we aim to analyze the contamination of the air during wound dressing change in burn patients in comparison to surgical ones.

**Methods:** We obtained microbial air samples during wound dressing change in a distance of 1-2 m from the patient in five burn patients. Air samples in rooms of four surgical patients were taken during wound dressing change and/or suction. All patients were known to be colonized with AB. The MAS 100® air sampler was used with blood agar petri dishes. In each case a volume of 500ml was sampled. Isolates were compared with patient isolates via subtyping in two cases.

**Results:** Burn patients had between 10 and 59% of their body surface area burned.

During their overall wound dressing changes AB was detected in air samples <100 KBE/m³. In the two cases where typing was performed, a clonal relationship to patient isolates was shown. During one dressing change an additional air sample was taken on the floor outside the patient room with no growth of AB. All surgical patients presented only small superficial wounds. No positive air sample was observed during dressing change in these patients. In only two of these patients AB was detected in the patients wound, all were positive in tracheal secretion.

**Conclusion:** During wound dressing changes in burn patients colonized with AB, the pathogen was present in the patient surrounding air in low numbers, but not outside the room. This implicates prevention measures like surface cleaning after procedure, wearing of appropriate personal protective equipment, closing doors and potentially air disinfection methods or quarantine for a period of time.

In contrast, patients with closed wounds seem not to disperse any AB during dressing changes, suggesting that the magnitude of an open wound could be predictive for air spreading during agitation via dressing changes rather than colonisation with AB itself.

**Disclosure of interest:** None declared.

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**P63 Bloodstream infections and local access site infection surveillance program in hemodialysis, Vaud, Switzerland**

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**Introduction:** Patients on chronic hemodialysis (HD) are at high risk of developing bloodstream infections (BSI) and local access site infection (LASI). These infections engender high morbidity and mortality. In 2007, a BSI and LASI infections surveillance program was created, following the implementation of recommendations for the prevention of healthcare-associated infections in HD centers of the canton of Vaud. Between 2007-2013, this surveillance program encountered organizational difficulties and failed to produce usable data representative of the situation.

**Objectives:** The aim of the intervention was to improve the structure of the surveillance program in the different HD centers of the canton of Vaud to produce usable data representative of the situation.

**Methods:** In order to improve infection data collection from the HD centers, a nurse was designated as Surveillance nurse in each center. The questionnaire and work instructions created in 2007 were adapted. A standardized methodological framework was established. Surveillance nurses in the participating centers were audited on work methodology. They were trained by the Senior Infection Control Nurse Specialist to better recognize and report infections in the questionnaire and they were offered regular contact to discuss problems encountered. The Senior Infection Control Nurse Specialist received the questionnaires and entered data to be analyzed on a database.

**Results:** The number of reported infections is increasing in particular regarding LASI. 54 episodes of BSI and LASI were reported in 2014 compared to 16 reported episodes in 2013, for an equivalent number of HD sessions. In 2013, among the 16 episodes, 12 were BSI and 4 were LASI (3 catheter infections and 1 fistula infection). In 2014, 30 were BSI and 23 were LASI (21 catheter infections and 2 fistula infections).

**Conclusion:** Auditing and training nurses in charge in HD centers helped us to increase the quality of BSI and LASI reporting. We observed an increased number of reported infections, especially LASI. The LASI could not be easily detected before the implementation of the methodological framework. This surveillance improvement ensures a more precise data collection enabling us to be more accurate in describing the epidemiology of BSI and LASI.

**Disclosure of interest:** None declared.

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**P64 Implementation of S. aureus surveillance for prevention of bloodstream infections in hemodialysis patients**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P64

**Introduction:** Surveillance for S. aureus (SA) nasal carriage followed by decolonization is a validated strategy to reduce infections and mortality in hemodialysis (HD) patients. This practice is not widespread in Belgian HD units. The current prevalence of methicillin sensitive SA (MSSA) and methicillin resistant SA (MRSA) carriers in our HD population is unknown.

**Objectives:** To evaluate the feasibility of routine surveillance and to assess SA prevalence, a point–prevalence survey measuring the colonization rate of HD patients was organised.

**Methods:** Screening of all HD patients was performed in January, June and November 2014. Home HD (n=1) and peritoneal dialysis (n=5) patients were excluded. Separate swabs (ESwab, Copan, Italy) were taken from anterior nares, and the insertion site of the dialysis catheter. For MSSA detection, swabs were inoculated directly on chromogenic SA plates (SaSelectTM medium, Bio-Rad Laboratories, Belgium). MRSA was isolated on chromogenic MRSA plates (BDTM CHROMagar MRSA, Becton-Dickinson, Belgium) after overnight enrichment in tryptic soy broth of 100µl ESwab Amies medium. Suspected colonies were identified by gram
stain and matrix-assisted laser desorption/ionization time-of-flight mass-spectrometry. MRSA confirmation was obtained by meca gene and nuc gene polymerase chain reaction.

**Results:** 154 patients (mean age 70 years, range 27-95 years) from 3 HD units were screened: 1 in-hospital unit (n=107), 2 outpatient centres (n=47). Mean dialysis time was 4.2 years. 14% of patients were in residential care. SA colonization rate was stable from January to November (26.3%), MRSA prevalence was 1.3% in January/June and 2.8% in November. Outpatient centres showed similar MSSA prevalence (33% and 28%) to the in-hospital unit (17%). 13 patients (9.2%) were persistent MSSA carriers, 8 of them carrying a central line (5.6%). None of the catheter insertion site swabs demonstrated SA.

**Conclusion:** Nasal MSSA prevalence in HD patients equals the general population prevalence (29%-32%). MRSA colonization rate (1.3%-2.8%) is low compared to the total in-hospital-at-risk population (4%). Routine surveillance 3 times a year is achievable and should include MSSA and MRSA screening in all HD patients. New patients should be screened upon HD start.

**Disclosure of interest:** None declared.

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**P65**

**Free-flow duration prior as an influential factor on microorganism and endotoxin amount of reverse osmosis water for dialysis**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**Introduction:** Reverse Osmosis water constitutes up to 99% of dialysis water that every time of hemodialysis requires about 150 liters. The microbiological and endotoxin monitoring of the water used for hemodialysis is extremely important in immunocompromised cases such as chronic kidney disease patients.

**Objectives:** Although the frequency of RO water monitor is monthly, the detailed methods to collect the RO water was not clearly reported. We aimed to determine the duration of free-flow on the qualification rates of microorganisms and endotoxin in RO water.

**Methods:** 305 samples of dialysis water were collected from 61 collection sites at 8 medical units and 2 RO water producing facilities in a medical center. The water was collected for quality examination after 5 free-flow duration separately: 0, 5, 3, 5 and 10 minutes. The spread plate method was used to estimate colony count. The endotoxin was tested using Limulus Amebocyte Lysate (LAL) test. The qualification of colony count and endotoxin (EU) were defined as less than 100 CFU/ml and 0.25 EU/ml according to ISO 11663: 2009 regulation.

**Results:** The colony count qualification rates in different free-flow duration were as following: 0 minute = 22.45%, 1 minute = 93.88%, 3 minutes = 93.88%, 5 minutes = 100%. After 10-minute free flow, the endotoxin qualification rate was only 61%. The result of endotoxin testing was normal after dialysis route being equipped with endotoxin filter. The qualification rates of colony count in storage water at RO water producing facilities were 75% after 0 minute and all 100% after one-minute duration. The endotoxin qualification rate were 0% of 0 minute, 0% of 1 minute, 75% of 3 minute, and 100% of 5 minute duration of free flow.

**Conclusion:** In summary, we observed that colony count analysis for water collected after 5 minutes free flow or without free-flow will lead to indiscriminative result. Longer water route is associated with higher endotoxin disqualification rates. The discrepancy between the colony count testing and endotoxin analysis indicate the need for both testing to promote the quality of medical care and ensure the safety and health of dialysis patients.

**Disclosure of interest:** None declared.
Antimicrobial Resistance and Infection Control 2015, Volume 4 Suppl 1
http://www.aricjournal.com/supplements/4/S1

Page 44 of 117

Hygiene) which involved several different hospitals and enabled it to assess the frequency of SSIs in this kind of operation and identify potential risk factors.

Objectives: This project aims to develop a model for assessing the direct cost of SSIs borne by the hospital and the regional health service. The study was run by the Gaetano Pini Orthopaedic Institute in partnership with Aon Hewitt Risk & Consulting, AGRC Italy and the University of Milan.

Methods: Seven patients who developed an SSI during the ISChIA project were chosen for the study. A model for analysing the additional costs of an SSI was developed which started by considering two different circumstances: hospital admission with changes to the DRG attributable to the SSI and cases where the extra costs could be traced back to subsequent hospital admissions or outpatient procedures.

Moreover, an analysis aimed at establishing the costs borne by the hospital and those borne by the regional health service was carried out.

Results: The total extra cost of the SSIs analysed came to over €32,000, with an average cost per SSI of approximately €9,560 and costs ranging from €3,411 to €62,273 for hospital admissions due to infections. The cost of €57,419 was borne by the regional health service – with an average cost per case of €8,202 – while the hospital had to pay €8,513 with an average cost per case of €1,216.

Conclusion: This project has allowed us to develop a quantitative model for assessing the extra costs associated with SSIs. Certain variables that could lead to an underestimation of the results need to be taken into consideration. Of these, the lack of post-discharge information and the fragmentary nature of such data could affect the clinical outcome and the possibility of quantifying the true cost.

Disclosure of interest: None declared.

P69
Wound leakage in the early postoperative phase correlates with surgical site infections following total hip and knee arthroplasty, a case control study
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P69

Introduction: A Surgical Site Infection (SSI) following total hip or knee arthroplasty (THA/TKA) is considered to be a devastating complication, leading to prolonged hospitalization, repeated surgical intervention and often the removal of the prosthesis.

Objectives: We performed a study to investigate which factors were associated with the development of a SSI following THA/TKA, in order to identify leads for reducing the risk of SSI.

Methods: We identified 25 cases who developed SSI following THA/TKA. For each case we included two controls matched on type of surgery (THA/TKA) and date/time of surgery (i.e. surgery before- and after the case). Analysed variables included age, gender, body mass index, known co-morbidities (such as diabetes and smoking), preoperative length of stay, ASA-classification, antibiotic prophylaxis, therapeutic anticoagulation, S. aureus decolonization, use of drains, wound closing, nonthermiera, haematoma, wound leakage, dressing changes and length of stay.

Results: Cases had significantly more often co-morbidities, hematoma, wound leakage and wound dressing change compared to controls. Noticeable, in cases the wound dressing changes occurred more often on the day of surgery, as well as at day one and day two postoperative. Cases also had a prolonged postoperative stay in the hospital. For the other variables, there was no statistically significant difference.

Conclusion: The study was undertaken after an unexplained increase in SSI, following a period of multiple changes, including the implementation of fast-track surgery. It is likely that formation of hematoma as well as increased wound leakage, lead to the increased risk of SSI. In literature, persistent wound leakage (>72 hours) is linked to development of SSI. Surprisingly, we found more wound leakage in the early postoperative phase correlated with SSI. The use of tranexamic acid, suction drains and a critical evaluation of guidelines for preventing thromboembolic events all offer reducing the risk on wound leakage and the development of SSI.

Disclosure of interest: None declared.

P70
Enterococci in orthopedic infections: who is at risk?
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P70

Introduction: Orthopedic and trauma surgery is most frequently a clean surgery, unless injury-related or in the presence of spontaneous soft tissue infection. International guidelines recommend 1st and 2nd generation cephalosporins for perioperative prophylaxis; the later do not cover enterococci.

Objectives: To investigate whether some patient populations/types of surgery would be particularly at risk for enterococcal infections and might benefit from an adapted prophylaxis.

Methods: Single-center, retrospective cohort study of adult patients operated for orthopedic infections 2004-2014. Only intraoperative microbiological samples and first clinical infectious episodes were considered for analysis. We excluded recurrent infections and pediatric cases.

Results: Among 2740 surgical interventions, enterococci were identified in 100 (3.6%) intraoperative samples. Only 33/100 (33%) infections were monomicrobial. Overall, 665 surgeries (24%) involved osteosynthesis material. Enterococcal infections were particularly related to the foot (29/429 vs. 71/2311; p<0.01), associated with abscesses (25/1070 vs. 75/1670; p<0.01), polymicrobial infections (67/572 vs. 33/1853; p<0.01) and underlying osteosynthesis material (35/665 vs. 55/2075; p<0.01). All hardware (total joint arthroplasties, plates, nails) were equally infected without predilection for a particular material. The proportion of enterococci among all pathogens in diabetic foot infections was 7%. Enterococci significantly more often responsible for diabetic foot infections (48/659 vs. 52/2081; p<0.01) and infections among elderly people (median age 65 years vs. 56 years, p<0.01). In contrast, enterococci were almost never identified in septic bursitis and native bone or joint infections. By multivariate analysis adjusting for case-mix and age, the presence of diabetic foot (odds ratio 1.9, 95%CI 1.2-2.9) and polymicrobial infection (OR 6, 95%CI 3.9-9.4) were the only variables significantly associated with enterococcal infection; while sex, age, type of material, and the exposure to antibiotic therapy prior to intraoperative sampling were not.

Conclusion: Enterococci in orthopedic surgery are rare and mostly encountered as co-pathogens in polymicrobial infections of the ulcerating diabetic foot. There is no indication to change our antibiotic prophylaxis policy.

Disclosure of interest: None declared.

P71
Anaerobes in clean orthopedic surgery? Is it a problem?
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P71

Introduction: Scheduled orthopedic interventions are considered as "clean surgery", unless the intervention follows open fracture injury-related conditions or in the presence of spontaneous soft tissue infection.

Objectives: To investigate whether some patient populations and types of surgery would be at particular risk for anaerobic infections.

Methods: Retrospective cohort study of adult in-patients operated for orthopedic infections from 2004-2014. We assessed obligate anaerobes and considered only first clinical infection episodes; thus possible recurrent infections were excluded.

Results: Anaerobes, isolated from intraoperative samples, were identified in 65 (2.4%) of a total of 2740 surgical procedures. Anaerobes were identified in half (33/65; 51%) as responsible for monomicrobial infections. Anaerobic co-infections were particularly related to plates, mostly in the lower extremities and to open fractures (8/150 vs. 57/2590; p=0.01) and polymicrobial infections (33/352 vs. 32/1853; p<0.01). In contrast, anaerobes
were never documented in septic bursitis, and less likely in native bone or prosthetic joint infections (7/321; 2%). Anaerobic infection was also less frequent in immune-suppressed patients, including diabetic patients, with overall incidence of infection of 1.0% and 0.9%, respectively. The serum C-reactive protein level at admission was lower for infections involving anaerobes (median 61 mg/L vs. 77 mg/L, p=0.04) than for infections that did not involve anaerobes. By multivariate analysis adjusting for the case-mix, the presence of fracture-devices such as plates (odds ratio 2.1, 95% CI 1.3-3.5) was the only variable positively associated with anaerobic infection, while underlying immune suppression yielded to be formally protective (OR 0.4, 0.2-0.8). Sex, age, the presence of abscess formation, type of material, and exposure to antibiotic therapy prior to intraoperative sampling showed no association.

Conclusion: Obligate anaerobes in orthopedic surgery are co-pathogens in half of the cases and mostly encountered in infections of the lower extremity. However, most of these infections are not classical surgical site infections, but often related to open fractures or severe trauma.

Disclosure of interest: None declared.

**P72**

Which patients and orthopedic material do get infected with Gram-negative non-fermenting rods?

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P72

Introduction: The 1st and 2nd generation cephalosporins used for perioperative prophylaxis do not cover non-fermenting Gram-negative rods (NFR).

Objectives: We investigated patient populations and types of surgery at risk for Gram-negative infections overall, and NFR in particular.

Methods: Retrospective cohort study of adult patients operated for orthopedic infections between 2004 and 2014. Only the first episode of infection was considered for analysis and infection diagnosis was based on intraoperative samples.

Results: The median age of all patients was 57 years; 871 were females, and 1021 were immune-suppressed. Overall, 665 episodes (24%) involved osteosynthesis material (321 arthroplasties, 150 plates, 54 nails, and other materials). The median duration of antibiotic prescription prior to intraoperative sampling was 4 days; it occurred in 42% of all cases. Of the total 2740 surgical procedures, 568 grew Gram-negative pathogens (21%) of which 258 (9%) were NFR (120 episodes as co-infection) and 178 (7%) *Pseudomonas aeruginosa*. Prior antibiotic use was significantly associated with NFR infections (159/947 vs. 99/1478; p<0.01). On the median, NFR patients yielded 7 days of prior antibiotic use compared to 3 days of patients with non-NFR infections (p=0.0001). Additional conditions associated with NFR infections were the presence of plates (25/144 vs. 233/2281; p<0.01) the presence of diabetic foot (57/385 vs. 201/2040; p<0.01). Besides plate infection, no other hardware or prosthesis was particularly involved in NFR infections. Risk was associated with an age older than 80 years. In this age category, NFR were responsible for 11% of all pathogens among orthopedic infections. In contrast, NFR were almost never documented in septic bursitis and less frequently associated with abscess formation in native bone or prosthetic joint infections. NFR infection was also less frequently identified in shoulder infections (3/80 vs. 255/2345; p=0.04).

Conclusion: The most important finding associated with orthopedic infections due to NFR is prior antibiotic use in elderly patients with diabetic foot infections/problems.

Disclosure of interest: None declared.

**P74**

Surgical site infection: main cause of readmission of patients undergoing cardiac surgery

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P74

Introduction: Readmissions are a frequent problem in health institutions, bringing discomfort to the patient and family, and weigh the health system and society, therefore, cardiac patients suffer multiple readmissions to achieve full control of the disease or death, due to the complexity and the difficult management of cardiovascular diseases. Among the common causes of readmission there are the infections related to health care.

Objectives: To characterize the readmission cardiac patients after the surgical procedure.

Methods: This is a quantitative, retrospective, descriptive study, conducted through the medical records of patients who underwent cardiac surgery and subsequent readmission.

Results: The sample consisted of 62 patients readmitted after performing heart surgery, these 66% were male, with predominant age group of 61 to 70 years and the comorbidities that stood out was hypertension (80%). The surgical site infection was the leading cause of rehospitalization, significantly associated to the variables obesity and dyslipidemia.

Conclusion: The identification of patients at risk for the development of surgical site infection can minimize readmission rates and reduce the costs associated with care, and must therefore, be subject to a different action planning by the nursing staff.

Disclosure of interest: None declared.

**P75**

Surgical site infection among patients undergoing cardiac transplantation

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P75

Introduction: When several cases of severe bacterial infections with *Mycobacterium chimaera* in a Swiss hospital became public so called heater cooler units (HCU) used during open heart surgery were suspected to be the origin of the pathogens.

Objectives: After confirming that the tanks of the HCU used in our facility were contaminated we attempted to identify potential transmission ways.

Methods: To enable a timely risk assessment and due to the fact that *Mycobacterium chimaera* are very slow growing organisms we used non-fermenters as a surrogate parameter for water associated pathogens. In an experimental setting we conducted air sampling in different distances to the operating HCU. In addition air was sampled in the area of the operating table while HCU were placed at their usual location in the operating room. This was conducted either when HCU were operating or switched off. Air (200 L in 2 minutes) was collected by air sampler MBA530LK5100 and conducted over microbiological plates for culturing.

Results: Non-fermenters could be identified in up to three meters distance to the operating HCU. As long as the HCU were not operating cultures from the area of the operating table remained negative for non-fermenters. Once the HCU were started cultures showed considerable growth of non-fermenters.

Conclusion: Considering our results pathogens from contaminated HCU tanks are disseminated via aerosol formation. Thus there is a potential way of transmission to patients undergoing open heart surgery. So far the extend of the problem is unknown which is why we would like to encourage other hospitals to initiate similar examinations. Our results suggest that HCU should be banned from the operating room. As they are also used in intensive care units this should be further evaluated as well.

Disclosure of interest: None declared.
Objectives: To analyze the occurrence and the predisposing factors for surgical site infection in patients undergoing cardiac transplantation, verifying the relationship between infections and variables related to the patient and the surgical procedure.

Methods: This retrospective cohort study was conducted exploring the medical records of patients older than 18 years who underwent heart transplantation. The correlation between variables was performed using the exact test of Fischer and Mann-Whitney-Wilcoxon.

Results: The sample consisted of 86 patients, predominantly men, with severe systemic disease, underwent extensive preoperative hospitalization. Showed signs of surgical site infection 9.3% of transplant, five (62.5%) superficial incisional, two (25%) and deep (12.5%) of organ/space. There was no statistically significant association between variables related to the patient and the surgical procedure.

Conclusion: There was no association between variables and cases of surgical site infection, possibly related to the small number of cases of infection in the sample investigated.

Disclosure of interest: None declared.

P76

The effect of surveillance program for surgical site infection of hepatobiliary-pancreatic surgery for 5 years: a prospective study in a tertiary hospital in Korea

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)p76

Introduction: Surgical site infections (SSIs) constitute one of the most important complications of hepatobiliary-pancreatic surgery [identified as ‘BILI’ in the National Healthcare Safety Network (NHSN) system of the Centers for Disease Control and Prevention], resulting in increased morbidity, mortality and medical expense. Surveillance of SSIs is one of the most effective methods for reducing the incidence.

Objectives: This study conducted to examine the effect for 5 year surveillance and feedback program of hepatobiliary-pancreatic surgery in a tertiary hospital with 1,700 beds in Korea.

Methods: This prospective study involved 2,562 patients who were to undergo hepatobiliary-pancreatic surgeries [identified as ‘BILI’ in the NHSN system of the CDC] from 2008 to 2012. For all patients enrolled, the following characteristics were recorded at the time of surgery and during hospitalization: age, sex, ASA score, wound class, emergency or elective surgery, general anesthesia, use of scope, trauma, and risk index score by the NHSN system. SSIs were identified through active surveillance and feedback program of hepato-biliary-pancreatic surgery in the surgery department. Statistical significant was determined using the Chi-squared test, the Fisher exact test, the t test and a logistic regression analysis of selected variables (P<0.05) was performed to identify risk factors. Statistical calculations were performed by means of the SPSS.

Results: A total of 2,562 consecutive cases undergoing operations for BILI category and there were 115 cases of SSI for 5 years. The overall SSI rate was 4.49% and SSI rates were significantly reduced than the first year (P=0.012). Superficial incisional SSIs were 19 cases (16.5%), deep incisional SSIs were 11 cases (9.6%) and Organ-space SSIs (intra-abdominal infections) were 85 cases (73.9%). Using a logistic regression model, the following risk factors were age (odds ratio [OR] = 1.045 ; 95% confidence interval [CI], 1.028 - 1.061) and intraoperative time (OR = 1.006 ; 95% CI, 1.005 - 1.008). Conclusion: The prospective surveillance and subsequent feedback program were effective for reducing the rates of SSIs of hepatobiliary-pancreatic surgery.

Disclosure of interest: None declared.

P77

Cost of organ/space infection in elective colorectal surgery. Is it just a problem of rates?

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)p77

Introduction: Organ/space (O/S) infection in colorectal surgery remains a major health problem. In Catalonia, the VINCat Program has monitored 24,832 procedures during 2007-2014, showing a steady rate of O/S infection over the years, 8.2% (95% CI 7.9 - 8.6). Improving awareness of stakeholders could be an easy strategy for assembling quality programs within health systems.

Objectives: Evaluating excess costs of organ/space infections associated with elective colorectal surgery in the Catalan Health System.

Methods: We selected a sample of 10 different sized hospitals that provided data to VINCat from January 2012-June 2014. To estimate the excess of cost we based on differences between lengths of stay in patients with and without O/S infection and extra-cost related to readmission/need of ICU and re-operation.

Results: A total of 2276 patients underwent elective colorectal surgery. O/S infection occurred in 193 (8.5%). Patients with O/S were more frequently men (73% versus 60%; p = 0.001); underwent a rectal procedure (43% versus 31%; p<0.001) and had NNIS index ≥ 1 (43% versus 34%; p = 0.06). Median length of stay was 3 fold higher (22 days versus 7 days; p < 0.001) when O/S occurred which accounted for an extra cost of €3,052 per patient. Within the group of O/S infection, 45/193(23%) patients were re-admitted with a median length of stay of 13 days (IQR 8 - 17); 117/193 (60%) required re-operation and 56/193 (29%) required intensive care unit stay with a median length of stay of 5 days (IQR 3 - 12). This added an additional cost of €2,235 per patient. Accordingly, 193 O/S infections accounted for an overall excess cost of €1,020,391.

Conclusion: O/S infection represents an important excess of cost for the Catalan Health System. The reinforcement of quality strategies can lead to a strong reduction in the use of resources and relieve its current financial constraints.

Disclosure of interest: None declared.

P78

Surgical site infections rates among patients with craniotomy. Results of a prospective surveillance program in a university teaching hospital

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)p78

Introduction: Surgical site infections (SSI) after neurosurgery have serious clinical consequences and increase costs. Surveillance of SSI after craniotomy is not carried out enough.

Objectives: To describe the results of a SSI surveillance program among patients after craniotomy.

Methods: Prospective surveillance in a 700-bed university hospital in Barcelona, Spain. The study included all patients admitted for elective or
urgent craniotomy from October 2012 to December 2014. All craniotomies followed up within 30 days of surgery or after 1 year if implant inserted. CDC definitions for SSI were used. Prosthetic implants included plates and screws for cranial osteosynthesis.

Results: Overall, 469 patients were followed; 54% women, median age of 52 years (range: 18-84). Among them, 70% were elective procedures and 30% urgent or delayed. An implant to secure the bone flap to the skull was used in 426 (91%) patients. SSI developed in 61 patients (13%), organ/space 9%, deep incisional 3.5% and superficial 0.5%. Thirty-three patients (54%) required readmission. Mean days from surgery to infection were 40d. Comparison between patients with and without SSI did not show differences in age, sex, type of surgery (elective or urgent), implant insertion, operation duration, and adequacy of antimicrobial prophylaxis. SSI rates vary depending on ASA score and reason for neurosurgery. Common causative bacteria was Coagulase-negative staphylococci (33%) followed by Propionibacterium spp (26%) Staphylococcus aureus (21%) and gram negative bacilli (33%). Thirteen out of 61 episodes were polymicrobial.

Conclusion: Surveillance of craniotomy has allowed us to determine SSI rates and risk factors for SSI. Our results require the implementation of preventive measures.

Disclosure of interest: None declared.

P79 Strategies for reducing surgical site infection in neurosurgery: experience from a Brazilian hospital

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P79

Introduction: Our Hospital focus on providing excellent care for surgical patients, with approximately 9000 surgeries happening in our Operating Rooms (OR) every year.

Objectives: To describe the strategies adopted to reduce Surgical-Site Infection (SSI) in patients undergoing neurosurgery.

Methods: In April, 2013, we observed a peak of SSI in our neurosurgical patients (21.4%). Looking back on our data, we noticed that SSI were higher in this population when compared to our general clean Surgery population (9.6% X 1.4%) in the first semester of 2013, and we needed to understand the OR practices to identify and to implement possible points for improvement. After an evaluation of all the process, our main actions consisted on: improving skin preparation in Neurosurgical patients; reducing time of pre-operative preparation; review antibiotic prophylaxis guidelines (drug of choice/time to start/time to do additional doses/length of ABP prophylaxis); discussion of individual cases of infection with the surgical team.

Results: In the first semester of 2013 we did extensive on-site work with the Neurosurgeons at our Hospital as well as with the OR staff. In the months that followed, we observed a reduction in the number of SSI infections in the Neurosurgical patients (6.7% in the second semester of 2013 and 2.3% in the first semester of 2014) accompanied with a reduction in the SSI in global surgery infection (1.31% in 2013 and 0.5% in the first semester of 2014) as it would be expected.

Conclusion: With different actions in important points of the care process for patients undergoing neurosurgery, we managed to get success with a significant decrease in infections in this group of patients. We highlight the involvement of neurosurgeons in improving the process.

Disclosure of interest: None declared.

P80 Compliance with antibiotic prophylaxis guidelines in a university hospital’s neurosurgical unit: a 7-year follow-up

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P80

Introduction: Surgical site infections (SSIs) are costly complications in neurosurgical practice and can be prevented by adequate perioperative antibiotic administration. Antibiotic prophylaxis (ABP) guidelines for neurosurgical procedures have been in place for 10 years at the HUG nevertheless the long-term compliance with these guidelines has not been evaluated.

Objectives: To assess the appropriate use and guideline-compliance of ABP in neurosurgery in 2007 versus 2014.

Methods: We performed 2 surveys on the adequacy of ABP including surveillance data on spinal and cranial surgeries collected during a 4-month period in 2007 compared with a 2nd period (1/10.13 to 30.09.11) addressing spinal surgeries only. Adequate ABP was defined as correct choice and dosage of the AB (considering also MRSA carriers), optimal timing of the administration (< 1h before surgical incision) and a second dose administration of intraoperative ABP if the operation lasts > 4 hours.

Results: In the survey of 2007, 177 operations were included compared to 314 operations in 2014. Overall, we noticed improvement in guideline compliance over the last 7 years. In 2007 ABP was omitted in 16% (28/177) of the interventions compared to 2% (7/314) in 2014. The choice and dose of the AB remained adequate over the years (98% (146/149) of the operations in 2007 versus 99% (304/307) in 2014). Improvement in the timing was also noted, passing from 52% (77/149) of the procedures with the ABP administration within the 1st hour, to 81% (248/307) during the 2nd period. In 2007, ABP was administered too early (> 1 hour before the incision) in many cases. In 2014, more patients (39%, 7/18 vs 12%, 2/17) did not receive the repeated dose of ABP when required.

Conclusion: We report an improvement of the compliance with ABP guidelines in neurosurgery in particularly regarding antibiotic timing and coverage. More efforts are needed to further optimize ABP in high-risk patients and procedures.

Disclosure of interest: None declared.

P81 Characteristics and institutional initiatives that improve the surgical antibiotic prophylaxis use

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P81

Introduction: There is little data about adherence to surgical antibiotic prophylaxis guidelines in Brazil.

Objectives: To recognize the institutional initiatives to improve antibiotic prophylaxis practices in neurosurgery.

Methods: Cross-sectional observational study, carried out with a population consisting of hospitals, medical records of neurosurgical patients, Infection Control Team (ICT), surgical team. The sample of hospitals and surgical team was used for convenience and the records for each hospital was calculated based on 40% of overall adherence.

Results: Among the nine assessed hospitals, five achieved quality certification in 2010. The mean weekly hours of ICT per hospital bed was 0.7 and 3.8. Eight hospitals disclosed SSI rates, seven stratified by surgical specialty, six created the antibiotic prophylaxis guidelines with the surgeons’ approval; in four the recommendations were disseminated. Of the 1,011 neurosurgical cases 38 were excluded due to lack of records. Overall adherence was 10.0%. The administration route was appropriate in 100%, dose in 90.6%, indication in 90.0% and time of administration was appropriate in 100%, dose in 90.6%, indication in 90.0% and time of onset in 77.1%. There was a lower adherence regarding duration (26.1%) and a statistically significant association between hours of ICT/ICU bed (p=0.048), dispensation of surgical antibiotic prophylaxis use guidelines (p = 0.035), adherence monitoring (p = 0.024), disclosing of results (p = 0.015) and the period of the day when the surgery occurred (CI=1.7 to 6.6). Among the total of 43 anesthesiologists and surgeons interviewed more than 80% agreed with the institutional guidelines and more than 50% reported they always followed them.
Conclusion: The number of ICT professionals/critical bed, dissemination of guidelines, monitoring and disclosing of results are associated with higher adherence regarding antibiotic prophylaxis use; period of surgery, dose (IC 1.72 - 6.65) and initial time (IC 1.12 - 3.01) and surgery type, initial time (IC 1.24 - 4.25) and duration (IC 1.09 - 2.59). The ICT had structure as required by law, but had shortcomings regarding the process of guideline implementation, monitoring and dissemination of results.

Disclosure of interest: None declared.

P82
An audit and feedback strategy does not improve compliance with surgical antimicrobial prophylaxis guidelines

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

Introduction: The efficacy of surgical antibiotic prophylaxis (SAP) in reducing surgical site infections has been clearly ascertained, provided that the patient receives the right antibiotic, at the right dose, at the right time before surgical incision.

Objectives: This study was carried out to assess whether an evaluation of routine SAP practices may improve subsequent compliance with SAP guidelines (GL) through surgeon and anesthesiologist feedback.

Methods: In 2013, we carried out an audit on SAP in our 850-bed tertiary hospital. We rated a point-by-point compliance with national GL indicators (SAP indication/no indication, type of antibiotic, dose, time of injection before incision, duration) for all surgical interventions recorded in those given days. We then presented the results to surgeons and anesthesiologists, focusing on negative performance measures and providing support to fill the gaps. One year after T-1, we performed an identical analysis (T-3) to evaluate the impact of the strategy on daily practice.

Results: 124 surgical interventions were recorded at T-1 and T-2, and 56 at T-3. The overall rate of conformity with GL was 60% for T-1 and T-2, and 54% for T-3. Two out of 124 procedures (1.6%) did not receive SAP at T-1 and T-2, and 1 out of 56 at T-3 (1.8%), despite indication. SAP was rarely anticipated during pre-operative anesthesiology consultation, whereas allergies and comorbidities were always detailed. The drug and the dose were correctly administered in all the interventions. The number of rejections was also correct according to the duration of each specific procedure. However, the timing of first injection was too close to incision (< 30 minutes), with conformity rate as low as 30% in T-1 and T-2, and 14% in T-3. SAP duration was < 48h in 100% of the cases.

Conclusion: This audit and feedback strategy failed to improve compliance with SAP GL indicators in the post-feedback period. However, the lower number of procedures recorded in the T-3 day may have affected the overall performance of the system. Alternative means aimed at improving quality of care and reducing SAP practice variability within our surgical department should be carried out.

Disclosure of interest: None declared.

P84
The measurements to reduce the rate of surgical site infection in a tertiary teaching hospital

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

Introduction: The surgical technique and equipment are much improved. However, surgical site infection (SSI) is still an important issue in medical care. SSI will increase length of stay, healthcare expense and workload of healthcare workers (HCWs).

Objectives: In the Department of Hepatobiliary Surgery in a tertiary teaching hospital, the rate of SSI was 0.94% (January 2014 to April 2014), and increased to 4.46% (May 2014 to June 2014). In order to decrease the rate of SSI, some measurements were applied.

Methods: The factors may contribute the increased rate of SSI, which including no consensus in use of antimicrobial prophylaxis for surgery, no identical method of wound care, and the insufficient implementation of hand hygiene. After discussion some measurements were applied. First, the chief resident prescribed the antibiotic before surgery based on the guideline. Second, we revised the standard procedure of wound care. The procedure was announced to the HCWs and supervised by nurse practitioners and infection control nurses.

Results: After introducing these measurements, the rate of surgical site infection decreased to 0.93% at the period of August 2014 to January 2015, compared to 4.46% at the period of May 2014 to June 2014. Our results show that implementation can reduce surgical site infection incidence.

Conclusion: Surgical site infection is a common complication of surgery, which may reduce the quality of life, even leading to morbidity or mortality. Healthcare workers should had consensus in care of surgical wound and execute it carefully, in order to prevent further healthcare
associated infection. After the teamwork with healthcare workers, the rate of surgical site infection reduced. The quality of care in surgical wound improved in the Department of Hepatobiliary Surgery.

Disclosure of interest: None declared.

P85
Role of procalcitonin as an early market in diagnosis and follow up of surgical site infection in Al Azhar University Hospital – New Damietta, Egypt
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Introduction: Identifying patients with bacterial infection and sepsis is a major challenge in emergency departments and critical care units. Procalcitonin (PCT), the prohormone of calcitonin, was described as innovative parameter in early diagnosis of infection.

Objectives: This work was carried out to evaluate the role of PCT as an early marker in diagnosis and follow up of patients with surgical site infection.

Methods: The study was conducted on 50 patients admitted in the surgical departments of New Damietta, University Hospital, in the period between September 2012 and September 2013. Blood, urine and/or pus cultures were done. White blood cell (WBC) counts were determined using the automated hematology analyzer. Serum C-reactive protein (CRP) level was measured by the semi-quantitative latex agglutination test. Serum PCT concentrations were determined using the enzyme linked immunosorbent assay (ELISA).

Results: Postoperative infections were found in 29 patients (58 %) with SSI in 11 (22 %), urinary tract infection (UTI) in 5 (10 %), blood stream infection (BSI) in 4 (8 %), SSIs and BSI in 7 (14 %) and SSI and UTI in 2 (4 %) of these patients. Staphylococcus aureus & coagulase negative Staphylococci were the most frequently isolated pathogens, followed by Escherichia coli, Pseudomonas aeruginosa, Proteus mirabilis, Candida albicans, Salmonella Paratyphi B and Klebsiella pneumoniae. Most of the isolated organisms were sensitive to Imipenem. Among the infected group, median serum levels of PCT and Temperature were higher (P <0.001) in the early phase (one day after operation, 1.20 ng/ml,36.5 °C) more than preoperative phase (0.11 ng/ml,37.7 °C) and the late phase (5 days after operation: 0.46 ng/ml, 37.5 °C). Median serum levels of CRP and WBC were increased gradually (P <0.001) from the baseline to the late phase (5.0 mg/l, 12.0 mg/l, 48.0 mg/l for CRP and 5.3 K/uL,10.1 K/uL, 11.2 K/uL for WBC, respectively).

Conclusion: These data indicate that PCT is greatly helpful to distinguish an infection from an inflammation. Moreover, it plays a very important prognostic role in the early detection of patients at risk of infection in the post-operative period.


P86
The risk of transmission of infectious agents in orthodontic surgery
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P86

Introduction: Indirect contact transmission is considered as the most common mechanism of transmission of microorganisms in healthcare environments. Contaminated medical devices, equipment and surfaces in the environment of the surgical dentures are applied as a vehicle. Microbial contamination (bioburden) of medical devices from the category of critical, semicritical and non-critical was monitored in orthodontic surgeries in this project.

Objectives: The file included 11 dental chair units in Department of Orthodontic, Faculty of Medicine and Dentistry, Palacky University Olomouc and 11 dental chair units in private orthodontic surgeries. Dental chair units belongs to the category of non-critical medical devices and at the same time is defined as "patient zone" there is applied "My Five Moments for Hand Hygiene-Dental Care".

Methods: Swabs were taken from the following places: headrest, hand lights, armrest, spittot, terminal of a rotary tool, control panel, and hand control of doctor’s chair. orthodontic bands and wires belong to the category of critical medical devices. Orthodontic pliers belongs to the semicritical category of medical devices. Microbial contamination of the above mentioned medical devices was monitored by using of cotton swabs and cultivation in liquid and solid culture medium.

Results: Public orthodontic surgeries: Orthodontic bands and wires which included to the critical category of medical devices were contaminated in one case by coagulase-negative staphylococcus.

Private orthodontic surgeries: Pseudomonas aeruginosa, from the group of gram-negative bacteria, was demonstrated the most often. Microscopic filamentous fungus Aspergillus sp. was demonstrated from spittot in one case.

Conclusion: The public medical facility has a higher incidence of coagulase-negative staphylococcus in category of critical (bands, wires) and semicritical medical devices. Staphylococcus aureus was demonstrated in two cases in the private surgeries on the surface of semicritical medical devices (orthodontic pliers). It is very necessary to follow the recommendations for disinfection or sterilization of the above mentioned critical and semicritical category of medical devices.

Disclosure of interest: None declared.

P87
Multimodal approach for surgical site infection prevention – results from a pilot site in Kenya
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P87

Introduction: Surgical Site Infections (SSI) are the most frequent healthcare-associated infection in developing countries with incidence rates up to 30%. Prevention of SSI is complex and faces multiple challenges, especially in resource limited settings. Since 2013, WHO in collaboration with Johns Hopkins University, has been leading the Surgical Unit Safety Program (SUSP) in 5 African hospitals, one of which is the AIC Kijabe Hospital, a private teaching facility in rural Kenya.

Methods: The SUSP intervention incorporated a bundle of 6 SSI prevention measures selected as priority by the site leaders (pre-operative bathing, arm preparation, removal of hair, optimal surgical hand and skin preparation using locally produced alcohol-based products, appropriate surgical antibiotic prophylaxis and improving operating room discipline) embedded within adaptive work to improve the safety culture. Implementation was achieved with local adaptation and creation of tools for advocacy, training, leadership and front-line staff and patient engagement. SSI surveillance and process measures evaluation reflecting the intervention have been carried out throughout the study period for about 18 months, based upon a WHO protocol using standardized definitions.

Results: Preliminary data show that the crude SSI rate significantly decreased from 9.3% (38/406 patients) before to 5% (18/353) post-intervention. Patients receiving post-operative antibiotics decreased from 50% to 26%; hair removal with shaving decreased from 25% to 2% of patients; theatre discipline improved with a drop in the average number of door openings per operation from 55 to 40.

Conclusion: Implementation of a SSI prevention bundle and creation of a safety climate was successfully achieved at AIC Kijabe Hospital with tangible reductions in SSI rates and improvement of process measures. Local production of alcohol-based products for surgical hand and surgical site preparation was an innovative approach to overcome availability and cost barriers. Engagement of senior staff coupled with structured management of patient safety programs helped inculcate these concepts into the local culture and practice and are crucial for the long term sustainability.

Disclosure of interest: None declared.
P88
A continuous process of creating responsiveness among healthcare workers results in maintaining good lab practices & increasing awareness regarding safe & hygienic work environment
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P88

Introduction: In early 2013, the section of Histopathology of Clinical Laboratory, The Aga Khan University & Hospital was facing the minimal safe practices among technical staff including improper Hand Hygiene practices, Inadequate Decontamination procedures & Compromised Handling of Biological Spill management. Hence Initiation of Laboratory Staff Awareness Program appeared very productive in improvement of staff routine safe laboratory practices even under stressed & hectic work environment.

Objectives: The background is that we had encountered number of observations in periodic Safety Inspections regarding Hand Hygiene practices, decontamination procedures & handling of biological spill. Hence in compliance to maintain a safe work environment the laboratory was urged to initiate the Staff Awareness Sessions & Quiz on monthly basis to achieve improvement.

Methods: In this audit 50 technical staff undergone with assessment in two categories i.e. Awareness; assessed by quarterly quiz and Practices; assessed by direct observation and are evaluated in criteria of Satisfactory, Good & Excellent. The data of two years 2013 & 2014 is analyzed & compared in criteria of improvement from minimal or satisfactory level which is thereby improved up to the level of excellence in staff awareness and routine practices.

Results: In 2013 hand hygiene was Satisfactory among 86% of staff while by 2014 60% of staff were following an excellent level of hand hygiene. In 2013 Decontamination practice was Satisfactory among 89% of staff while by 2014 59% of staff were practicing the excellent level of decontamination.

In 2013 Biological Spill Management was Satisfactory among 96% of staff while by 2014 it is improved among 68% of staff up to the level of excellent.

Conclusion: On the basis of above results the achievement in improvement up to the level of excellent observed in 60% of staff for Hand Hygiene, 59% of staff for following proper Decontamination procedure and 68% of staff for Biological Spill Management regarding awareness and implementation in routine practices.

Disclosure of interest: None declared.

P90
Teaching methods in the prevention of catheter-related bloodstream infection: a systematic review
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P90

Introduction: Catheter-related Bloodstream Infections (CRBSI) are most worrisome event due to the morbidity and mortality associated. Looking for elaboration of educational programs developed by nurses, revealed the following research question: “What are the methods and teaching techniques that have proved to be effective in reducing CRBSI rates?”.

Objectives: To identify and to describe the methods and teaching techniques applied to training programs for healthcare workers aiming the CRBSI prevention.

Methods: A Systematic Literature Review was performed following the PICO [1] strategy between January to April of 2013, using standardized controlled and non-controlled search terms. The following databases were searched: PubMed/MEDLINE, CINAHL, LILACS, EMBASE, ERIC and Web of Science, without restriction of language and time. The articles were included if they met the quality assessment criteria [2].

Results: Ten studies were included among 300 gathered. Five categories of Teaching Methods were assessed with their respective ability of use (Exposatory 100%, Joint Development Method 80%, Individual Work 60%, Group Work 0% and Special Activities 0%). Twenty-six Teaching Techniques were presented according to each category. The Verbal Technique (80%) and Dialogued Conversation (80%) showed to have higher affinity of use, respectively related to the Expository and Joint Development Methods. Ten Instructional Resources and five Analysis Methods were also assessed according to each related category and with its affinity of use.

Conclusion: Different educational interventions found to be effective in reducing CRBSI. It was not possible to identify any one method as more effective. None of the studies included cited any specific theoretical instructional approach able to underlie their teaching technique during their training sessions. The infection preventionist needs to explore and achieve different teaching skills during educational training once the Education is one of the strategies for preventing Healthcare Associated Infections.

Disclosure of interest: None declared.

References

P91
Preliminary results of a French multi-centre audit on transmission-based precautions
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P91

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Disclosure of interest: None declared.

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Disclosure of interest: None declared.

References
Introduction: In addition to standard precautions, transmission-based precautions (TBP) aim to prevent cross transmission of micro-organisms from patient to patient or to healthcare workers (HCW). In France, guidelines were updated in 2009 for contact precautions and in 2013 for droplet and airborne precautions.

Objectives: The objective was to assess TBP implementation in healthcare settings (HCS).

Methods: The study consisted in a mixed audit of procedures, resources and knowledge. It was conducted between January 1st and December 31st 2014. Inclusion criteria were voluntary public and private hospitals in France. Self-assessment questionnaires were administered at two levels: institutional and HCW. At ward level, an external auditor observed how TBP were applied for each patient requiring them (organisation, supplies and environment). Data were computed online by each HCS. Results were given as a percentage of objectives attained at institutional and ward levels, and as percentages of correct answers attained at HCW level. Pooled scores were calculated by criteria.

Results: A total of 547 hospitals participated, including 6,148 patients requiring TBP, 129,514 HCW and 5,114 physicians. At institutional level, the alert system score was 81.5%. In particular, 99.1% of HCS had a procedure to follow concerning internal information in case of multidrug resistant bacteria (MDR-B), 60.3% had an information system in case of readmission of a MDR-B patient. Moreover, 84.6% of HCW had a procedure to check whether TBP were implemented in case of MDR-B, 91.6% of whom traced it. At ward level, 95.0% of the implemented TBP belonged to the appropriate category. The overall score was 84.2%, going from 68.6% for prescription traceability to 92.2% for room organisation. Further analyses are ongoing and these results will be available in June 2015 (HCW level, stratifications by specialty).

Conclusion: Such a large participation will serve as a national reference leading to TBP promotion actions for security improvement at local and national levels, as announced in the French national programme on healthcare-associated infections prevention.

Disclosure of interest: None declared.

P92
Factors associated with influenza vaccination compliance at a tertiary care teaching hospital in Argentina
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Introduction: After pandemic influenza A H1N1 in 2009, an increase in influenza vaccination compliance among healthcare personnel was evident in all care settings. However, these levels could not be sustained over time. Although different variables are associated with the level of compliance to influenza vaccination, these have not been evaluated at institutional level in our country. Their identification could allow adjustments in influenza vaccination campaigns in order to increase its compliance.

Objectives: To identify factors associated with influenza vaccination compliance during a multyear period of intervention.

Methods: A retrospective observational study, at a 142-bed tertiary care teaching hospital, was conducted to evaluate those factors associated with influenza vaccination compliance. All staff who worked for at least four years between March 2010 and June 2014 was included in the study. As influenza vaccination is mandatory for staff in our institution, Department for Infection Prevention and Control implemented annual campaigns to increase the compliance with this recommendation based on brochures, reminders and vaccination in the workplace.

Results: There were 6,012 opportunities of influenza vaccination with an overall compliance of 75.8% (95% CI 74.8% – 76.9%). Significant differences in compliance were observed between ancillary staff (94.0%), nurses (91.7%), and physicians (50.9%). Females have better compliance (83.2%) than males (62.8%), and employees (87.5%) than contract personnel (46.8%). Influenza vaccination decrease significantly from age 19 – 29 years (90.7%) to age ≥ 60 years (53.9%). Except sex, the remaining variables persisted in the controlled multivariate model for compliance. The overall rate of compliance decreased from 76.9% in the first year of vaccination to 71.4% in the final year, reaching a peak of 82.2% in the second year.

Conclusion: Despite an acceptable level of compliance immediately after the pandemic, the study allowed to demonstrate a significant reduction in vaccination rates in recent years. Since, medical staff, and contract personnel represent the groups with less influenza vaccination compliance, target strategies should be developed to improve the compliance of future influenza vaccination campaigns.

Disclosure of interest: None declared.

P93
Risk factors for delayed isolation of tuberculosis patients in a tertiary care hospital in a low-incidence country
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P93

Introduction: Delayed isolation of tuberculosis patients increases the risk of nosocomial transmission.

Objectives: The purpose of this study was to analyze risk factors for delayed isolation of tuberculosis patients in a tertiary care hospital in the Netherlands.

Methods: We included all patients with culture-proven Mycobacterium tuberculosis infection between January 1st 2010 and December 31st 2012. Demographic and clinical information was collected retrospectively from the medical records. Risk factors were analyzed using univariate and multivariate logistic regression. A prediction model for non-isolation was developed.

Results: In the three-year time period, 58 patients had a culture-proven tuberculosis infection in our hospital, 20 with an extrapulmonary infection only. For 41 patients (70.7%), isolation measures were not taken. Twelve of these were patients with extrapulmonary tuberculosis only, and in these cases isolation measures were forgotten with aerosol generating procedures. The median number of days of non-isolation was 4 (range 1-162). For the patients with pulmonary tuberculosis (38 patients, 25 (65.8%) not isolated) four factors were predictive for non-isolation: presence of the symptom "fatigue", absence of hemoptysis, absence of tuberculosis in the differential diagnosis, absence of involvement of a pulmonologist or infectious diseases specialist on admission. Due to these non-isolated patients, 1113 health care workers and 78 patients had to be screened for tuberculosis.

Conclusion: In a low-incidence setting, it seems that tuberculosis patients with a clinical presentation that is not "classical", tuberculosis is not included in the differential diagnosis, and experts in tuberculosis are not consulted. This leads to delayed isolation of patients, which is a risk for health care workers and other patients.

Disclosure of interest: None declared.

P94
Air change rate vs airflow pathway: bioaerosol containment and removal in patient rooms
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Introduction: Recent studies have shown that higher air change rates may have the unintended consequence of creating turbulent airflows that entrain high concentrations of infectious particles within the breathing zone, and possibly, breakdown pressure relationships necessary to contain the spread of infectious particles to other clinical spaces.

Objectives: A series of experimental and numerical tests were conducted in an actual hospital to observe the containment and removal of respirable aerosols (0.5-10µm) with respect to ventilation rate and directional airflow in a general patient room, and, an airborne infectious isolation room (AIR).

Methods: A total of four experimental tests were conducted; two each in a general patient room and an infectious isolation room. A synthetic oil (polyaliphatic olefin) was continuously aerosolized at a rate of 15mg/0.4L of air per second to generate an aerosol (0.5µm - 10µm) at the approximate height of a patient lying at rest (0.6m). Particle size distribution samples
were drawn at 30 sec intervals at 30 sampling locations in the test rooms over 4 hours. Computational analyses were used to validate the experimental results, and, to further quantify the particle transport phenomena.

**Results:** Increasing mechanical ventilation from 2.5 to 5.5 ACH reduced aerosol concentrations only 30% on average. However, particle concentrations were more than 40% higher in pathways between the source and exhaust as was the suspension and migration of larger particles (3-10μm) throughout the patient room(s). Higher ventilation rates did not appear to affect directional airflow relationships between corridors and patient rooms having anterooms and a pressure differential of ≥ 2.5PΔ.

**Conclusion:** Higher ventilation rates were not found to be proportionately effective in reducing aerosol concentrations. Airflow pathways, not air change rates, were found to be the dominant environmental factor for bioaerosol migration and potential cross-infection.

**Disclosure of interest:** None declared.

**References**


**P95**

Experience of source isolation during hospitalization – a qualitative study

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**Antimicrobial Resistance and Infection Control** 2015, 4(Suppl 1):P95

**Introduction:** This study explored and describes the factors that may influence how patients react to source isolation from others during hospitalization.

**Objectives:** The study also sought to determine how background variables such as gender, age and previous hospitalization affect source isolation.

**Methods:** This qualitative study used content analysis to review data collected from interviews with five patients.

- The conceptual framework describes antibiotic resistance and infection control from a public health perspective and explored its prevention in Denmark.
- The theoretical framework describes how patients experience an infection acquired by exposure to drug-resistant bacteria, as well as subsequent isolation.

**Results:** The limited space, lack of contact with people resulted in patient monotony and anxiety.
- Women showed greater concern about precautions against infection, and about risk of transmitting disease to visitors.
- Men outwardly resigned themselves to the situation and did not speculate about infection precautions. Men had a more rational approach, and tended to cope better when isolated.
- Younger patients seemed to have better coping strategy during isolation.
- Elderly patients felt sad and lonely.
- Patients developed their own strategies for coping with source isolation.

**Conclusion:** Hospitals need more alternatives (e.g., better training and improved treatment) to prevent negative psychological affects due to isolation without compromising infection prevention. Hospitals should update their personnel at all organization levels, and focus on room facilities in the ward, contact time and improved information. Risk assessment should be individualized for each patient.

**Disclosure of interest:** None declared.

**P97**

Quantifying the magnitude of hazardous incidents among laboratory staff in Kenya; preliminary results of a national health care workers survey, 2014-2015

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**Antimicrobial Resistance and Infection Control** 2015, 4(Suppl 1):P97

**Introduction:** Occupational health surveillance data are vital to effective intervention. Limited information is available on the magnitude of occupational injuries among laboratory personnel in Kenya.

**Objectives:** We set out to quantify the prevalence of hazardous injuries among laboratory personnel in Kenya.

**Methods:** As part of the Kenya’s premier national public health laboratory’s training on bio-safety and bio-security, laboratory personnel were invited to take part in a survey on occupational hazards and the safety climate at their workstations. Descriptive statistics were used to summarize types of hazardous incidents experienced by laboratory personnel. Logistic regression was used to describe factors associated with reporting a hazardous injury.

**Results:** One hundred and sixteen laboratory personnel drawn from 108 health facilities participated. Majority were drawn from public health facilities (90%); the others were from private health facilities (8%) and faith based organizations (2%). Twenty-five (22%) were from facilities that had reporting mechanisms for occupational exposures. The median duration of service was 4 years (Range 0.2-33.0) and 18 (16%) had ever been trained on biosafety. Eighty-nine (77%) personnel experienced by 127 incidents, these were: spills (46), sharps injuries (38), hazardous gas inhalation (19), subcutaneous chemical exposures (17), falls (6) and hazardous agents ingestion (1). Incidents occurred during spillage (44%), laboratory procedures (35%), waste handling (28%), surface-contamination (22%), maintaining equipment (9%), device use (7%), while others were due to inappropriate dressing (8%), food stuff in work area (4%), fires (2%) and heavy lifting (1%). At the time of incident, PPE donned by the majority were gloves (87%) and lab coats (82%). Only 63% (56) reported their incidents;

**Disclosure of interest:** None declared.

**P96**

Risks of needlestick injuries in nursing homes for dependent seniors: myth or reality?

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**Antimicrobial Resistance and Infection Control** 2015, 4(Suppl 1):P96

**Introduction:** As part of the monitoring of needlestick Injuries (NSI), there is no data available on the risk of healthcare workers NSI in nursing homes for dependent seniors.

**Objectives:** The objectives of this study are to identify risk situations of NSI, to estimate the occurrence risk of NSI and to evaluate the NSI management in nursing homes.

**Methods:** This study took place from September 22th to November 21th 2014, by all nurses employees in nursing homes in the Rhône-Alpes region (France). This study is based on volunteering with 2 questionnaires available online: one for each institution and one for each nurse. The questionnaire for nurses is self-administered and anonymous. The descriptive analysis of regional data was performed using the software Epi-Info version 6.04.

**Results:** Among 679 nursing homes in the Rhône-Alpes region (France), 163 participated to the study (24%). These nursing homes employed 1123 nurses, among whom 801 answered the evaluation (71%). 183 nurses reported a NSI event during their activity in nursing homes (22.8%), including 63 during the last 12 months of activity (34.4%), thus a NSI rate of 7.9% in the past year. The NSI occurred during a subcutaneous injection (86 cases, 47.5%) including 60% when using a pen injector; a blood collection (59 cases, 32.6%) including 55.9% of capillary sampling; a subcutaneous infusion (18 cases, 10%). A third of these NSI occurred when removing the medical device. Thirty percent of nurses make the wound bleed. Nearly a third of nurses (29.3%) did not benefit from an expert opinion following the NSI and only a third (34.8%) received this expertise within 4 to 6 hours following the NSI.

**Conclusion:** This study shows that nursing homes are also at risk of NSI, since nearly 1 nurse in 4 reports a NSI event. The use of pen-injector is one of the major causes of AES. Furthermore, the management of NSI appears as suboptimal in these institutions. This study should enable to raise awareness among all healthcare workers, and lead to the implementation of preventive actions for NSI in nursing homes.

**Disclosure of interest:** None declared.
sharp injuries were more likely to have been reported (OR 3.1 95% CI 1.4-7.0, p < 0.05).

Conclusion: Due to the magnitude of occupational hazards, an integrated information and incident management system should be implemented to routinely document occupational hazards.

Disclosure of interest: None declared.

P98

The relationship between laboratory safety climate and hazardous incidences among laboratory staff selected health facilities in Kenya: preliminary results from an on-going national health care workers survey

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Introduction: Hospitals’ safety climates have been correlated with incidents of exposure to blood and body fluids.

Objectives: We examined the relationship between laboratory safety climates and hazardous incidents among laboratory personnel at selected health facilities in Kenya.

Methods: A survey on history of hazardous incidents and safety mechanisms was conducted among laboratory personnel in Kenya. A hazard was defined as a fall, inhalation of harmful gas, ingestion of hazardous agents, subcutaneous chemical exposure, sharp injury or a hazardous spill. The laboratory safety climate was rated on a ten point scale. We used univariate analyses to describe the relationship between experiencing a hazard and the safety climate.

Results: One hundred and thirteen laboratory personnel were interviewed; the median duration of service was 4.0 years (range 0.2 - 33 years), 62 (53%) had received Hepatitis B vaccination and 18 (16%) had been previously trained on biosafety. Health facilities were equipped with: sharps’ disposal facilities (90%), PPE (82%), waste disposal mechanisms (60%), containment of hazardous wastes (38%), fire safety equipment (38%), vaccination measures (28%), reporting mechanisms for exposures (22%), safety equipment (19%), protocols for occupational injuries documentation (17%) and safety audits (10%). Eighty-one (77%) laboratory personnel had experienced a hazard. Having been vaccinated against Hepatitis B, trained on biosafety, availed to safety mechanisms and work duration were not associated with history of a hazard.

Conclusion: Although the relationship between hazardous incidents and safety mechanisms is not of statistical significance, the absence of appropriate laboratory safety mechanisms it still is of public health concern. Equipping labs with necessary safety infrastructure as well as assessing personal factors related to injuries may decrease the incidences of laboratory hazards.

Disclosure of interest: None declared.

P99

Did the pandemic virus A(H1N1)pdm09 interfere other respiratory viruses? Evidence from the subtropical city Hong Kong

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Introduction: The first wave of the novel influenza virus A(H1N1)pdm09 in the subtropical city Hong Kong coincided with the summer epidemics of seasonal influenza and other common respiratory viruses. We hypothesize that this virus could have interfered the regular seasonality of other respiratory viruses.

Objectives: We obtained surveillance data from a tertiary hospital to test the hypothesis of viral interference.

Methods: Weekly age-specific numbers of positive specimens for influenza A(H1N1)pdm09, seasonal A(H1N1), A(H3N2), influenza B, respiratory syncytial virus (RSV), adenovirus and parainfluenza were aggregated into the age groups of 0-4, 5-17, 18-64, and 65+ years during 2004 to 2013. Wavelet analysis was used to assess the temporal patterns of age-specific epidemic curves of other respiratory viruses were compared across the pre-pandemic, pandemic and post-pandemic periods. The epidemic peak time of each virus was also calculated separately for the winter and summer peaks in the pre- and post-pandemic seasons.

Results: Positive proportions of viruses other than A(H1N1)pdm09 markedly decreased in all the age groups during the first pandemic wave. After the first wave of the pandemic, the positive proportion of A(H3N2) increased, but those of B and RSV remained slightly lower than their pre-pandemic proportions. Changes in seasonal pattern were also observed, but inconsistent across virus-age groups. As compared to the pre-pandemic period, the delayed peaks during the post-pandemic period were observed in A(H3N2) in all age groups and RSV of the 0-4 age group. By contrast, influenza B, adenovirus and parainfluenza showed slightly earlier winter and summer peaks in most age groups.

Conclusion: There is some evidence that age distribution, seasonal pattern and peak time of other respiratory viruses have changed since the pandemic. These changes could be the result of viral interference, but could have also been caused by changing health-seeking behavior and other unknown mechanisms. The observed changes suggest a need to consider viral interference while formulating control policies, particularly the vaccination policy in different age groups.

Disclosure of interest: None declared.

P100

Survival and re-aerosolization in dust of Mycobacterium smegmatis, a surrogate marker for Mycobacterium tuberculosis

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P100

Introduction: Mycobacterium tuberculosis (MTB), an essentially airborne pathogen transmitted via aerosols remains viable while in the soil, outside its hosts for extended periods of time. It has been suggested that MTB cannot be re-aerosolized and cause disease once it has landed outside the body in dust or the environment.

Objectives: This project aimed to answer several questions relating to MTB and its ability to cause disease after re-aerosolization: Can MTB be re-aerosolised? Does re-aerosolized MTB remain viable? If viable, can it cause infection? Can environmental bioburden be reduced using copper surfaces?

Methods: This prospective in vitro study was of two phases (1*non-copper and 2*cooper) preceded by a pilot study. Non-pathogenic fast growing Mycobacterium smegmatis(MSM) was used as a surrogate for MTB. 125 mg of sterile dust was spread in a sealed plexiglass aerosol chamber prior to nebulization of 20 ml of 106 cfu/ml of MSM LA six stage Anderson air sampler and settle plates were combined for sampling before and after re-aerosolization of dust using two small fans. Plates incubation at 37ºC lasted 3-10 days. Estimation of CFU number was based on viable plate count.

Results: MSM survived for more than 19 days in dust in the absence of copper and could be re-aerosolized, whereas in the presence of copper, its survival rate was about 10 days after nebulization in dust- almost 50% less than on a non-copper surface. Twenty-four hours after nebulization, was noted a significant decrease in both copper (17.88%) and non-copper (100%) for respirable particles, but copper still showed significantly lower levels of mycobacteria.

Conclusion: MSM, surrogate marker for MTB survived in dust and remained viable after re-aerosolization. This study demonstrated that mycobacteria can be re-aerosolized and remains viable. This is particularly relevant in low to middle income countries with high MTB bioburden where dust is common and sweeping in healthcare facilities is frequent. It also illustrated that anti-microbial properties of copper surface remain effective in dust. Copper can be used as a touch surface to reduce the bioburden of microbes including mycobacteria.

Disclosure of interest: None declared.
**P101**

**How much Sistan was successful in tuberculosis control?**

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**References**

None declared.

**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**P102**

**Eastern Mediterranean region tuberculosis economic burden in 2014**

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**References**

None declared.

**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**
in educating the public about multiresistant organisms and infections to achieve a comprehensive approach to their prevention and control. Disclosure of interest: None declared.

P104

Systematic and mandatory monitoring by the public health authorities – a novel approach to improve infection control and increase patient safety

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P104

Introduction: Although infection control is the main responsibility of hospitals themselves the public health system has its own important role in enhancing patient safety. The increasing threat of multiresistant bacteria and outbreaks of nosocomial infections gave a reason to restructure the tasks and responsibilities of the Bavarian public health service in 2010.

Objectives: Monitoring of medical institutions had been performed by the public health only when there was a cause of concern. This was considered to be insufficient and to lead to inadequate knowledge in hospital hygiene. Accordingly a multi-step improvement was carried out: a) knowledge in hospital hygiene was enhanced by introducing mandatory yearly training courses and allocating more specific teaching time in the basic training of public health staff, b) a special unit (SEI) for hospital hygiene with the authority to enforce legal actions was founded and c) yearly mandatory, standardized monitoring programs with special focus points are performed by the public health offices and the SEI.

Methods: The monitoring programs consisted up to 2015 in following topics: quality and amount of infection control staff; operation, emergency and obstetric department; intensive care units (ICU); bone marrow transplantation units; out-patient operative centers; surveillance of nosocomial infections on ICU; management of multi-resistant bacteria and antibiotics; performance of hand hygiene and decontamination of the environment. Public health offices and SEI used during the inspections newly developed check lists to ensure a standardized monitoring protocol. The results were communicated locally, to the Ministry of Health, to medical associations and to professionals in the field.

Results: The awareness for the problems in hospital hygiene was enhanced tremendously by this multistep program. For instance additional staff for infection control is assigned increasingly. Several training centers started not only new courses but participated also in defining standard teaching courses. The monitoring programs revealed constructional deficiencies, which led to a specifically funded building program.

Conclusion: All these improvements are important aspects of enhancing patient safety. Disclosure of interest: None declared.

P105

A paradigm shift in public health structures: creating sustainable systems to achieve global healthcare equity

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P105

Introduction: A paradigm shift is required to effectively serve the public health needs of the developing world. Such a shift will rely on more efficient partnerships between public health entities, as well as more sustainable models of providing care, and the application of new medical technologies.

Objectives: Low- and middle-income countries currently face a public health epidemic due to the inability to properly serve resource-poor and remote communities. Lack of communication between the many nonprofit, governmental, and other entities involved plague attempts to increase health of resource-poor populations. An organized approach that includes local, national, and international agents is required to efficiently provide public health services. Such a paradigm shift would be sustainable, unlike current models, and allow local medical professionals to take charge in the administration of care with greater effectiveness.

Methods: By aligning efforts of governments, nonprofit organizations, and other entities, more efficient and effective care can be administered to those who need it. We propose to organize these efforts, while also teaching and equipping healthcare professionals in developing settings to run self-sufficient and sustainable clinics for the rural poor. Along with building local health infrastructure and establishing partnerships, research and implementation of novel therapeutics must be explored.

Results: Sustainable healthcare administration at the local level is essential. Healthnovations International works to empower local medical professionals to provide sustainable care for those in resource-poor settings. Local clinics are provided with equipment and other necessities to help them become self-reliant. Once this independence is achieved, the local health professionals working in the clinic take on full administrative responsibility.

Conclusion: By encouraging thoughtfully orchestrated efforts across governmental and not-for-profit entities, resources can be intelligently distributed to those who need them most. Meanwhile, to complement this top-down approach to global health, local clinics and village medical professionals must be empowered to deliver care both effectively and sustainably. By balancing these two approaches, true health equity can be achieved around the world.

Disclosure of interest: None declared.

P106

Using modern concepts to engage the world in an annual public health campaign

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P106

Background: Public health campaigning has been used for a number of decades to promote awareness and understanding about health issues and to mobilize action. In 2015, billions of people across the world have the opportunity to access and support campaigns due to the ownership of smart, mobile technologies. The WHO SAVE LIVES: Clean Your Hands campaign is in its 7th year. In order to maximize the impact of this global annual campaign, each year a new creative focus is given to the topic of hand hygiene in health care.

Objectives: a) To visually represent real life, using a three-pronged advocacy approach for hand hygiene improvement, with a focus on health-care managers, health workers and patients and using a low budget, engaging and easily replicable idea; b) To stimulate activism across the globe; c) To progress the campaign’s legacy and 2015 theme of strong health systems using hand hygiene as the ‘entrance door’ to infection control.

Methods: Current global health campaigns featured on social media were reviewed to determine the state of the art and what might best capture people’s attention, aiming to keep the campaign fresh, relevant and connected to the audience’s frame of reference. Hashtags appropriate for use in promoting hand hygiene on a global scale were explored. Communications expertise and a creative agency was secured to further explore and assess the impact of a new medium for promoting the campaign and hand hygiene in health care.

Results: A one-minute video was created using hospital management staff, health workers and patients, filmed in a real life setting. The focus was on promoting ‘safe hands’ in health care using the phrases ‘I promote’, ‘I provide’ and ‘I deserve’. The video built upon WHO recommendations and previous messages to ensure greatest impact, consistency and credibility.

Conclusion: Short advocacy videos featuring a promotional concept that people all over the globe can be part of are currently one effective way to promote awareness and understanding of a key public health issue and overcome campaign fatigue.

Disclosure of interest: None declared.
P107

Public health management of group A streptococcal infection in mother-baby pairs in England: a case series review

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

Introduction: Group A streptococci (GAS) are causative organisms in a large and increasing proportion of UK puerperal sepsis deaths, and remain an important consideration in neonatal sepsis in the UK and around the world. UK guidelines advise that both mother and baby should be treated with antibiotics if either develops an invasive GAS (iGAS) infection in the 28 days following birth to reduce the risk of iGAS developing in the other party.

Objectives: To assess compliance with the UK guidelines in mothers who develop GAS infection in the puerperium over a 2-year period across the North East of England.

Methods: We reviewed records of all cases of GAS infection notified to the North East Health Protection Team (part of Public Health England) between 1 Sep 2012 and 31 Aug 2014 in women who had given birth in the preceding 28 days. We assessed whether antibiotics had been prescribed in each case, and the process through which antibiotic prescription had been arranged.

Results: In 19 of 24 pairs, both mother and baby received antibiotics, though 2 babies received courses which deviated from the guidance. The hospital treating the mother prescribed antibiotics for the baby in 14 pairs, though agreed to do so only after consultant intervention in 3 of these pairs. GPs prescribed antibiotics for 5 remaining treated babies. In 2 pairs, only the mother received antibiotics. In 3 pairs, neither mother nor baby received antibiotics.

Conclusion: Some variation is explained by the clinical picture: there is little rationale to treat mothers (or babies of mothers) who have GAS isolated on microbiological samples but whose clinical picture does not suggest iGAS infection. Some variation resulted from poor understanding: 2 babies were not prescribed antibiotics as they were assessed as “clinically well”, missing the point of antibiotic prophylaxis. Some junior staff refused to prescribe antibiotics until instructed to do so by a consultant.

To improve consistency of practice, the Health Protection Team is developing a regional protocol for treatment of puerperal GAS cases in conjunction with clinical colleagues.

Disclosure of interest: None declared.

Reference


P108

An audit on pneumococcal vaccination rates among adult patients with asthma and chronic obstructive pulmonary disease (COPD) in a local polyclinic

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

Introduction: Pneumococcal disease is a preventable cause of morbidity and mortality. It can lead to pneumonia, bacteremia and meningitis. S. pneumonia infection is the most common cause of community acquired pneumonia worldwide. The common serotypes isolated were all covered by the pneumococcal vaccine. Smokers, patients with heart disease, asthma, COPD, diabetes mellitus, alcoholism, liver cirrhosis as well as the immunocompromised are at a greater risk and should be vaccinated. All adults aged 65 years and older should also get the adult Pneumococcal vaccine as long as it has been 5 years since the previous dose and they have no contraindications.

Objectives: To increase uptake of adult Pneumococcal vaccination rates in patients with Asthma and COPD in Bukit Batok Polyclinic from September to November 2013 to at least 10%.

Methods: All patient visits coded with the Diagnoses “Asthma” and/or “COPD” in the months of May-November 2013 were retrieved from the clinic database with the help of our clinic operations executive and IT support staff. Those who were administered the adult Pneumococcal vaccine (PPSV23) vaccine in these months were identified. Patients who were less than 19 years old, or were already previously vaccinated were excluded. A root cause analysis showed multiple physician, system and patient factors. Appropriate interventions were put in place and the vaccination rates were reassessed.

Results: The results showed an improvement in uptake rates with the highest rate of 5.99% in October 2013.

Conclusion: Physician recommendation and increasing patient awareness of the vaccine were effective in increasing uptake rates. Doctors should target suitable patients for vaccination in every doctor-patient contact, dispel misconceptions, offer information and provide adequate counselling about the risks and benefits of the vaccine. Electronic prompting to remind physicians to offer vaccinations and clinical audit of immunisation rates is likely to be an effective way of improving and monitoring vaccine uptake rates.

Disclosure of interest: None declared.

References


P109

Innovation of stamp campaign for strengthening of routine immunization eradication of polio

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

Background: Polio is still crippling disease in Pakistan around 306 cases reported by year of 2014, this is alarming situation regarding polio virus around globe too, therefore to strengthen routine immunization eradication of polio is a goal to achieve health standard better regarding morbidity and mortality. The innovative stamp campaign for psychological, emotionally and healthy activity of stamps on children hand about polio to develop interest and impact for polio awareness/education for eradication.

Aim and object: To eradicate polio free world, and object is educate, aware children about importance of polio drops and routine immunization.

Material and method: Descriptive study by questioner among the school children to enhance capacity about polio awareness, therefore we put polio stamps on children hands and educate them about polio after that we analysis the data by asking question about polio and its importance on spss version 11.

Results: Sample size: 500 hundred children were stamping regarding polio.

The outcomes of the properly given answers:

What is polio? Answers were: 353 (70.6%), what happen in polio? Answers were: 293 (58.6%). How many drops given? Answers were: 343 (68.6%), at what age groups taken polio drops? Answers were: 281 (56.2%), Did you like the polio stamp campaign? Answers were: 427 (85.4%).

Conclusion: Polio is challenging issue by innovation of stamp campaign play most important role in development according to growth of brain (age) here we are still facing crawling love disease (polio), therefore to regret the wrong myths create awareness engage community and children like polio stamp campaign the outcomes and impact of such campaign gives meaning full evaluation results regarding awareness that will bring change to eradicate polio from globe.

Disclosure of interest: None declared.
Introduction: The World Health Organization estimates that of the 2.6 million new cases of Human Immunodeficiency Virus (HIV) infections worldwide annually, nearly 370,000 (14%) occur in persons under 15 years. Nigeria has the 2nd highest number of new infections world-wide with 3.7% of the population living with HIV.

Objectives: Our objective was to collect information on socio demographic characteristics, knowledge about prevention of transmission of HIV and Sexually Transmitted Infections (STIs), and assess the attitude towards information about subject matter, and sexual practices.

Methods: We conducted a descriptive cross sectional survey, amongst adolescent secondary school students in Ibadan, Oyo State, Nigeria. We used a multistage sampling technique to select 270 respondents. Structured researcher-guided self-administered questionnaire was adapted to collect information. Data analyzed was expressed as descriptive statistics and chi-square (x2).

Results: Mean age of respondents was 14.5 ± S.D 1.5 years. Of 270 students, 102 (38%) were male, 224 (83%) affirmed that sex should be delayed, however 26 (10%) of the students were sexually active, with all 26 (100%) of this proportion having unprotected intercourse. A total 124 (45.9%) believe that unprotected sex increases the risk of HIV/AIDS, sexually transmitted infections and unplanned teenage pregnancy, with knowledge being significantly associated with female gender (x2= 8.757; p<0.05) and being a senior secondary student (x2=53.758; p<0.05).

Conclusion: Lack of information about sexual health and HIV, poor knowledge of HIV transmission and unprotected intercourse amongst sexually active adolescents, are major drivers of HIV infections, and barriers to ending the pandemic in at risk groups. Sexual health and sexuality education should be incorporated into secondary school curriculum in Oyo state, and in Nigeria, with improved access to information on safe sexual behavior through youth-oriented public awareness campaigns.

Disclosure of interest: None declared.

Mitigating the impact of HIV/AIDS among in and out of school youth through peer education using family life HIV education in federal capital territory ABUJA NIGERIA

P111

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P111

Introduction: HIV/AIDS has systematically permeated the entire Nigerian social fabric, affecting males and females in both urban and rural areas, as well as adolescent young people.

Objectives: This paper presents findings from an evaluation of a HIV prevention program designed to determine the effects of HIV prevention intervention (HPI) on in school youths in AMAM Local Government Area Abuja Nigeria.

Methods: Data were collected from 75 trained peer educators from three Schools in AMAC Local Government Area FCT Abuja Nigeria and also 100 in school youths who were not trained. Data were also collected at the beginning and end of the intervention among 950 in school youths that were reached with peer education in three Schools and also among other 1100 in school youths from three other schools that were not reached with the program using qualitative and quantitative research methods.

Results: The findings revealed that the programme had several positive effects on the students such as increase in knowledge of HIV/AIDS, adoption of preventive behavior and acquisition of life skills. The quantitative data shows the knowledge of the respondents have increased by 71% at the end of the intervention and the result also shows that the students trained as peer educators have higher knowledge of HIV prevention and life skills than those who were not trained.

Conclusion: The quantitative and qualitative data show that the project has produced several positive multiplier effects on the knowledge and behavior of youths. The findings also show it is necessary to focus on young people because they are at the center of the HIV/AIDS epidemic. The project shows that Peer education is one of the best approaches to providing comprehensive knowledge on HIV/AIDS/STIs and related issues, as it provide an excellent environment for effective peer-to-peer learning.

Disclosure of interest: None declared.

Increasing HIV counseling and testing services uptake among young people aged 15-24 years, a pilot intervention of soccer activities in Kpaduma II AMAC Local Government Area Federal Capital Territory Abuja Nigeria

P112

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P112

Introduction: Uptake of HIV Counseling and Testing (HCT) among young people aged 15-24 years remains relatively low in Nigeria (54.2% for males and 21.3% for females, according to a report published 2004 by Population Council). This low uptake of HCT may hinder access to HIV prevention and care among young people.

Objectives: The overall objective of this project was to promote uptake of HCT among young people 15-24 years with the use of soccer activities in Kpaduma II AMAC Local Government Area Federal Capital Territory Abuja Nigeria.

Methods: Data on access and attitudes towards HCT were collected among 273 young people aged 15-24 years living in Kpaduma I and Kpaduma II AMAC Local Government Area Abuja Nigeria. The data were collected using qualitative and quantitative methods. Qualitative data was obtained using key informant interviews and focus group discussions while the quantitative was obtained using structured questions. After the survey, a soccer tournament was organized in the Kpaduma II which is the intervention community with aim to bring youth together to promote the uptake of HCT services. Education sessions on HCT services were organized at the end of each game during the tournament and messages address fear of being positive and stigmatization.

Results: Out of the 273 respondents who were interviewed in the two communities, (50.4%) were males and (49.6%) were females. About (61%) female respondents in Kpaduma I and Kpaduma II communities reported that they had taken an HIV test and (52%) male respondents reported that they had not taken a test said they could not take a test due to confidentiality, fear of being tested positive and stigmatization. Over 600 people attended and about 450 tested at the events and received their results and also condoms and information flyers were distributed.

Conclusion: Soccer as a platform for HIV prevention should be encouraged because it can be harnessed to create sustained behavior change in participants and it’s participatory, team based, and can be used to facilitate both knowledge acquisition.

Disclosure of interest: None declared.

Accreditation of HIV services to improve infection control system of hospital – experience from India

P113

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P113

Introduction: Patient care in hospital has been assessed with various tools like PLHIV Friendly Checklist for Hospital developed by UNAIDS. These process helps in acknowledging the constraints within hospital to provide stigma and discrimination free services to PLHIV even in general hospitals. In order to ensure that quality standards are maintained,
Christian Medical Association of India developed an Accreditation process by which the member institutions are assessed at various interval of times. **Objectives:** To ensure strengthening of infection control for patient safety through an Accreditation of HIV Services.

**Methods:** Christian Medical Association of India (CMAI) as a network of Christian Hospitals in India developed an Accreditation tools with inputs from experts to assess the quality of HIV Services provided in the hospitals. CMAI trained and oriented experts in the field to conduct the assessment in selected hospitals. The results were discussed with the hospital and action plans for improvement were made in consultation.

**Results:** CMAI assessed 5 of the member institutions as a pilot to assess the services provided by the hospital to be PLHIV friendly. The areas assessed included Counseling, Out – patient HIV care, Medical Care, Obstetric Care, Surgical Care, HIV Testing, Infection Control, Blood Safety, Post - Exposure Prophylaxis, Staff Education, HIV Team, HIV Policy and guidelines, Organization of positive people/Community Organization, Networking with NGO's/private practitioners and other hospitals, Home based care, Discrimination/Stigma, Drug availability and access. A total of 105 schools were examined with each component having different levels of quality improvement. The hospitals assessed scored 67, 85, 73, 102 and 59. It was observed that areas like networking and support groups were lacking in most of the hospital. Policy and guidelines to ensure implementation of the stigma-free and non-discriminatory environment was also a necessity. **Conclusion:** A comprehensive care and support for PLHIV extends beyond hospital settings and needs to be a part of the service provided in a hospital with necessary linkages and networking. Accreditation of HIV services assisted the hospital in developing action plans for improvement and also monitor accordingly.

**Disclosure of interest:** None declared.

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**P114**

Prevalence of Staphylococcus aureus, Escherichia coli and Salmonella spp. isolated from meat and cooked meat at Khon Kaen Municipality Schools

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P114**

**Introduction:** Staphylococcus aureus, Escherichia coli and Salmonella spp. are important causes of enteric illness. Foods of animal origin have been consistently implicated as the main sources of enteritis in school children.

**Objectives:** The purpose of this study was to determine the prevalence of Staphylococcus aureus, E. coli and Salmonella spp. in meat and cooked meat.

**Methods:** The raw and cooked pork and chicken in the canteens from 11 Khon Kaen Municipality Schools (average age 10-16 year) were collected between February and March 2013. Fifty-three were from raw meat and 91 were from cooked meat. Salmonella spp., Staphylococcus aureus and Escherichia coli were detected by ISO 6579:2002, AOAC Official Method 998.08 (3M Petrifilm) and AOAC Official Method 2003.11 (3M Petrifilm), respectively.

**Results:** The results showed that the raw meats were contaminated with S. aureus, E.coli and Salmonella spp. 43.40%, 62.26%, 56.60% and 25.27%, 43.96%, 7.69% in cooked meats, respectively.

**Conclusion:** The source for meat consumption should be from standard farms and slaughterhouses. In addition, hygienic kitchens, cooking skills, and healthy cooks are major factors for hygienic municipality school canteens, so they are safe for school children consumption.

**Disclosure of interest:** None declared.

**References**


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**P115**

The effectiveness of health education programs on the Opisthorchis viverrini in junior high school, Nakhon Ratchasima, Thailand

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P115**

**Introduction:** Opisthorchis viverrini is a major public health problem in Thailand. It is associated with cholangiocarcinoma, the highly fatal bile duct cancer. Therefore, experimental research was conducted to improve the knowledge on the Opisthorchis viverrini using health education program among junior high school in Nakhon Ratchasima province Thailand.

**Objectives:** Experimental research was conducted to improve the knowledge on the Opisthorchis viverrini using health education program among junior high school in Nakhon Ratchasima province Thailand during November 2010 and January 2011.

**Methods:** Health education programs were created as follows a short movie, pamphlet, and game related to O. viverrini knowledge and perception. 200 students (12 and 15 years old) in secondary school were studied. The students were assigned an experimental (150 students) and control (50 students) group. The experimental group participated in the designated program activities for 2 weeks. Student knowledge levels were collected by questionnaires before and after the intervention program.

**Results:** The results indicate that the experimental group had significantly increased its knowledge of O. viverrini (126/150 students, 84%), perceptions of disease transmission, severity, prevention and control (p<0.01). It was also found that knowledge of O. viverrini transmission, severity, prevention and control, were significantly correlated with health education programs (p<0.001). In addition, the highly attractive and effectiveness were found in the short movie and game more than pamphlet (p<0.001).

**Conclusion:** The study suggested that health education programs were reach and effective to improve student knowledge particularly short movie and game. Moreover, this attractive movie and game could be realized the O. viverrini transmission, severity, prevention and control, it is recommended that this health education programs should be applied to other similar school to O. viverrini prevent and control in new generation age of Thailand.

**Disclosure of interest:** None declared.

**Reference**


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**P116**

Using of geographic information system for risk area analysis of liver flukes in Thailand

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P116**

**Introduction:** Opisthorchis viverrini is associated with cholangiocarcinoma and its high incidence in Thailand.

**Objectives:** This study aims to investigate the human behavior, and environmental factors influencing to the distribution, and to build a model using stepwise multiple regression analysis with geographic information systems on environment and climate data.

**Methods:** GIS was used for analysed the risk areas in Surin province of Thailand, from 2012 and 2013 including: human behaviors (knowledge, attitudes, and practice). Liver fluke infections were screened from 40 cases/districts) by Kato's thick smear. The relationship between liver fluke and human behavior, health service unit, and environmental factors using statistic analysis by stepwise multiple correlation.

**Results:** The O. viverrini infection was found in 46 from 680 eligible participants. The human behavior; attitudes, was correlated with the liver
fluke disease distribution at 0.000 level, while, the site of health service unit were not correlated with the liver fluke disease distribution. The relationship between the environmental factors; population density (148-169 pop/km²; \( X_{pop} \)), was correlated with the liver fluke disease distribution at 0.034 level. Land use factor has significantly correlation between wetland (\( X_{wet} \)), and liver fluke disease distribution at 0.006 level. The multiple regression analysis method was used to predict the distribution of liver fluke. Equation following: \( OV = -0.599 + 0.005(\text{population density (148-169 pop/km²); } X_{pop}) + 0.040(\text{human attitude (<50%); } X_{att}) + 0.022(\text{land used (wetland}; X_{wet}); OV = \text{is the patients of liver fluke infection, } R^2 = 0.878, \text{and, Adjust R Square: } 0.849. By equation, it was found population density (148-169 pop/km²), human attitude <50%, land used; wetland were effect on the disease dispersion.

Conclusion: Combination of GIS and statistical analysis which helps to simulate the spatial distribution and risk areas of liver fluke, is a potential tool for future planning a prevention and control.

Disclosure of interest: None declared.

Reference

P117 Utility of Xpert Carba-R® in diagnostic laboratory for early detection of carbapenem-resistant Enterobacteriaceae

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P117

Introduction: The emergence and global spread of carbapenem-resistant Enterobacteriaceae (CRE) is of great concern to health services worldwide. These bacteria are often resistant to all beta-lactam antibiotics and frequently co-resistant to most other antibiotics, leaving very few treatment options. Healthcare facilities need the ability to test high-risk patients and get an accurate result quickly during or prior to the admission process for better patient and bed management. Traditional enriched culture methods are laborious, taking up to 72 hours for a result.

Objectives: In our study, we evaluated the Carba-R kit from Cepheid GeneXpert, which is a rapid, and a comprehensive test that detects and differentiates the most prevalent carbapenemases (KPC, NDM, VIM, OXA-48 and IMP-1) is important for a successful infection control program.

Methods: We tested 60 resistant isolates as per manufacturer’s instructions. We used either known controls or other samples in which has been tested by Research Unit for genotyping detections. All tests have been performed as per manufacturer instructions.

Results: Of the 60 samples, all samples were for Klebsiella pneumoniae. 16 were negative as expected and 44 were positive as follow: TEN for NDM (22.7%), TWO for VIM (0.045%) and THE REST for OXA48 (72.7%). The assay correctly identified 56 of the samples and failed to identify FOUR isolates, which has multiple genetic resistant mechanisms.

Conclusion: Xpert Carba-R is a very promising tool for rapid screening of CRE, assay at small scope failed to detect multiple resistant mechanism, or mechanism at which CRE due to other rare genotypes not listed in the panel. Further studies needed to elaborate more on this assay.

Disclosure of interest: None declared.

P118 Knowledge and practice of infection control – in the NDMA era

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P118

Introduction: India has reported one of the highest rates gram negative resistance in the world. Knowledge on infection control and the translation of this into practice is of paramount importance for the performance of health care institutions.

Objectives: To assess the knowledge, attitude and practice on infection control practices in an ICU in an oncology, BMT and neurosurgical centre in South India.

Methods: This is a descriptive and observational study. A questionnaire was distributed amongst the health care workers (HCW), which included topics related to various infections control practices. Subsequent to this an observational study was also done on the same participants.

Results: Sixty nine respondents participated in the survey which predominantly included the nurses (60). 72.4% of the respondents had 1-5 years of experience in the hospital. Knowledge regarding PPE and Biomedical waste disposal based on questionnaire (Q in %) was 98.5 and compliance by Observational (O in %) was 92.5. Adherence to VAP bundle Q 97.1, O- 86.9, adherence to CRBSI bundle 92.7.0 -86.9, oral hygiene for VAP prevention Q 86.9, O-83. Knowledge on high end antibiotic Q-92.7, O (helped in tracking this ) -92.7%, use of alcohol based hand rub Q-98.5, O-94.2, five moments of hand hygiene Q and O 88.5, 6 steps of hand hygiene Q-92.5, O-65%.

Conclusion: There is a very good concordance between knowledge and practice of most participants in most of the components, except in the practice of performing all the six steps of hand hygiene where there was a discrepancy, though the rate was still very good. Most of the participants were nurses and so good overall compliance rate is expected. A study with active participation of doctors will reveal the true concordance between knowledge and practice of infection control, especially hand hygiene practices. Such audits will bridge the gap between awareness and practices. Disclosure of interest: None declared.

P119 Automatic discontinuation of isolation precautions and electronic alerts of MDRO positive patients: safe or sorry?

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P119

Introduction: The Netherlands have a low prevalence of Multi drug Resistant organisms (MDRO), in part due to their national guideline concerning MDRO carriers. Apart from being flagged in Electronic Health Records, immediate isolation precautions must be taken if the last MDRO culture and control cultures was 499 days (IQR 187-1055).

Methods: We performed a retrospective study in our tertiary care university medical centre by reviewing the data of all patients with MDRO alerts who were screened in 2014 to determine if MDRO carriage was still present. Patients with MRSA/VR/CRE carriage were excluded, since they follow different guidelines. Patients who are carrier of MDRO are cultured twice (throat and perianal swab) at least 24 hours apart. After 2 negative screening results of both sites, the MDRO carriage is considered not to be present anymore.

Results: In 2014, 238 patients were cultured for MDRO carriage. Median age was 59 (IQR 29-70) years, 55% (n=130) was male. Of the initial MDRO positive cultures, the most common material were urine (53%), rectal/ perianal/faecal (23%) and sputum cultures (6%). Most common micro-organism was Escherichia coli (n=136) with ESBL as the most prevalent resistance mechanism (35%).The median time between initial positive MDRO culture and control cultures was 499 days (IQR 187-1055).

Fifty-six patients tested MDRO positive in the first control cultures. Sixty-seven patients were screened a second time, of which 21 were MDRO positive (after initial negative cultures). 48% (95% CI 37.4-71.6) of the patients with the initial MDRO positive culture < 1 year ago, remained MDRO positive. Of the patients who had been labelled MDRO positive longer than 1 year ago, 26% (95% CI 20.2-34.6) remained MDRO positive.

Conclusion: Twenty-six percent of the patients labelled MDRO positive longer than 1 year ago, remain MDRO positive and can be a source of MDRO transmission within the hospital. Discontinuation of electronic alerts and isolation precautions for MDRO carriage should therefore be based on microbiological screening results.

Disclosure of interest: None declared.
P120
Prevalence of extended-spectrum beta-lactamase producing – Enterobacteriaceae (ESBL-E) carriage on admission at Geneva University Hospitals (HUG)
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P120

Introduction: The increasing prevalence of ESBL-E in the community is a cause of concern for hospitals. Early detection of ESBL-E carriers on admission could allow timely implementation of control measures or appropriate selection of antimicrobials.

Objectives: To describe the current prevalence of ESBL-E rates upon admission to 4 different services at HUG, in the context of a multicenter European study (R-Gnosis).

Methods: Patients admitted to 4 different services were screened by rectal swabs on admission. From January 2014 through January 2015, patients admitted to 4 wards, including: Ortho1 (sport traumatology), Ortho 2 (septic); Geriatrics (2 wards) and patients undergoing elective colorectal surgery (ECS) were screened from April 2013-October 2014.

Results: Overall, from 2394 admitted patients, 2136 were screened on admission (89.2%). Median age was 67.3 years (SD±20.9); 51.6% were male. Only 92/2136 (4.3%) had a previously known status of ESBL carriage. A total of 226/2136 (10.6%) patients were found to be ESBL-E carriers: E. coli (n=166; 73.4%); K. pneumoniae (n=26; 11.5%) and other Enterobacteriaceae (n=34; 15.0%). Among K. pneumoniae carriers on admission, 24/26 (92.3%), had a previous hospitalization less than 12 months before admission screening and 21/26 (80.8%) had the previous hospitalization within 3 months only. ESBL-E carriage was 83/981 (8.4%) and 61/430 (14.2%) for Ortho 1 and 2 respectively; Geriatrics, 42/371 (11.3%); and ECS, 41/354 (11.6%).

Conclusion: Overall 10.6% of patients screened were ESBL-E carriers upon admission at HUG, mostly due to ESBL-producing E. coli. Patients admitted to septic orthopedics, geriatrics and ECS had a higher prevalence on admission. The majority of ESBL- Klebsiella pneumonia carriers had a recent history of hospitalization.

Disclosure of interest: None declared.

P121
Extended spectrum beta-lactamase (ESBL) strains of E. coli as a cause of urinary tract infections in hospitalized patients
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P121

Introduction: Urinary tract infections are the second most frequent infections of any organ and among the most common infections in adults. They may be community-acquired or nosocomial, mainly caused by Gram negative bacteria, the most frequent finding being E. coli.

Objectives: The aim of our study was to determine the characteristics of urinary tract infections in hospitalized patients in the University Clinic of nephrology in Skopje, caused by ESBL positive E. coli.

Methods: Medical records were reviewed retrospectively and demographic data and clinical data were obtained in patients with ESBL positive E. coli. Study included 80 patients, 40 with ESBL positive and 40 with ESBL negative strains of E. coli.

Results: The groups did not differ in number, gender and age, but ESBL positive group was of older age and had more cases with urosepsis than the ESBL-negative group. Regarding the comorbidities, most of the patients had diabetes mellitus type 2- in 16 patients (40%) and 15 of them (37%) had chronic kidney disease. In most of the patients, antibiotics were used empirically before urine culture was obtained, which accounts for the high number of cephalosporins and hinolones used – 9 patients (22%), and amikacin in 11 (27%), imipenem 5 (8%). Univariate analysis of risk factors associated with ESBL+ infections, identified diabetes mellitus, sepsis and previous hospitalizations are predictors of ESBL positive infections. When the three variables were entered into a multivariate logistic regression, diabetes and sepsis were found to be predictors of ESBL positive patients.

Conclusion: Our results showed that ESBL-positive urinary tract infections were more frequently associated with sepsis, and that the index of comorbidities, although rather high in both groups, was not associated exclusively with ESBL positive strains. It is important to provide prompt diagnosis in cases with ESBL positive urinary tract infections, because improper treatment is a factor for higher mortality.

Disclosure of interest: None declared.

P122
Extended spectrum-beta-lactamase producing Enterobacteriaceae causing nosocomial infection in a tertiary care hospital, Nepal
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Introduction: The emergence and spread of resistance in Enterobacteriaceae are complicating the treatment of serious nosocomial infections and threatening to create species resistant to most currently available antimicrobial agents. Extended spectrum β-lactamase (ESBL)- producing Enterobacteriaceae causing nosocomial infection pose unique challenges to clinical microbiologists, clinicians, infection control professionals and antibacterial-discovery scientists in Nepal.

Objectives: The study was aimed to determine the ESBL-producing Enterobacteriaceae accountable for nosocomial infection.

Methods: The study was conducted at Tribhuvan University Teaching Hospital (TUTH), a 750 bedded tertiary care referral hospital located at Kathmandu, Nepal. A total of one hundred fifty nine bacterial isolates causing nosocomial infection were studied over a period of one year from March 2011 to February 2012 as described by American Society for Microbiology (ASM). Antibiotic susceptibility testing was performed by the Kirby-Bauer Disk Diffusion technique as recommended by Clinical and Laboratory Standards Institute (CLSI). A combination disk method was done for the detection of ESBL-producing isolates according to the guidelines of CLSI. Data were analyzed using SPSS 17.0 software and interpreted according to frequency distribution and percentage.

Results: *Escherichia coli* 61.6% (n=98) was found to be predominant which was followed by *Klebsiella pneumoniae* 31.4% (n=50), *Citrobacter freundii* 5.7% (n=9), and *Morganella morganii* 1.3% (n=2). The prevalence of ESBL was 23.9% (n=38). Among the ESBL producer *Klebsiella pneumoniae* was found to be predominant 26% (n=13) which was followed by *E. coli* 24.5% (n=24) and *C. freundii* 12.5% (n=1).

Conclusion: It is clear that high prevalence of bacterial strains producing ESBL in our hospital which prompts a special attention for the management of such patients as well as urgent need for implementation of infection control strategies to prevent the dissemination of such strains. ESBL detection should be routinely performed in clinical laboratory as false reporting would results in treatment failure despite in vitro sensitivity.

Disclosure of interest: None declared.

P123
Trends in extended spectrum beta-lactamase (ESBL) producing Enterobacteriaceae and ESBL genes in a Dutch teaching hospital, measured in 5 yearly point prevalence surveys (2010-2014)
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P123

Introduction: Enterobacteriaceae and ESBL genes in a Dutch teaching hospital, Trends in extended spectrum beta-lactamase (ESBL) producing Enterobacteriaceae accountable for nosocomial infection.

Methods: Medical records were reviewed retrospectively and demographic data and clinical data were obtained in patients with ESBL positive E. coli. Study included 80 patients, 40 with ESBL positive and 40 with ESBL negative strains of E. coli.

Results: The groups did not differ in number, gender and age, but ESBL positive group was of older age and had more cases with urosepsis than the ESBL-negative group. Regarding the comorbidities, most of the patients had diabetes mellitus type 2- in 16 patients (40%) and 15 of them (37%) had chronic kidney disease. In most of the patients, antibiotics were used empirically before urine culture was obtained, which accounts for the high number of cephalosporins and hinolones used – 9 patients (22%), and amikacin in 11 (27%), imipenem 5 (8%). Univariate analysis of risk factors associated with ESBL+ infections, identified diabetes mellitus, sepsis and previous hospitalizations are predictors of ESBL positive infections. When the three variables were entered into a multivariate logistic regression, diabetes and sepsis were found to be predictors of ESBL positive patients.

Conclusion: Our results showed that ESBL-positive urinary tract infections were more frequently associated with sepsis, and that the index of comorbidities, although rather high in both groups, was not associated exclusively with ESBL positive strains. It is important to provide prompt diagnosis in cases with ESBL positive urinary tract infections, because improper treatment is a factor for higher mortality.

Disclosure of interest: None declared.
Introduction: For the execution of a good infection control policy we depend on information about the local endemic level of resistant microorganisms and resistance genes.

Objectives: This paper describes the trends in prevalence of ESBL producing Enterobacteriaceae (ESBL-E) ESBL-genes, measured in five consecutive yearly Point Prevalence Surveys (PPS), in a Dutch teaching hospital.

Methods: On the day of the survey all patient present in the hospital and day-care clinic (including patients on dialyses), were screened for rectal ESBL-E carriage. Rectal swabs (Eswab, Copan, Italy) were taken and cultured using an enrichment broth, containing cefotaxime (0.25 mg/L) and vancomycin (8 mg/L) (TSB-VC) and a selective agar plate (EBSA, Alpha-Omega, Netherlands). Both phenotypical and genotypical methods were used to detect the production of ESBL and presence of ESBL-genes. Isolates containing an identical ESBL gene, from patients that were admitted on the same ward, were selected for Amplified Fragment Length Polymorphism typing to identify clonal relatedness.

Results: Out of 2,695 patients who were screened and evaluable, 135 (5.0%) were positive for ESBL-E. E. coli was most frequently found (112/145), followed by K. pneumoniae (9/145), and E. cloacae (7/145). The ESBL-E prevalence was stable over the years. In all PPSs CTX-M were the most prevalent ESBL type. Over the years, a decrease in CTX-M-1-like ESBL genes was observed, starting with a proportion of 44% in 2010, 34% in 2011, 22% in 2012, 24% in 2013 to 25% in 2014 (p = 0.026). Overall 5.2% of all ESBL-E were acquired by nosocomial transmission based on epidemiological linkage and molecular typing of the strains.

Conclusion: During this 5-year period the prevalence of rectal ESBL-E carriage was stable and only a minority was caused by nosocomial transmission. A relative decrease of CTX-M-1-like ESBL genes was observed. As this is the most prevalent ESBL gene in poultry, this decrease might be related to the strong (>60%) decrease in the use of antibiotics in poultry in our country in the same period.

Disclosure of interest: None declared.

P124

More than half of ESBL-E are susceptible to fluoroquinolones: admission prevalence data from eight non-ICUs in a German university hospital

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P124

Introduction: Little information is available on prevalence of extended-spectrum-beta lactamase-producing Enterobacteriaceae (ESBL-E) with and without additional resistance to fluoroquinolones. In Germany, Enterobacteriaceae are classified according to their susceptibility to four classes of antimicrobial substances. Only organisms resistant to acylureidopenicillins, 3rd and 4th generation cephalosporins and fluoroquinolones are labelled as “multidrug-resistant”.

Objectives: The aim of this prospective analysis was to gain evidence on admission prevalence and incidence of ESBL-E with and without resistance to fluoroquinolones in non-ICUs in a German university hospital.

Methods: This is part of the R-GNOSIS framework. WP 5 investigates the benefits of isolation precautions over standard measures for ESBL-E-carriers in non-ICUs. Rectal swabs are obtained for all patients admitted to the participating wards within 3 days of admission. Patients staying longer than 3 days are screened every 7 days thereafter and before discharge. Chromogenic culture media are used for ESBL-screening, identification and susceptibility testing is performed using Vitek 2 (bioMeirieux, Germany).

Results: Between February 2014 and February 2015, 8317 patients were admitted to 8 medical and surgical wards. An admission sample was obtained for 6047 patients (73%). Among all 8317 patients, 6814 patients had a LOS of more than 3 days, and 4083 patients were screened at least twice (60%). The majority of ESBL-E-carriers was identified on admission (n=607, 10.1%). However, 197 patients (4.8%) were screened negative on admission and turned ESBL-positive during their stay. Admission prevalence of ESBL-E resistant to fluoroquinolones was 4.7% (n=286), and 2.7% (n=111) of patients turned positive during their stay.

Conclusion: More than 50% of ESBL-E were susceptible to fluoroquinolones. As the increase of ESBL-E is a worldwide concern and resources to prevent their spread are limited, focusing on ESBL-E according to their antimicrobial susceptibility pattern may be a pragmatic approach.

Disclosure of interest: None declared.

P125

Clinical features of ESBL-producing E. coli responsible for bloodstream infections in French patients and molecular characterization of isolates

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P125

Introduction: We conducted an annually bloodstream infection (BSI) survey into hospitals overlapping the Centre France region (2.6 million). Since 2005, the incidence of BSIs associated with ESBL-producing E. coli (ESBLEc) increased.

Objectives: To improve the understanding of the pathway and the determination of the risk factors of ESBLEc-BSIs.

Methods: For each BSI, were reported patient age, sex, recent hospitalization, living in nursing home, recent antibiotherapy, urinary catherization, BSI source, death within 7days of diagnosis.

BSI isolated: antimicrobial susceptibility, determination of molecular mechanism associated with ESBL-production, genetic diversity of ESBLEc (MLST).

Results: During the survey (474,953 PDs), 443 E. coli BSI were identified, including 31 ESBLEc (7.0%; 30/31 CTX-M). Incidence of community acquired (CA)- and healthcare associated (HCA)-BSI were 0.47/100,000 and 0.040/1,000 PDs, respectively.

Major findings: For ESBLEc-CA-BSIs, male/female ratio was 1.4, median age 80, urinary BSI source in 50% of cases, recent antibiotherapy in 33 %.

Most ESBLEc were resistant to fluoroquinolones (67%), SXT/TMP (67%). High genetic diversity (8 STs including 4 ST131). For ESBLEc-CA-BSIs, male/female ratio was 0.9, median age 75, urinary BSI source in 63% of cases (recent catherization in 1/2), recent antibiotherapy in 58%. Most ESBLEc were resistant to fluoroquinolones (79%), SXT/TMP (63%). Low genetic diversity (9 STs including 7 ST131). Among BSI, ESBLEc-BSI were associated with healthcare (p < 0.004), long-stay unit (p < 0.018), recent antibiotherapy (p < 0.002). ESBLEc were associated with resistance to fluoroquinolones, SXT/TMP and genta/tobramycine (p < 0.001).

Among ESBLEc-BSI, clinical determinants and BSI characteristics similar whatever the clonal group excepted for ST131 associated with long-stay unit (p = 0.042).

Among ST131-BSI, clinical determinants and BSI characteristics similar for ESBLEc and non ESBLEc excepted median age higher in ESBLEc (63%). Low genetic diversity (9 STs including 7 ST131).

Conclusion: Recent antibiotherapy (and easy spread into long-stay units for ST131): likely the major risk factor for ESBLEc BSI.

Disclosure of interest: None declared.

P126

First report of OXA-48 carbapenemase-producing Escherichia coli in Taiwan

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P126
Introduction: Carbapenems are the last-line antibiotic in treating Enterobacteriaceae because its broad-spectrum antibacterial ability, high bactericidal activity and good stability to β-lactamases. However, carbapenem-resistant Enterobacteriaceae (CRE) infection increased all over the world in recent years. The challenge of carbapenems in treating Enterobacteriaceae is increasing.

Objectives: A 55-year-old woman who had been diagnosed with cancer and had received multiple courses of chemotherapy in Vietnam, visited our hospital for a second opinion in June 2014. Left breast tumor with non-discharge necrotic tissue was presented at admission. The laboratory examination demonstrated WBC 6300/μL, Hb 12.1g/dL and PLT 103000/μL. Specimen from left breast wound grew Escherichia coli, which resistant to carbapenems, broad-spectrum β-lactams and fluoroquinolones. There was no inflammation reaction caused by the pathogen. During hospitalization, she did not receive antimicrobial therapy effective to the pathogen.

Methods: We found that this Escherichia coli had the presentation of carbapenemase via modified Hodge test. Polymerase chain reaction and DNA sequencing was performed to test if Carbapenemase (blaKPC, blaNDM, blaOXA) or β-lactamases (SH, TEM, OXA, GES, CTX-M) presents.

Results: Resistance genes of blaOXA-48 and CTX-M-1-group were found. Besides, this Escherichia coli also presented with loss of outer membrane protein A and F. With multilocus sequence typing (MLST) analysis, this Escherichia coli is ST-405.

Conclusion: To our knowledge, this is the first OXA-48 carbapenemase producing Escherichia coli isolated in Taiwan, though it’s originated from Vietnam. It’s resistance profile is similar to other OXA-48 carbapenemase producing Escherichia coli isolated from Japan and France. According to this finding, Escherichia coli acquiring OXA-48 carbapenemase may had spread to Southeastern Asia. In order to prevent the transmission of CRE, the detection of carbapenemase in Enterobacteriaceae is important.

Disclosure of interest: None declared.

P127
Transferable resistance in multiresistant Gram-negative bacteria isolated from hemocultures in Slovakia
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Introduction: Antimicrobial resistance can be transferred between bacteria, and their plasmid-encoded resistant genes can be next transferred to other pathogens.

Objectives: The aim of this study was to assess the character of transferable resistance in multiresistant clinical isolates of Gram-negative bacteria from blood cultures in Slovakia.

Methods: This multicentre study was performed in November 2011 – January 2013. Altogether, 269 isolates of GNB from positive blood cultures of septic patients from hospitals in Slovakia were analysed. Transferability of resistance–determinants was assessed by phenotypic methods with conjugational experiments. Strains of rifampin-resistant Escherichia coli 3110, rifampin-resistant Proteus mirabilis P38, rifampin-resistant Pseudomonas aeruginosa 1008, and rifampin-resistant Pseudomonas aeruginosa 1670 were used as recipient strains. Escherichia coli strain ATCC 25922 was used as a control strain.

Results: Laboratory analysis of transferable resistance was performed with 213 clinical isolates, excluding 14 isolates for selectable resistance of rifampin and nalidixic acid. Transferable resistance was confirmed in 61 isolates (28.6%), of which 18 (29.5%) in Klebsiella pneumonaeae, 5 (8.2%) in Proteus mirabilis and in 7 (11.5%) other species. Cefotaxime (36%; 59%), ceftazidime (28; 45.9%) and aztreonam (23; 37.7%) resistances were the most frequently transferred resistotypes. Transfer only the one organism determinant of resistance was observed in 26 isolates (42.6%) and the multiple transfer in 35 isolates (57.4%). The most frequent recipient of antibiotic resistance determinants was strain Escherichia coli 3110 with 52 transfers (85.2%), followed Proteus mirabilis P38 (30 transfers; 49.2%) and Pseudomonas aeruginosa (9 transfers; 14.8%). Interspecies transfer among the resistant bacteria was observed in 18 isolates (29.5%).

Conclusion: In this study, we described high proportion of transferable resistance among multiresistant clinical isolated of Gram-negative bacteria in Slovakia.

Disclosure of interest: None declared.

P128
Point prevalence, lab-based survey of antimicrobial resistance in referral and regional hospitals in Oman
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2Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

Introduction: Anti-Microbial Resistance (AMR) is both a clinical challenge and a public health threat as AMR infection worsens patient clinical outcome and burden of health systems. Cost of treatment, lengths of hospital stays, and morbidity and mortality increased. Few studies have described the prevalence of antimicrobial resistance in Oman, but those are limited to either one hospital or one organism.

Objectives: This study aims to assess the prevalence of antimicrobial resistance among the tertiary and secondary care governmental hospitals in Oman.

Methods: This is a point-prevalence survey using the World Health Organization (WHO) tool [1] conducted 16-22 March 2014. 11/15 (73.3%) of the referral and regional hospitals of the country participated. Microsoft Excel used to collect data on five AMR organisms; Methicillin-Resistant Staphylococcus aureus (MRSA), Vancomycin-Resistant Enterococci (VRE), Extended-spectrum β-lactamase (ESBL) producing Enterobacteriaceae, Carbapenem-Resistant Enterobacteriaceae (CRE), and Multi-Resistant Acinetobacter spp (MRAB). SSPS software used to describe the overall results.

Results: 254 bacterial isolates have been identified. 90 (35.4%) are Gram positive (Staphylococcus aureus (13 isolates, 14.4%); Enterococci spp (11, 12.2%) and others (66, 73.3%)); while 164 (64.6%) are Gram negative (Escherichia coli 120 isolates, 73.2%); Acinetobacter spp, 10 (20.7%, and others (34, 20.7%). 47/254 (18.5%) isolates have AMR feature (either MRSA, VRE, ESBL, CRE or MRAB), 6 (60%) are MRAB out of the 10 total Acinetobacter isolates. Among the 73 isolates of E. coli, 24 (32.9%) isolates are ESBL, while no CRE identified. 10 (27%) ESBL isolates recognized among the 37 Klebsiella pneumonaeae and 2 (5.4%) are CRE. 4 MRSA isolates (30.8%) identified among the Staphylococcus aureus. One sample (9%) is VRE among the Enterococci spp.

Conclusion: The prevalence of resistance is higher in Acinetobacter, E.coli, MRSA, Klebsiella, and Enterococci respectively. This study is the first prevalence survey that covers multiple organisms and many hospitals in Oman and provides important baseline. Capacities are available in the participating hospitals to identify AMR organisms. Continual and national surveillance is the optimal goal for the accurate and generalized data on AMR.

Disclosure of interest: None declared.

P129
Detection of colistin resistant Klebsiella pneumoniae co-producing extended spectrum, AmpC beta lactamase and carbapenemase in a tertiary hospital in Nigeria
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Introduction: From 2011 to date, there are increasing detections of carbapenem resistant Klebsiella pneumoniae (CRKP) in a 700 bed capacity general hospital in Kano, Nigeria. CRKP infections are very difficult to treat. Colistin is one of reserved antibiotics for treating CRPKs. Of recent, in vitro colistin resistant strains of CRKP were detected by disc diffusion.
method using 10 μg colistin discs (Oxoid, UK) according to the CLSI guidelines.

Objectives: To test the susceptibility of CRKP invito to colistin and screen the colistin resistant isolates for extended spectrum beta-lactamase (ESBL), AmpC and Metallo beta lactamase (MBL) production.

Methods: Susceptibility of 34 CRKP to colistin was determined using disc diffusion method. Colistin resistant strains were concurrently screened phenotypically for ESBL and MBL according to CLSI 2012 breakpoints using double disk synergy test and modified Hodge test respectively. AmpC was detected using AmpC disk test.

Results: Result shows that 6 out of 34 CRPKs (17.6%) were resistant to colistin (Interpretative criteria: resistant ≤ 11mm). Five CRKP produced ESBL and AmpC, and 3 produced MBL type of carbapenemase. Co-production of ESBL and AmpC was detected in 4 of the isolates, ESBL and MBL in 3, AmpC and MBL in 2. ESBL, AmpC and MBLs were detected concurrently in 3 CRPK. Five out of the 6 CRKP (83.3%) were isolated from urine and catheterips, while the remaining one was from wound.

Conclusion: The study indicates that, colistin resistant CRPK strains have emerged in the hospital. Co-production of two or three of the beta lactamase enzymes by many of the isolates is worrisome, since it further narrows down treatment options.

Disclosure of interest: None declared.

Reference

P130
Four years of experience with carbapenem-resistant Gram-negative bacteria in two tertiary care hospitals in Crete, Greece

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Introduction: Carbapenem-resistant gram-negative bacteria (CRGNB, Acinetobacter baumannii, Klebsiella pneumoniae, Pseudomonas aeruginosa) are important nosocomial pathogens in Greece.

Objectives: To describe the epidemiology of CRGNB in two tertiary care hospitals in Crete, Greece.

Methods: Analysis of infection control records from June 2011 to December 2014 of 450-bed Venizelion Hospital and 750-bed University Hospital, both being referral centres for Southern Greece. Consecutive patients with CRGNB isolation (only first CRGNB per patient) were recorded. Data presented as no.(%) or mean±SD.

Results: A total of 1537 cases with CRGNB were detected: 582 A. baumannii, 510 K. pneumoniae and 445 P. aeruginosa. Mean patient age was 63.6±18.7 years. The greatest burden was in ICU (41.4%) and medical wards (36.7%). Respiratory specimens constituted the most frequent source of A. baumannii (56.3%) and P. aeruginosa (43.6%); urine samples were the most frequent source of K. pneumoniae (28.8%). In-hospital mortality (37.7%) was similar among the 3 pathogen groups; however, ICU patients with CRGNB had higher mortality rates compared to other departments (33.5% vs 26.6%, p<0.001). Similarly, ICU patients had longer hospital stay after CRGNB isolation compared to other departments (median 21 vs 8 days, p<0.001).

Conclusion: This study shows that the burden of CRGNB is much greater in ICUs, accounting for significant morbidity and mortality. Therefore, in Greek hospitals where CRGNB infections are a major problem, infection control measures should mainly focus in critical care departments.

Disclosure of interest: None declared.

P131
Epidemiological study of Klebsiella pneumoniae isolates producing KPC-2 carbapenemase in a general hospital over a four year period in Greece

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Introduction: In Greece Klebsiella pneumoniae producing KPC-2 carbapenemase (Kp-KPC+), due to possible therapy failure, special care should be taken.

Methods: Between 2011 and 2014, K. pneumoniae isolates were recorded from routine laboratory tests. Carbapenemase production was tested by Modified Hodge Test. Phenylboronic acid, EDTA or both along with meropenem discs were used as inhibitors for detection of Klebsiella pneumoniae carbapenemases (KPCs), metallo-beta lactamases (MBLs) or both carbapenemases, respectively. Susceptibility testing for various antimicrobial agents including carbapenemases was performed by the disk diffusion method according to CLSI criteria. MICs were determined by Vitek-2 or E-test methodology. blaKPC, blaESBL and blaMBL genes were detected by PCR. Clinical data, related to admission, previous hospitalizations and outcome, were collected using patients’ medical records.

Results: During the study period, 18 Klebsiella pneumoniae isolates were found as KPC-2 producers (11.5%). No other carbapenemase gene was detected in our hospital during the study period. The majority of Kp-KPC (+) isolates were recovered from urine cultures. All isolates were highly resistant to carbapenems, whereas susceptibility rates for colistin, tigecyclin and gentamicin were 100%, 92% and 77%, respectively. The first KPC-2 positive isolate was detected in September 2011. The yearly distribution of these patients was: 2011(3), 2012 (7), 2013 (4), 2014 (4). 10 patients had a history of previous hospitalization in tertiary care hospitals in Athens. Crude mortality rate among patients with Kp-KPC(+) was high (6/18, 33.3%). Colonization/infection during hospitalization was not identified.

Conclusion: In our hospital there is a low prevalence of Kp-KPC+ compared to tertiary care hospitals in Athens. Given the antimicrobial therapy toxicity, the prolongation of hospitalization and the mortality due to possible therapy failure, special care should be taken.

Disclosure of interest: A. Tatsiopoulos Consultant for: Microbiology, K. Tryfonopoulou: None declared, A. Stamatiou: None declared, P. Giakouppi: None declared, E. Petinaki: None declared.

Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P131

P132
Epidemiology of bloodstream infections sustained by carbapenem-resistant Klebsiella pneumonia in a large teaching hospital in northern Italy

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Introduction: The rapid diffusion of carbapenem-resistant (CR) Klebsiella pneumoniae (Kp) represents a diffusion of concern from both clinical and public health standpoints. In particular, bloodstream infections sustained by C-R Kp are associated with high mortality rates and the treatment of these clinical picture is a major challenge for clinicians.

Objectives: To describe annual incidence of C-R Kp BSIs, dating back to the first positive C-R Kp blood culture, in a 1,300-beds teaching hospital in northern Italy.

Methods: We performed a retrospective study at IRCCS AOI San Martino – IST of Genoa, Italy. Between 1 January 2007 and 31 December 2014, overall hospitalizations and hospital patient days were obtained from the hospital.
Introduction: Carbenapenem resistance occurs via two mechanisms: resistance of expression genes (NDM-1, KPC, OXA) or combination of extended spectrum beta-lactamase production and alteration of the expression of porins (NCP Enterobacteriaceae).

Objectives: We conducted a case-case-control study to identify if NDM-1 Enterobacteriaceae share risk factors with NCP Enterobacteriaceae.

Methods: Patients admitted for at least 48 hours between September 2010 and July 2013 were included. Case 1: Patients with NDM-1 Enterobacteriaceae isolated from either clinical or surveillance cultures. Case 2: Patients with NCP Enterobacteriaceae isolated from either clinical or surveillance cultures. Control: Patients screened negative for carbapenem-resistant Enterobacteriaceae (CRE). Patients with both NDM-1 Enterobacteriaceae and NCP Enterobacteriaceae were excluded. Demographic, clinical, microbiological and antibiotics usage data were collected from electronic medical records. We conducted time at risk adjusted bivariate analysis followed by multivariate analysis using STATA 12.

Results: A total of 1934 patients were screened for CRE. A total of 40 NDM-1 Enterobacteriaceae and 43 NCP Enterobacteriaceae patients were compared with 61 randomly selected control patients. There was no significant difference in age, sex, and total infection index between cases and controls. Independent risk factor for NDM-1 Enterobacteriaceae was intensive care unit (ICU) admission in the preceding 3 months (OR, 3.2; 95% CI 1.2 – 8.6; p=0.002) and for NCP Enterobacteriaceae was number of days exposed to carbapenems (OR 1.2; 95% CI 1.1 – 1.3; p=0.002).

Conclusion: NDM-1 Enterobacteriaceae and NCP Enterobacteriaceae do not share similar risk factors in this small single center study. This finding has an implication on infection control strategies for CRE control.

Disclosure of interest: None declared.
All the isolates were resistant to all the A. baumannii strains isolated from hospitalized patients in Palestine. The presented data indicate a high potential therapeutic resistance. To characterize the CP-AB isolates molecular typing using bla KPC, bla n=1, PAR bla n=1, and NDM isolates of CP-AB from six patients fell into two clusters of resistance. The study comprised consecutive patient admissions to the intensive care unit (SICU). Results: After excluding an environmental source we performed antimicrobial susceptibility tests using different patterns of resistance were defined according to EUCAST guidelines. Different patterns of resistance were defined according to recent EUCAST guidelines. New patient isolates of CP-AB were genotyped prospectively.

Results: Molecular typing revealed that 3 out of the 4 SICU-isolates were genotypically identical. Although temporally and locally coinciding, the 4th isolate of the patient cluster did not match. This 4th strain however was identical to a strain previously identified in a patient from the neurological department in July 2014. A physical link between these two patients could not be identified. Even more surprisingly, another isolate of CB-AB from a neurosurgical patient isolated in September 2014 was found to be identical with the three isolates of the SICU cluster, despite the absence of detectable temporal or local link to the SICU. Conclusion: Isolates of CP-AB from six patients fell into two clusters of two and four strains, respectively. In this case patient transfer within the hospital cannot explain these unexpected genotypical relationships. Surprising genotyping results should engender efforts to analyse the pathways of transmission.

Disclosure of interest: None declared.

Introduction: Modern medicine requires a clear and explicit criteria to describe the phenomena of public health; and one of the major problems of public health is drug resistance of microorganisms. Objectives: The aim of this study was to analyze how big epidemiological problem are highly-resistant - multidrug-resistant (MDR) and extensively-drug resistant (XDR) non-fermentative bacilli isolated from bloodstream infections (BSI) in southern Poland. Results: Of the 72 isolates, 88.2% were resistant to 14 out of 16 antimicrobials, among ACI also found the highest share of XDR: 95.7%. More than 75% of ACI strains were resistant to 14 out of 16 antimicrobials, among ACI also found the highest share of XDR: 95.7%.

Results: Molecular typing revealed that 3 out of the 4 SICU-isolates were genotypically identical. Although temporally and locally coinciding, the 4th isolate of the patient cluster did not match. This 4th strain however was identical to a strain previously identified in a patient from the neurological department in July 2014. A physical link between these two patients could not be identified. Even more surprisingly, another isolate of CB-AB from a neurosurgical patient isolated in September 2014 was found to be identical with the three isolates of the SICU cluster, despite the absence of detectable temporal or local link to the SICU. Conclusion: Isolates of CP-AB from six patients fell into two clusters of two and four strains, respectively. In this case patient transfer within the hospital cannot explain these unexpected genotypical relationships between isolates from three departments. Transmission of CP-AB may have occurred in the context of consultants’ visits or when patients were temporarily moved to a diagnostic unit such as endoscopy or radiology. In the context of clusters of CP-AB isolated from several patients, genotyping provides the opportunity to follow the movement of these highly resistant bacteria within a hospital. Surprising genotyping results should engender efforts to analyse the pathways of transmission.

Disclosure of interest: None declared.

Introduction: The increase in the incidence of hospital acquired infections due to A. baumannii (MDR-AB) mandates characterizing the strains circulating in Palestinian hospitals. Objectives: Determine the antibiotic of the MRD-AB. Identify the genes responsible for the carbapenem and the aminoglycosides resistance. Identify the presence of the two virulence genes OmpA and epsA. Determine the strains types of the MDR-AB isolated from Palestinian hospitals.

Methods: 72 single patients MDR-AB collected from all over Palestine, except Gaza, were included in the study. The CLSI guidelines were followed to determine the antibiotic of the isolates. The presence of the carbapenem resistance genes blaOXA-23, blaOXA-24, blaKPC, blonDM and the aminoglycoside resistance genes apha6 and apha1 were determined by PCR. Moreover, the two A. baumannii virulence genes OmpA and epsA, were evaluated by PCR. Finally MLST was performed on 13 isolates to determine the Strain Type (ST) of the isolates.

Results: All the isolates were resistant to all the β-lactam antibiotics including the carbapenems. Of the 72 isolates, 77.9% positive for blaOXA-23, 14.7% positive for blaOXA-24, 4.4% positive for blaOXA-3. In addition, 5.88% and 0% were positive for blonDM and blakPC respectively. Moreover, of the 72 isolates none were positive for apha6 gene while 92% were positive to the apha1 gene. The only two antibiotics that showed a non-resistant profile were colistin sulfate (78%) and tigecycline (95%). 98.5% of the isolates possessed the OmpA biofilm producing gene. Finally, MLST of 13 isolates revealed that more than one strain of A. baumannii is circulating in the Palestinian hospitals, 7 isolates ST 208 (53.8%), 2 isolates ST 218 (15.4%), 1 isolates ST231 (7.7%), 1 isolates ST348 (7.7%) and 2 isolates new ST (15.4%).

Conclusion: The detection of these extremely drug resistant pathogens in Palestine was a strong reminder of the importance of mandating that the infection control programs in all the hospitals must be active in order to reduce the spread of these deadly pathogens. Disclosure of interest: None declared.

Introduction: Although the prevalence of carbapenem-producing Acinetobacter baumannii (CP-AB) in Germany is still low an increasing number of outbreaks has been reported in recent years. In August 2014 we observed a cluster of 4 patients with CP-AB (OXA-23) on our surgical intensive care unit (SICU). Objectives: After excluding an environmental source we performed epidemiological analyses to gain insight into the spread of CP-AB in our university hospital.

Methods: To characterize the CP-AB isolates molecular typing using amplified fragment length polymorphism was conducted. A genotypic comparison with strains collected in 2013 and the first half of 2014 was carried out. All new patient isolates of CP-AB were genotyped prospectively.
P139

Molecular characteristic of imipenem-resistant Pseudomonas aeruginosa isolated from urinary tract infections in Southern Poland

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Introduction: Carbenapenem-resistant Pseudomonas aeruginosa (PAR) has become a serious health problem worldwide. It is essential to understand its epidemiology as it may help to control the antibiotic resistance. Objectives: To analyze the molecular characteristics of carbanpenem-resistant PAR in urinary tract infections in Southern Poland.

Methods: Antimicrobial susceptibility testing was performed. Metallo-beta-lactamases were detected. Multidrug-resistant (MDR) was non-susceptible to one antimicrobial in ≥3 antimicrobial classes. Extensively-drug resistant strain (XDR) was susceptible to ≤2 antimicrobial classes. MLST was performed (Curran et al. 2004).

Results: The median (Q1:Q3) age was 60 years (54:69), 33.3% were females. Among 183 urine samples contained P. aeruginosa, 21 imipenem-non-susceptible strains were included for further analysis. MIC50 for imipenem was 12.0 μg/ml. Eighteen strains (86.0%) were resistant to meropenem (MIC50=80.0 μg/ml). Sixteen strains (76.0%) were resistant to doripenem. Based on the EDTA-assay, 9 (42.8%) MBL-positive isolates were identified. VIM-2 was present in three isolates. No isolates with SPM nor IMP, SIM, GIM were detected. Three (14.2%) isolates were resistant to meropenem (MIC50=8.0 mg/l). Sixteen strains (76.0%) were imipenem-non-susceptible strains with ≥2 antimicrobial classes. Eighteen strains (86.0%) were imipenem-non-susceptible strains with ≥2 antimicrobial classes. Eighteen strains (86.0%) were imipenem-non-susceptible strains with ≥2 antimicrobial classes.

Conclusion: This study indicated the emergence of MDR and XDR strains producing MBL. A high prevalence of imipenem-resistant strains and MBL is a critical problem and a therapeutic challenge for clinicians. Continuous surveillance is necessary to detect the presence of MBL-producing strains.

Disclosure of interest: None declared.

P140

Seasonal variations on prevalence and antimicrobial resistance of Salmonella isolated from dogs in Khon Kaen province, Northeast Thailand

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P140

Introduction: Salmonella spp. can be isolated from healthy dogs at rates of up to 36% and they tend to shed Salmonella organisms to feces for very prolonged periods of time after infection. Objectives: To describe Salmonella isolated from dogs and to investigate their antimicrobial resistance based on seasons in Khon Kaen province, Thailand.

Methods: During 2012-2013, 428 fecal samples were collected from dogs by rectal swab in 3 seasons (winter, summer and rainy). All samples were examined for Salmonella spp. isolation and identification by ISO 6597:2002. To assess the prevalence of antimicrobial resistant patterns was done using disk diffusion technique among 7 antimicrobials.

Results: Salmonella contaminated to dogs feces in winter, summer and rainy seasons were 13.6%, 13.1% and 9.3%, respectively. The identified most found serovars in winter, summer and rainy seasons were S. Give (23.5%), S. Typhimurium (40%) and S. Weltevreden (21.4%), respectively. Highly resistant ampicillin, sulafathoxazole/trimetoprim and tetracycline Salmonella spp. isolated from dogs were 52%, 24% and 48%, respectively.

Conclusion: Salmonella spp. can be detected in dogs without any overt clinical signs indicating possible carrier state that can be spread to their owners especially in children. Therefore, to avoid carrier state in pets, sanitary and health management is crucial for their owners. Ongoing multi-provincial investigation should be encouraged to better understand the reasons for these observed seasonal variations.

Disclosure of interest: None declared.

References


P142

Detection of extended spectrum beta lactamases (ESBLs) and carbapenemases in Escherichia coli isolated from cow-dungs and poultry droppings

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P142

Introduction: The rising needs for source of protein has led to uncontrolled use of antibiotics in cattle and poultry farms in Nigeria. There is great concern among researchers in the region on possibility of acquiring multi drug resistant bacteria from their meats directly or from plants when their wastes are used as manure. Equally possible is spread of the multi drug resistant bacteria by farm workers which are know for poor sanitation. Objectives: The study was carried out to determine if extended spectrum beta-lactamase (ESBLs) and carbapenemase can be detected in E. coli isolated from cow-dungs and poultry droppings from different farms located in Abraka-Delta, South-South geo-political zone of Nigeria.

Methods: A total of 146 and 88 E.coli were isolated from cow-dungs and poultry droppings respectively. Antimicrobial susceptibility test was carried out by disk diffusion methods using ceftazidime (30μg), cefotaxime (30μg), cefoxime (30μg), cefoxime (30μg), cefoxime (30μg), gentamycyin (100μg), amoxicillin-clavulanic acid (30μg), ciprofloxacin (5μg), ofloxacin (5μg), trimethoprim-sulfamethoxazole (25μg), nitrofurantoin (300μg), and meropenem (10μg). ESBL and carbapenemase production were determined by double disc synergy test (DDST) and Modified Hodge’s test respectively. Carbapenemase producers were further screened for metallo-beta lactamases (MBL) production by double disc synergy test.

Results: Isolates from cow-dungs were highly resistant to amoxicillin-clavulanic acid (94.5%), cefotaxime (89.0%), cefoxime (82.2%), cefuroxime (80.8%), and ceftazidime (78.1%). All isolates from poultry droppings were resistant to amoxicillin-clavulanic acid and cefotaxime (100%). Higher prevalence for ESBLs (27.27%), carbapenemase (18.18%) and MBLs (17.04%) production was found in the isolates obtained from poultry droppings than isolates from cow dungs which recorded 23.97%, 8.21% and 6.85% for ESBLs, carbapenemase and MBL production respectively.

Conclusion: The detection of ESBL producing and carbapenem hydrolysing isolates in cow-dungs and poultry droppings obtained from the environment is highly worrisome because these dungs/droppings are often among polimycrobial infections than monomicrobial (p=0.042, OR=0.093, 95% CI 0.0085-1.00). Eight XDR strains were designated to MLST typing scheme. Four strains belonged to ST235, two strains to ST 260. The remaining two strains belonged to ST664 a ST234, respectively.

Disclosure of interest: None declared.

P143

Factors associated with hand hygiene compliance at a tertiary care teaching hospital in Argentina

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P143

Introduction: Several interventions have been implemented by hospitals to improve hand hygiene compliance. In that sense, the WHO Multimodal
Hand Hygiene Improvement Strategy based on administrative support, system change including availability of alcohol-based handrub, education, reminders in the workplace, monitoring, and performance feedback has been successfully implemented.

Objectives: To identify factors associated with hand hygiene compliance during a multiyear period of intervention.

Methods: An observational prospective study including nursing, physician, technical, and support staff was conducted at a 142-bed tertiary care teaching hospital to assess those factors associated with hand hygiene compliance. Students from Nursing School performed hand hygiene observations through 21 cross-sectional studies from October 2009 to October 2014. Department for Infection Prevention and Control implemented a hospital-wide hand hygiene initiatives based on WHO Multimodal Hand Hygiene Improvement Strategy.

Results: There were 27,484 unique observations with an overall compliance of 72.7% (95%CI 72.2%–73.2%). Significant differences in compliance were observed between nursing staff (80.2%; 95%CI 79.4%–80.9%), physician staff (69.5%; 95%CI 68.6%–70.49%) and support staff (64.5%; 95%CI 63.3%–65.6%). Neonatal Intensive Care Units (87.3%; 95%CI 85.7%–73.2%) and Bone Marrow Transplantation (82.2%; 95%CI 80.3%–83.9%) had higher compliance than did Adult Intensive Care Units (75.5%; 95%CI 74.6%–76.3%) and General Wards (66.1%; 95%CI 65.2%–67.0%). These findings persisted in the controlled multivariate model for compliance. Additional factor found to be significant in the model included greater compliance when healthcare workers were leaving patient rooms. The overall rate of compliance increased from 46.3% (95% CI 40.9%–51.7%) in the first year of observation to a peak of 79.6% (95% CI 78.5%–80.6%) in the fifth year, and it decreased to 77.7% (95%CI 76.3%–78.7%) in the final year.

Conclusion: A Multimodal Hand Hygiene Improvement Strategy was effective in increasing compliance rates among all categories of hospital workers. We identified a variety of factors associated with increased compliance. Additionally, we note the importance of continuous interventions in maintaining high compliance rates.

Disclosure of interest: None declared.

The keys to success: initial findings from the Hand Hygiene Australia (HHA) program review

Introduction: The Australian Commission on Safety and Quality in Health Care engaged HHA to implement the National Hand Hygiene Initiative (NHHI) in 2008. The NHHI is based on the World Health Organisation clean care is safer care program. In 2014 HHA was asked to review hospital hand hygiene (HH) programs to evaluate their alignment with the NHHI.

Objectives: To review the validity of HHIC data, and to identify innovations and key components of a successful HH program.

Methods: HHA selected healthcare facilities across each Australian state and territory based on size (>300 beds) and high reported HHC. Program Reviews (PR) were conducted by the national HHA team, and consisted of a structured interview with hospital staff responsible for HH promotion, and side-by-side auditing. The interview covered the 5 key components of the WHO multimodal strategy: system change, education and training, monitoring and performance feedback, reminders in the workplace, and institutional safety climate.

Results: 22 healthcare organisations were visited (median HHC 81%, range 71-90.6%). All had HH products at the point of care. The higher performing facilities included HH in all teaching activities, monitored HH online learning package completion rates, and conducted targeted education dependent on audit results. All sites reported regular auditing conducted by ward-based auditors in 19/22 sites. 13 (59%) sites audited all wards. There was validation of data and regular and timely performance feedback to all stakeholders at all sites. The annual auditor validation process was monitored in 11/22 sites, with 12 sites running auditor refresher training as required. Minor auditing inconsistencies were detected during side-by-side auditing at 6 sites. Of those, 5/6 did not monitor the annual auditor validation, nor run refresher sessions. The PRs identified several local innovations and reinforced the importance of local ownership to achieve exceptional results.

Conclusion: All sites visited were well aligned with the NHHI. However, auditing of all wards and annual auditor validation were identified as areas for improvement. Overall, these PRs support the validity of data submitted as a part of the NHHI, and have provided new ideas about how to implement HH improvement.

Disclosure of interest: None declared.

How to keep alive the “Clean Your Hands” campaign in a hospital setting: six years after

Introduction: The hand hygiene is the most important practice to prevent healthcare associated infection. Portugal joined the WHO “SAVE LIVES: Clean Your Hands” campaign in October 2008, having developed a national strategy supplying training and didactic tools, providing a database and economic incentives to participating hospitals.

Objectives: Promotion of persistent good practices in hand hygiene.

Methods: The implementation of the campaign in this acute care 400 bed hospital was coordinated by the Infection Control and Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P145

Disclosure of interest: None declared.

Introduction: Preventable infections contribute significantly to disease burden in Nigeria. Improving hand hygiene in healthcare, communities and general population can break the chain in the spread of most germs that threaten health and drag on socioeconomic development. Hand hygiene is fundamental to patient safety and important to occupational health – both are interconnected. The occupational health benefits of hand hygiene to healthcare workers provide additional incentives / motivation – acting in their own self-interest as well as duty of care. Implementing hand hygiene improvement at national and facility level involves managing behaviour and expectations and managing change.

Objectives: This presentation seeks to share our experience in implementing hand hygiene partner programme (HHPP) in Nigeria between 2012 and 2013 with the support of a reputable external private sector partner.

Methods: The HHPP was implemented in partnership with the Federal Ministry of Health in three key components - stakeholders training, mini targeted local seminars and conferences, carefully structured and committed introduction of WHO multimodal hand hygiene improvement strategy focusing on maternal and child units.

Results: High level of interest and awareness in hand hygiene in general and the use and role of alcohol based hand rub in infection control were created among key decision makers and opinion leaders, government officials and healthcare workers in Nigeria.

Conclusion: As we continue to work hard and drive our hand hygiene programme, we hope that the lessons from our experience would be useful in sustaining hand hygiene improvement and public health in Nigeria as well as prove transferable across the big diverse population of over 170 million people and other developing countries as part of strengthening health systems. The Ebola Virus Disease pandemic provides additional advocacy to strengthen infection prevention and control systems. Improvement in hand hygiene is one of the pillars for success.

Disclosure of interest: S. Kama-Kieghe Employee of: SKD Productivity Center, Shareholder of: Managing Partner, B. Okeke Employee of: GOJO industries-Europe Ltd.

Introduction: The hand hygiene is the most important practice to prevent healthcare associated infection. Portugal joined the WHO “SAVE LIVES: Clean Your Hands” campaign in October 2008, having developed a national strategy supplying training and didactic tools, providing a database and economic incentives to participating hospitals.

Objectives: Promotion of persistent good practices in hand hygiene.

Methods: The implementation of the campaign in this acute care 400 bed hospital was coordinated by the Infection Control and Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P146

Disclosure of interest: None declared.
Resistance Unit and focused on the following actions: (1) formal commitment signed by the administration head and the medical/nurse units heads; (2) implementation of multimodal strategy campaign; (3) audits and correction measures to structural conditions of the units (for example: existence of alcohol-based handrub – ABHR at the point of care); (4) infection control link professionals observer training (replicated in each unit) and subsequent observational study before/after the campaign in 2009 and then annually; (5) annual celebration of Hand Hygiene Day (5 of May) with presentation of small films and games, lectures and poster competition. Results are annually revealed, with benchmarking between units, specific interventions in units with lower compliance rates and compliance rates inclusion in its performance indicators.

Results: Compliance rates of 61.3%, 74.7% and 78.6% before, after campaign in 2009 and 2014, respectively. In the "first moment": 53.8%, 69.5% and 73.5 respectively. All the professional categories showed improvement. The ABHR consumption increased from 20.2 in 2010 to 31.4 in 2014.

Conclusion: A national strategy was fundamental to the implementation of the local campaigns. Contributing factors to this success included a national database with real time results (to motivate professionals); performance indicators (to motivate head units) and continuous tools to remember the good practice, keeping alive the campaign.

Disclosure of interest: None declared.

P147
Improved individual hand hygiene compliance with a multimodal hand hygiene intervention – the results of the PROHIBIT (Prevention of Hospital Infections By Intervention and Training) project
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P147

Introduction: The PROHIBIT study aimed at inventorying and analysing national and local infection prevention activities in Europe and to test two interventions of proven efficacy in central venous catheter (CVC) bloodstream infection (CRBSI) reduction: a multimodal CVC bundle and a multimodal hand hygiene (HH) improvement strategy.

Objectives: Analyze the contribution of individual health care workers’ (HCW) HH compliance to the overall increase in HH.

Methods: Intensive Care Units of 14 hospitals in 11 European countries participated in this prospective stepped wedge cluster-randomized trial. HH was evaluated by direct observation conform the World Health Organization. Ten centres collected individual HH compliance data of HCW. Generalized linear mixed modelling was used, of HH compliance (%) per observation session.

Results: In 9762 sessions 46,729 HH opportunities of 1874 HCWs were collected in the 10 centres. Seven of the 10 centres (7980 sessions) were allocated to implement the HH campaign, alone or with the CVC strategy. Average baseline compliance in these centres was 43.1%, which increased to 60.8% after the start of the intervention. The proportion of HCWs with 0% compliance decreased from 26% during baseline to 11% after the implementation of the HH campaign whereas the proportion complying 100% doubled from 16% to 33%. Many HCWs were observed in <4 sessions only (34.4%) and not all were assessed during both periods. Individual changes in HH and the variance among HCWs were evaluated in HCWs assessed in both periods, with ≥4 observed sessions (5406) as HCWs with <4 sessions inflate the variance. Of these 375 HCWs 70.4% increased HH >10%; 11.5% remained constant (±10%) and 16.5% decreased >10%. The variance among HCWs within hospitals when comparing both periods decreased (p<0.05). This implies that the difference between relatively poor and good compliers remained comparable.

Conclusion: The multimodal HH campaign in our multicentre study resulted in the significant increase of the average HH compliance. The HH improvement was due to behaviour change of the individual HCWs.

Disclosure of interest: None declared.

P148
Hand hygiene excellence award winner: spreading the experience countrywide in Romania
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Background: Hospital « SF.Constantin » was designated among the winners of the « European Hand Hygiene Excellence Award » (2013). This award turned the winner medical team into a promoter of infection control, as part of the missions given to HHEA awardees.

Objectives: Improving hygiene in Romania.

Methods: The promotion of actions was conducted as: know-how in hospitals; organization of workshops/courses (infectious diseases, epidemiology, use of invasive devices, prevention of bloodstream infections, antibiotic stewardship); co-organization of two annual workshops with international participation; initiating the 5 May (WHO hand hygiene day) celebrations in Romania; translation into Romanian of books in the field.

Results: Since 2013, we conducted 29 courses/workshops in 16 towns. The number of participants was 1530. The topics encompassed 17 themes. All presentations were made in the spirit of the economy of peace, i.e. pro-bono. We gave the materials, initiated on-line feed-back. We contributed to the completion of four master theses, and we are doing the initiation of a patient’s education program. Instructed professionals came from surgery (51%), oncology (27%), intensive care (16%) and medicine (6%), being registered nurses (65%), doctors (25%), others (10%). We are involved in three major projects in regards to the implementation of infection control measures.

Conclusion: As HHEA winner, our institution contributes to spread infection control/hospital epidemiology in Romania. Our experience verifies the idea of considering hand hygiene as the entrance door to infection control.

Disclosure of interest: None declared.

P149
Afghan hurdles: from signing the pledge in 2012 to hand hygiene implementation in 2014
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P149

Introduction: Cutaneous Leishmanina (CL) skin defects lasting for >6 weeks1 similar to chronic wounds of the elderly in developed countries are prevalent in Afghanistan2 in uncovered body parts mostly of young children after their first contact with the parasite through a sand-fly bite. From two phase II CL trials3–4 it appears that clean CL wound management is crucial for rapid healing.

Objectives: As alcohol-based hand-rubs (ABHR) were not available in Afghanistan5 in 2012 when signing the WHO pledge6 to reduce the burden7 of the CL disease, we wanted to foster the local low-price ABHR production by involving the Pharmaceutical Faculty on the new Campus (PharmFac).

Methods: In the absence of PharmFac labs, we used the lab of the renovated leishmania centre of the Balkh Civil Hospital, which two of us had (DP & KWS) audited in 2012. We trained the students on the job of producing ABHR according to the WHO guide using the WHO starter kit. To prepare 3 batches of 100 ml ABHR bottles we had to buy the ingredients of WHO formula 1 on the Mazar bazaar.

Results: The students, who participated in the daily leishmania wound patients’ consultations, were highly motivated, when they understood the importance of hand-hygiene in this field. They were enthusiastic about their first opportunity of pharmaceutical bench work. They were hugely disappointed, when the later quality control at the HUG Pharmacy in Geneva revealed that two flasks of ‘Ethanol absolut’ had been adulterated with methanol, up to 50 and 80% respectively, and that they...
had to destroy all 150 ABHR flasks on the spot. In 2014 ABHR leftover stocks of the US Army had engulfed the bazaar of Mazar at 1/26 USD per litre (October 2014/February 2015). The temporary economic ABHR availability might explain the hand hygiene awareness and practice we observed in the Balkh Civil Hospital in contrast to what we had experienced in 2012.

**Conclusion:** Economic ingredients of guaranteed quality constitute the bottleneck for ABHR production in poor countries, not the motivation of pharmaceutical students. Those, who feel concerned, are invited to discuss such issues with us.

**Disclosure of interest:** J. G. Böttrich Employee of: B. Braun Melsungen AG, Z. Tothi: None declared, B. Roth: None declared, D. Pittet: None declared, K-W. Stahl: None declared.

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**P150**

**Hand hygiene: dreams come true “Clean Care is Safer Care”**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P150

**Introduction:** Hundreds of millions of patients around the world are affected by health-care-associated infections (HCAIs) that are also the most frequent adverse event in healthcare system. Most are preventable through adherence to patient-care-practices. Hand hygiene is the most effective practice in preventing and controlling HCAI as well as community infections.

**Objectives:** Clean Your Hands is a major component of the WHO First Global Patient Safety Challenge. It is a global campaign to improve hand hygiene among health-care workers. Since 2008 Hong Kong Infection Control Nurses’ Association (HKICNA) has been actively participating in the WHO Clean Hands Saves Lives campaign. It is proactively to promote hand hygiene in different healthcare settings and in the community.

**Methods:** Since 2008 till now, during the World Health Carnival, HKICNA ran a booth to promote hand hygiene in the community. We were happy to find that there were over a thousand public to participate in hand hygiene education and games.

**Results:** In 2012, HKICNA organized a poster design competition, the main theme was to promote hand hygiene in the hospital environment. The winner posters was used as talking wall in community and healthcare settings while others were used as design background of promotional gimmicks such as pen, tote bag etc. A hand-held electric fan was designed with visual lit up “hand hygiene” that again helps to remind healthcare workers the importance of hand hygiene.

In addition, two Hand Hygiene Dances were designed to continuously support and promote WHO’s initiative on hand hygiene. The two Hand Hygiene Dances demonstrate hand hygiene should start from young children to adulthood, from healthcare worker to different professions in the community. Both versions are highly promoted in hospitals and schools in Hong Kong and assessable in YouTube gaining thousands of ‘likes’.

**Conclusion:** Hong Kong Infection Control Nurses’ Association is fully committed in promoting infection prevention and control especially hand hygiene practices in healthcare and community. The endevour of “Clean Hand Save Lives” will continue.

**Disclosure of interest:** None declared.

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**P152**

**WHO multimodal strategy for improving hand hygiene supported within the organization’s management system,**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P152

**Introduction:** Hand hygiene (HH) has been singled out as a core element of patient safety for the prevention of healthcare-associated infections (HAIs) and the spread of antimicrobial resistance. Cleansing hands with alcohol-based hand rub is a simple and undemanding procedure that requires only a few seconds. Although we already had the five components of the WHO Multimodal Hand Hygiene Improvement Strategy implemented in our facility and a steady mandatory training program, compliance remains stable, with no further increase for many months.

**Objectives:** The objective of this study was to improve compliance of HH among HCWs by enhancing the monitoring and feedback, periodical analysis by leaders and with stronger support from the hospital administration.

**Methods:** On admission, patients were asked to monitor HCW adherence to HH and fulfill the customer satisfaction survey at the time of hospital discharge. The results were converted into indicators, with monthly feedback of the infection control team for leaders. It was set at 77% in 2012, 80% in 2013 and 83% in 2014. The results became part of the Profit Distribution Program for employees, already well-established in the organization. The results were validated by the sample direct observation by trained nurses and by comparison with alcohol consumption rates per 1,000 patient-days.

**Results:** In January 2012 the general adherence was 75% and reached 83% in December 2014 (an average increase of 10%). The adherence of nurses and physicians ranged from 74% to 84% and 73% to 82%, respectively. There was no significant difference between hospital wards. During this period the average annual rate of alcohol consumption for hand rub was 18.2, 24.8 and 44.4 liters per 1000 patient-days. During this 3 years the HAIs rates remained low (<2%).

**Conclusion:** Ownership for compliance must come from within clinical teams, and not solely driven from the infection control team. Support from the hospital management is essential. All tools available in the institution should be identified and can be used to promote patient safety climate. The participation of patients, continuous feedback and the economic stimulus were successful to help motivate HCW to improve HH.

**Disclosure of interest:** None declared.

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**P151**

**The current situation in compliance with hand hygiene in dental surgeries in the Czech Republic**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P151

**Introduction:** Implementation and compliance with hand hygiene in health care is different and depends on the type of separation. Hand care is very important for the prevention of transmission of infectious agents between patients and dentist’s protection against infection. Their microbial contamination occurs when bioaerosol contacts hands and during a treatment of the patient. The literature indicates that the degree of “compliance” in compliance with hand hygiene in a dental surgery is between 16-81%, with an average of 40%.

**Objectives:** The authors report in their work the current knowledge about the compliance policy guidance “Hand hygiene in health care” among dentists in the Czech Republic.

**Methods:** Epidemiological investigation was carried out by a single anonymous questionnaire in a total number of 54 respondents.

**Results:** Most were surprised to find that two dentists in private practice do not wash their hands before and after use non-sterile gloves. We consider as highly positive finding that dentists in private dental surgeries in 88.89% used to disinfect hands disinfectants based on alcohol. In Faculty of Medicine and Dentistry, Palacky University Olomouc and Faculty Hospital Olomouc, which is under the supervision of the constitutional Hygienist, disinfectants for hands are in 100% alcohol-based.

**Conclusion:** Hand hygiene has long been considered one of the most important infection control measures to prevent health care-associated infections. It is necessary to educate health care workers in dentistry about hand care.

**Disclosure of interest:** None declared.
**P153**

Implementation of the who multimodal hand hygiene improvement strategy in selected wards of Asella Teaching Hospital, Ethiopia

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)** P153

**Introduction:** The burden of health-care associated infections (HAI) in low-income countries is high. Adequate hand hygiene is considered the most effective measure to reduce the transmission of nosocomial pathogens.

**Objectives:** To assess compliance with hand hygiene and perception and knowledge about hand hygiene before and after the implementation of the hand hygiene campaign.

**Methods:** The study is carried out in selected wards of ATH (gynaecology, obstetrics, paediatrics, and neonatology). Compliance with hand hygiene during routine patient care is measured before and after the intervention, which is a four-day workshop accompanied by provision of hand hygiene products and posters emphasizing the importance of hand hygiene. Health-care workers’ (HCW) perception and knowledge about hand hygiene is assessed before and after the intervention. HCWs are divided into two broad professional categories: (I) nurse / midwife / health officer / nurse, midwife, health officer student, (II) medical doctor / intern.

Compliance at baseline and follow-up overall and for the different professional categories and wards will be compared with 2 tests. Hand hygiene knowledge questionnaire scores will be calculated as the sum of correct answers. Results will be indicated as medians and will be assessed by Wilcoxon rank-sum test.

**Results:** We observed a total of 2464 hand hygiene opportunities during 2923 minutes of observation at baseline. Compliance overall was 1.5%. Compliance for professional category I and II was 1.7 and 1.4%, respectively. Compliance on the neonatology ward was 4.1% whereas compliance was less than 1% on the other three wards. The median score for hand hygiene knowledge overall was 13 (interquartile range (IQR) 10-15) at baseline. For professional category I and II, median scores were 12 (IQR 9.3-14) and 14 (IQR 11-16), respectively. The impact of HAI on a patient’s clinical outcome and the effectiveness of hand hygiene in preventing HAI were judged to be high or very high by 73.8% and 96.7% of the HCW, respectively.

**Conclusion:** Compliance with hand hygiene at baseline was low in selected wards of ATH and was lower than baseline values in similar settings.

**Disclosure of interest:** None declared.

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**P154**

The support of Pelé: how to spread the compliance and commitment to hand hygiene

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)** P154

**Introduction:** The Little Prince Hospital (LPH), since 1919 is the largest paediatric teaching hospital in Brazil, maintaining an environment for innovation together with deep compromise with the patients assisted. The LPH is a philanthropic and non-profit organization with the support of brazilian celebrities, such as our most famous volunteer Edison Arantes do Nascimento, worldwide known as Pelé, who gave his name to our research institute (since 2005). Pelé brings us opportunities related to visibility and fundraising. We are currently celebrating 10 years of partnerships with Pelé, serving the cause of children health and engaging himself in spreading good practices in healthcare.

**Objectives:** To support efforts and improve staff compliance with hand hygiene practices according to the World Health Organization (WHO) Global Campaign: SAVE LIVES: Clean Your Hands.

**Methods:** Pelé accepted our invitation to learn the handrubbing technic according to the WHO “How to Handrub” methodology and poster. Then, he agreed photos to be taken while he was rubbing his hands and for a video to be produced in the support of infection prevention initiatives.

**Results:** Create educative materials like videos can be broadcasted both internally and worldwide, with the support of local health authorities and national and international stakeholders. Whereas the impact of such a strategy is still unknown, it deserves qualitative and quantitative assessment.

**Conclusion:** A gesture and attitude of social responsibility promoted by a global icon, capable of positive influence in behavioral change, that will save lives.

**Disclosure of interest:** None declared.

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**P155**

Hand hygiene multimodal strategy and the decrease on central line-associated bloodstream infection in a Brazilian neonatal intensive care unit

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)** P155

**Introduction:** Hand hygiene (HH) is the most important strategy to reduce healthcare associated infection. Central line associated bloodstream infection (CLABSI) is the most frequent and severe infection in the Neonatal intensive care unit (NICU).

**Objectives:** In this work we describe the impact of World Health Organization (WHO) multimodal strategy implementation on the CLABSI incidence in the NICU.

**Methods:** The WHO multimodal strategy was recommended by Sao Paulo State government in 2011 to all hospitals as a part of the campaign “Save lives: clean your hands”. Our HH multi-professional team implemented several strategies as checking the infrastructure for HH, education and training, videos, HH playful campaigns, games, creation of a HH mascot. All actions were followed by continuous feed backs of compliance to HH and infection rates to healthcare workers and were coordinated by the infection control committee and supported by the hospital leadership.

A prospective study during 2011 to 2014 in a maternity hospital with 63 NICU beds in Sao Paulo city/Brazil.

**Results:** The alcohol based product consumption for HH increased during this period from 33.8 ml to 90.0 ml/patient-day and , and the HH compliance increased from 63.0% to 84.0%, on the opposite the CLABSI incidence in the NICU reduced from 6.2 CLABSI/1000 Central Line (CL)-day to 1.5 CLABSI/1000 CL-day.

**Conclusion:** The WHO multimodal strategy implementation was crucial to guide the actions and systematization of the HH multiprofessional team. The commitment of a multiprofessional HH team was determinant to our outcome. We do have “saved lives” with all these actions and on 2014 both hospitals won the WHO Latin America HH excellence award as recognition of all our accomplishments.

**Disclosure of interest:** None declared.

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**P156**

Hand hygiene compliance to five moments in pediatric and neonatal intensive care units

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)** P156

**Introduction:** Hand hygiene compliance is essential to prevent healthcare associated infections. Direct observation is the gold standard to monitor optimal hand hygiene compliance. These subject in paediatric patients has limited data.

**Objectives:** The aim of this study was measure healthcare workers (HCWs) hand hygiene compliance using the five moments of hand hygiene.

**Methods:** An observational study of HCWs hand hygiene compliance was conducted in a paediatric teaching hospital. The study was set on four...
PIICUs: Neonatal (16-beds), Cardiac (20-beds), Surgery (12-beds) and General (14-beds). The observer was trained with members of research team. The data were collected manually at predefined timetables (09:00-17:00 hours), in period in 2014 from June to August and from October to December. The standardized WHO form was used. All opportunities observed were classified as one of the five moments of hand hygiene. HCWs were classified as: physicians, nurses, technical nurses, physiotherapists, radiology and laboratory technicians.

Results: A total of 1227 hand hygiene opportunities were observed, with 56.64% (695) compliance. Regarding hand hygiene compliance stratified by HCWs categories, was observed: 68.07% (140/203) nurses, 58.12% (451/776) technical nursing, 35.98% (25/57) physicians and others 53.57% (45/84) HCWs. The adherence, of all HCWs, in each opportunity of five moments in hand hygiene, according to frequency was: 62.66% (198/316) 1st moment; 56.66% (111/198) 3rd moment; 54.49% (18/345) 4th moment; 54.17% (26/48) 2nd moment and 53.75% (172/320) for the 5th moment. The hand hygiene compliance by PICUs was: 64.85% (345/532) Cardiac PICU; 61.35% (127/207) NICU; 54.3% (99/182) General PICU and 39.24% (124/316) Surgical PICU.

Conclusion: This tool allows the identification of fragile points of the work process in health assistance. And despite the study, occur in the same hospital, we can find very different perceptions and situations. This indicates, how at the same time, it is simple and complex, feasible with continuous education, feedbacks and good acceptance systems for hand hygiene. Direct systematic observations offers crucial data on compliance, and fulfill the five moments for hand hygiene is still considered a challenge in infection control.

Disclosure of interest: None declared.

P157
Hand hygiene compliance on two icus at hannover medical school: indication-specific analysis of compliance rates per bedside
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Introduction: Health care-associated infections (HAIs) are a major problem on intensive care units (ICUs) [1]. Hand hygiene (HH) is considered to be the most important tool to prevent HAIs. The aim of this study was to generate indication-specific HH compliance focusing on HCW compliance (AP), AJ.

Objectives: hand hygiene compliance, aseptic procedures.

Methods: For a period of 2 weeks direct bedside observation (BO) was performed on a surgical ICU and a medical ICU in accordance to the WHO guideline “my 5 moments for hand hygiene” [2]: (1) before contact with patients”, (2) before an AP, “3) after body fluid exposure”, “4) after contact with patients”, and “5) after contact with patients’ surroundings”. BO of HCW were performed from 7:00am to 7:00pm 3 days a week. AP were stratified into manipulation of ventilation devices (VD), intravascular catheters (IC), urinary catheters (UC), dressing (D), and other AP.

Results: During the 144 hour observation period, a total of 1,896 opportunities for HH were observed for the two ICUs. The indication (2) was the most commonly observed indication (28.3%; n=537; see Fig. 1). The overall HH compliance rate (CR) was 42.6%. The highest CR was evaluated for indication (2) (24.8%; see Fig. 2). Stratifying the AP into the different devices manipulations described below revealed that “manipulation of IC” was the most frequently observed AP but only reached low CR (24.2%; n=293). The highest CR was evaluated for “manipulations of UC” (42.9%; n=143). In contrast lowest CR was observed with “manipulation of VD” (18.7%; n=134; see table 1).

Conclusion: The overall CR per bedside was poor particularly with indication (2). Thus, future interventions to improve HH adherence to HH and therefore patients’ safety should focus on AP.

Disclosure of interest: None declared.

References

P158
Compliance of hand hygiene of healthcare workers in emergency care unit in a private tertiary hospital in São Paulo
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Background: The objective of this study was to assess the compliance of hand hygiene (HH) of healthcare workers (HCWs) in emergency care unit in a private tertiary hospital in São Paulo.

Methods: An observational study was conducted on the compliance of HH for the five World Health Organization (WHO) indications. HCWs were observed during routine patient care in day shift. The authors also measured the technique of HH through hand washing or hand hygiene with alcohol-based disinfectant. An observational study was performed before and after intervention. This intervention did training with the multidisciplinary team and communication (posters, email, phone and videos). The video was done with the healthcare workers in emergency care unit.

Results: A total of 530 HH opportunities were identified during the observation period. Overall compliance before intervention (BI) was 56% and after intervention (AI) 72.4% (P<0.05). Compliance before and after intervention: nurses (52.1% and 68.3%) (P<0.05) and doctors (59% and 79%) (P=0.05).

Conclusion: Adherence to hand hygiene practice and use of alcohol-based disinfectant of the doctor was high compared with the literature. The main point was the participation of physicians in the intervention.

Disclosure of interest: None declared.

P159
A survey about surgical hand antisepsis and implementation among surgeons in a newly-opened hospital in China
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P159

Introduction: The study was performed in a newly opened hospital. It is expected to improve the quality of the hospital surgical hand antisepsis and to reduce the surgical site infection eventually.

Objectives: To learn the surgeon’s knowledge level and implementation about surgical hand antisepsis, to provide guidance and decision-making basis in order to enhance the quality of surgical hand antisepsis further.

Methods: The survey has been carried out in 11 surgical departments between September 17th to 30th, 2014. The hospital infection control team (ICT) used a self-designed questionnaire to ask 100 surgeons to answer the questions. Contents of this survey included the general information about respondents, their knowledge level and implementation about surgical hand antisepsis, training attendance, whether further training required in the future. The survey’s quality control such as sample size, questionnaire modifications or adjustments, sample random selection has been done by ICT. The SPSS software10.0 has been used for statistics in this study.

Results: 1.96 copies of the survey questionnaire were returned. Male respondents accounted for 84.4%, less than 30 years old accounted for 59.4%, undergraduate surgeon accounted for 66.6%.

2. The average rate of the questions about surgical hand antisepsis answered correctly just was 68.6%, only 3.1% of respondents knew exactly the length of time when performing surgical hand antisepsis.

3. For the correct rate of the answer, the female surgeon answered correctly higher than male; the age <30 years group was higher than 30 to 39 age group and ≥40 age group; Postgraduate surgeon was higher than other categories.
4. From the departments, the general surgery, urology, neurosurgery and thoracic surgery, the correct rate of the answer were more than 70 percent.

5. The survey found that 80.2% of the total surveyed surgeon had accepted the training related to surgical hand antisepsis, 39.0% attended the hospital-level's training, 41.6% attended the department-level.

6. 83 % of respondents wanted to attend the further training about the knowledge related to surgical hand antisepsis and implementation.

Conclusion: The surgeon's knowledge level needs to be improved, it is necessary to carry out targeted standardized training regularly.

Disclosure of interest: None declared.

P160
Hand hygiene campaign to all the residential care home for elderly (RCHE) in Hong Kong
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P160

Introduction: Multidrug Resistant Organisms (MDROs) is a global public health challenge. Vancomycin Resistant Enterococcus (VRE) is a type of MDRO. There is a surge of incidence of infection and colonization with VRE in Hong Kong in 2013. Outbreaks caused by VRE occurred in hospitals; and previous experience showed that elderly population were at high risk. Infection Control Branch (ICB) anticipated that there might be increased involvement of RCHE residents following the pan-screening exercise in a public hospital. In an effort to prevent the spread of VRE within the RCHEs, a territory-wide hand hygiene campaign to all RCHEs was initiated in late 2013.

Objectives: To review the local situation of prevention and control of infectious diseases in RCHEs in Hong Kong and to develop a local action plan to enhance hand hygiene compliance among RCHEs in Hong Kong.

Methods: A locally adapted hand hygiene program for RCHE was developed based on the WHO guidelines on hand hygiene in health care. The program consists of 5 important components: System Change, Training / Education, Evaluation and feedback, Reminders in the workplace, Institutional safety climate.

Results: A total of 2400 RCHE staff received the training in the campaign. From 17 September 2013 to 27 September 2013, 96% of the RCHEs in Kowloon have been visited. By the end of October 2013, more than 90% of the RCHEs territory-wide have received the targeted training. Simplified education kit including posters and gimmicks were delivered to all RCHEs in October.

Conclusion: A multimodal WHO framework comprehensive hand hygiene promotion programme was successfully implemented. The program contributes not only hand hygiene improvement in RCHE but also psychological acceptances for caring VRE residents in RCHE.

Disclosure of interest: None declared.

P161
The impact of hand hygiene in the primary care: to go beyond the hospital setting
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P161

Introduction: Scientific evidence shows that hand hygiene is an easy and efficient practice in the reduction of healthcare associated infection, contributing to a decrease in morbidity and mortality. World Health Organization (WHO): “SAVE LIVES: Clean Your Hands” (SL-CYH) is still very centered in the hospital long term care settings.

Objectives: Adaptation of the WHO SL-CYH campaign to the primary care setting.

Methods: Implementation of the WHO multimodal methodology in a primary care setting involving 13 units, serving a population about 110,000 inhabitants. The implementation of the campaign was coordinated by the Infection Control and Antimicrobial Resistance Unit and focused on the following actions: (1) audits and correction measures to structural conditions of the units (for example: existence of alcohol-based handrub – ABHR- dispensers and washbasins to hand hygiene) and pocket ABHR located to the home care; (2) infection control link professionals observer training (replicated in each unit) and subsequent observational study before/after the campaign in 2013 and the year after (2014); (3) campaign launch event in each unit with distribution of promotional material (pens, pins, flyers, posters, small films, didactic games) and signature of formal commitment by the professionals; (4) celebration of Hand Hygiene Day (5 of May) with a walk for the general population and involving the local and national media; (5) organization of hand hygiene poster competition for professionals and (6) participation in the E-bug project directed to schools.

Results: Compliance rates on hand hygiene in the participating units was 56%, 82% and 82% before, after campaign in 2013 and 2014, respectively. The rate of compliance in the “first moment” was of 46%, 61% and 71% before, after campaign in 2013 and 2014, respectively.

Conclusion: The campaign methodology of WHO SL-CYH showed to be successful when applied to the primary care setting. The biggest difficulty was the inexistence of specific material in portuguese language and directed to this setting. The community intervention level seems to be an interesting contribution to WHO SL-CYH campaign.

Disclosure of interest: None declared.

P162
Surgical hands antisepsis with alcohol-based preparations: cost-effectiveness, compliance of professionals and ecological benefits in the Brazilian healthcare scenario
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P162

Introduction: Surgical hands disinfection with alcohol-based handrub preparation effectively removes Gram-positive and Gram-negative organisms (including multi-resistant ones), as well as fungi and viruses. Evidence allows concluding that alcohol-based handrub preparation versus scrubbing with chlorhexidine under the perspective of Brazilian hospitals.

Methods: Cost-effectiveness analysis through a decision model by comparing the two techniques for surgical hands disinfection:
a) Use of alcohol-based handrub preparation (Softalind® Pure, B. Braun Medical AG),
b) Scrubbing with chlorhexidine brushes. Outcomes considered were reduction of microbial counting (clinical scenario) and water savings (ecological scenario).

Results: Total costs of the technique with Softalind® Pure was 46% lower than the costs of the technique with chlorhexidine brushes. Additionally, the clinical scenario has shown superior effectiveness for the alcohol-based handrub preparation, due to the higher in vitro microbial counting of 23% than its comparator. In the ecological scenario, the reduction of 18.5 liters of water per procedure with the use of alcohol-based handrub preparation generates cost savings besides the saving in the water consumption itself.

Conclusion: The present evaluation pointed out several advantages for the use of alcohol-based handrub preparation for surgical hands disinfection. Among them the significant reduction in microbial counting, improvements in compliance of professionals due to less time for preparation (1 minute for alcohol-based preparations vs. 3 minutes for scrubbing with chlorhexidine) and less irritant effect under the skin, besides great savings in costs and water consumption and brushes disposal.

**P163**

Alcohol preparation compared to traditional surgical hand antisepsis: acceptance by surgical team at a private hospital in Brazil

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Introduction: Traditional surgical hand scrubbing (TSHS) has been replaced by alcohol-based formulation (ABF) in many countries due to antimicrobial efficacy, easy application, lower skin damage, time saver and no recontamination risk by rinsing hands with water [1]. In Brazil, chlorhexidine (CHG) and povidone-iodine (PVP-I) are used for TSHS.

Objectives: Compare one ABF to TSHS, evaluating surgical team acceptance and time, water, products and waste savings.

Methods: This before-after intervention evaluation, quantitative study was conducted in two operating suites (26 rooms) at a 650-bed private hospital - Sao Paulo, Brazil. The ABF approved for surgical hand antisepsis by ASTM E1115, CEN-EN 12791 and Brazilian Health Surveillance Agency was available for 12-week (May-July/2014). The subjects who met inclusion criteria answered two questionnaires: before and after ABF introduction, evaluating the following attributes: softness, dryness, irritation, skin feel, easiness in putting on surgical gloves, drying time, etc. Chi-square and McNemar tests were used. Time and water consumption were also measured.

Results: 52 (55.9 %) subjects completed the study. The majority were male (34; 65.4%), age of 36–55 years and > 16 years performing surgery (31; 59.6%). ABF was considered excellent/good by 47 (90.4%). Procedure simplifier/time saver, good fragrance, soft/comfortable/hydrated hands skin, non-abrasive/non-irritating were evaluated positively, p < 0.001. There were per person/hand antisepsis: approximately 73 seconds’ time saving, an average of 33.1 liters of water consumption saving and waste saving (surgical brushes/stereile towels).

Conclusion: The ABF for surgical hand antisepsis had an excellent/good acceptance by the members of surgical team. It results in considerable savings in water and healthcare associated residues as the environment is concerned.

Disclosure of interest: J. Kawagoe Grant/Research support from: GOJO - Provision of alcoholic products and technical and administrative support, A. Toniole: None declared, C. Silva: None declared, F. Menezes: None declared, M. Hutter: None declared, P. Zimmer: None declared, L. Barbosa Employee of: GOJO - Provision of alcoholic products and technical and administrative support, L. Correa: None declared.

Reference

**P164**

Sanitize your hands and have many more benefits

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P164

Introduction: Hand hygiene is one of the simplest and most effective measures in reducing healthcare-associated infections. The implementation of a strategy at national level, by consensus with the proposal of the World Health Organization, is the most effective approach to promote the practice of hand hygiene. Portugal joined, at October 2008, the campaign World Alliance for Patients Safety and Portugal’s National HealthService has been insisting on the use of proper hand hygiene standards by health professionals and general population.

Objectives: Evaluate the effectiveness of implementation of the campaign “Clean Care is Safer Care”.

Methods: Two hundred observations of hand hygiene standards, of all professional groups, during the year 2014, in Oceanos Health Unit.

Results: Oceanos Health Unit achieved a global improvement of hand hygiene practices, due to the involvement of all professional groups (family physician, family nurse and operational assistant). The improvement occurred in all the five moments of the hand hygiene, but the steepest increase happened on the fifth moment (after contact with the surrounding environment of the patient) with a difference of 62% between the pre and post campaign.

Conclusion: Hand hygiene is one of the basic precautions with more impact on the prevention of infections. Although the 2009 data showed an undervalued adhesion to the practice of hand hygiene (46.2%), at Oceanos Health Unit the overall rate of compliance has increased considerably since the establishment of the strategy “Clean Care is Safer Care” (39 % to 67 %). The Health Unit is also involved in patient education as well as their caregivers in order to integrate them as partners in security.

Disclosure of interest: None declared.

**P165**

Promoting hand hygiene program via social media

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P165

Background: Global hand hygiene (HH) campaign has been promoted since 2004 to protect the patient safety. On World HH day (May 5, 2014), a video campaign was launched in National Taiwan University Hospital (NTUH), Taiwan. We aimed to evaluate the effect of different social media on promoting the HH program.

Methods and materials: One 3 minutes-long video of HH campaign in 8 language was posted on the YouTube. The Chinese version had been promoted through three platforms, including the official hospital website, hospital group e-mail, and the Facebook site of one famous internet celebrity, who was also 6th grade medical student of the school the hospital affiliated to. The video traffic of the Chinese version during May 5, to Dec, 31, 2014 was analyzed via Google Analytics. The HH compliance was observed and compared in Nov. of 2013 and Nov. 2014, separately.

Results: During the observed period, 5,252 times the video was viewed, mainly on the Chinese version (3,509/5,252, 66.8%). The cost of the video was 6,250 USD and the cost per click was 1.2 USD. For the hospital level, the official website of NTUH had 24,000 subscribers and 151 linked to the video. The connection rate was 0.6% (151/24,000). As to the hospital-group e-mail, 9,967 peoples received the e-mail and 91 receiver opened the link (connection rate 0.9%, 91/9,967). There were no further feedback from the e-mail system or website. For the personal level, there were 13,000 impressions from the internet celebrity’s Facebook site and 807 had linked into the video. The connection rate as 6.2% (807/13,080) was significantly higher than the hospital website and group e-mail (both P value<0.001). 525 persons (4.0%, 525/13,080) had pressed “Like” for the HH campaign and 21 (0.2%, 21/13,080) persons further shared the video. The hospital-wide HH compliance was 83.7% (473/565) in 2013 and 86.7% (589/679) in 2014 (P=0.13).

Conclusions: We succeeded the HH compliance via a video campaign in 2014. For the Net Generation, social media as Facebook had provided significantly high connection rate. It revealed that the information transmission may not be depended on the hierarchy within the hospital. The information leader in novel social media, like Facebook, could be a strong support for future HH promoting program.

Disclosure of interest: None declared.
**P166**

**Communication is key: an innovative multidisciplinary approach to communication of regional antimicrobial resistance surveillance data to hospital microbiologists in North East England**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P166

**Introduction:** Antimicrobial resistance (AMR) must be urgently tackled [1]. Strategies to tackle AMR must include using high quality surveillance data to rapidly modify policy and practice. Yet, in the UK and elsewhere, AMR surveillance is conducted by specialists located in organisations separate from hospital practitioners. This leads to communication challenges, including delays, difficulty in communicating technical limitations around interpretation of data, and a lack of clinical interpretation of surveillance data.

**Objectives:** This project aimed to improve the quality, speed and clinical relevance of communication between hospital microbiologists and surveillance specialists with regard to AMR surveillance data.

**Methods:** A multidisciplinary virtual working group was convened, including hospital microbiologists, the regional microbiologist, a consultant epidemiologist, and a senior information officer, led by a public health specialty registrar. This group developed a short quarterly regional AMR report format, showing and statistically analysing trends, and giving a commentary on the data limitations and clinical significance of the data. The report is thematic, responding to queries and concerns of front-line microbiologists. Discussion of this report at an existing regional microbiology group was encouraged.

**Results:** Feedback regarding the “North East AMR Quarterly Report” to date has been universally positive. The level of engagement with this report, as measured by communication with the surveillance team, has been greater than for previous regional AMR surveillance reports, and it has been praised for its clear focus on clinical relevance in particular.

**Conclusion:** Surveillance is a key tool for tackling AMR. Surveillance data can be a useful tool to influence front-line practice, but to be most effective, it must be interpreted rather than presented in raw formats whose limitations and clinical relevance may not be clear. A multidisciplinary approach to creating data-driven reports was of particular value in this case, and may be worthy of consideration elsewhere.

**Disclosure of interest:** None declared.

**Reference**

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**P167**

**Drug resistance bacterial isolates in inpatients at Cocody University Hospital, Abidjan, Côte d’Ivoire in 2014**

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**Introduction:** Nosocomial infections by the emergence of antibiotic-resistant bacteria are also a real health problem in limited-resource countries. The high frequency of these infections goes along with increased consumption of antibiotics.

**Objectives:** The aim of this study was to determine drug resistance rate of indicator bacteria isolated from nosocomial infections in inpatients.

**Methods:** Hospital bass cross-sectional study was conducted on 299 isolates from inpatients of Cocody University hospital from January to December 2014. Bacteriological culture and examination was done following standard microbiological techniques. Drug resistance test was performed by disk diffusion methods against classes of antimicrobials. The data was analysed for descriptive statistics using EPI Info version 6.2 and Microsoft Excel.

**Results:** Of the total of 299 isolates, strains were respectively from surgical (30.4%), pediatrics (18.7%), medicine (17.7%), neurology (14%), pulmonology (11.4%) and intensive center unit (7%). Enterobacteriaceae were represented by 60.2%, including Escherichia coli (24.4%) and Klebsiella pneumoniae (19.1%). A total of 92 (51.1%) enterobacteria producing extended spectrum beta-lactamase (ESBL), ESBL have been commonly isolated in pediatric, surgical and intensive care unit, especially in the urine. The rate of resistance to ciprofloxacin were 68.3% for Enterobacteriaceae. About 62 isolates of Staphylococci (20.7%), 45 were Staphylococcus aureus (72.6%) and 17.8% were resistant to methicillin (MRSA). Multidrug resistance rate was 4.4%. MRSA were common in surgery especially in suppurations. Nearly, 10% of Pseudomonas aeruginosa were resistance to cefazidime (CRPA). These strains were isolated in intensive care and pediatrics units.

**Conclusion:** This study revealed that the rate of drug resistance was high for ESBL. These trends need to be monitored regularly. These data should be taken into account in the strategies against nosocomial infections.

**Disclosure of interest:** None declared.
chromatography coupled mass spectroscopy analysis. Disc diffusion assay was used to investigate the antibacterial activity of clove and rosemary essential oils against Pseudomonas aeruginosa (ATCC 9027). Furthermore, the antibiotic enhancement capacity of these oils was evaluated in combination with some antipseudomonal drugs comprising ceftazidime, imipenem, aztreonam and ciprofloxacin.

Results: Results revealed that clove essential oil exhibited higher activity towards the test bacterium than rosemary oil. Meanwhile, the antipseudomonal activities of all the tested antibiotics were enhanced in the range of 8-50% when combined with clove oil and 12-33.3% in case of rosemary oil. The antibacterial activity displayed by both essential oils, alone and in association with the antibiotics, is probably related to the major components identified in both oils, comprising eugenol (80.03%) in clove and eucalyptol (29.3%) in rosemary.

Conclusion: Clove and rosemary essential oils are potential candidate antimicrobial natural products that could enhance the activity of conventional antibiotics.

Disclosure of interest: None declared.

P170

Candida non albicans isolates with a high antibiotic resistance: a real threat for cancer patients in Karaj City

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Introduction: Cancer patients remain at substantial risk for developing serious infections particularly oropharyngeal Candidiasis. Because of a weakened line of defense in oral cancer patients, the present prospective study was carried out, with the aim of isolation, and identification of Candida spp from oral cavity of cancer patients.

Methods: From 50 cancer patients with oropharyngeal candidiasis sample was taken by the physician. All samples were sent to Research Laboratory, School of Medicine, Alborz University of Medical Sciences and processed by standard methods for Isolation and identification. Antifungal resistance pattern was carried out according to CLSI guideline. By Multiplex Polymerase Chain Reaction, identification of the 18s Ribosomal RNA among Candida spp was performed using specific primers for the molecular identification of Candida spp.

Results: Of the 50 patients which, 18 (36%) were female and 32 (64%) were male; mean ages was 38.4 years. Leukemia and lymphoma were the most frequent cancer in the studied group, accounting for 17 (34%) and 12 (24%) respectively. The mean weight of the patients was 73.2 Kg. A total of 29 Candida spp were isolated from 29 of cancer patients with oropharyngeal candidiasis; of which 17 were C. albicans and 12 were C. non – albicans.

All the Candida spp were confirmed using the 18s Ribosomal RNA specific primers for the molecular identification of Candida spp. Among all the Candida spp, Candida non – albicans showed a high resistance pattern to amphotericin B (MIC 07 µg / ml) and ketoconazole (MIC>05 µg / ml).

Conclusion: In conclusion, oropharyngeal Candidiasis is a serious infection among cancer patients. The isolated candida spp were resistant to common antifungal agents which may leads to longer hospital stay, more expensive/ toxic drugs and higher mortality. Therefore, interval surveillance is necessary in developing institutional guidelines.

Disclosure of interest: None declared.

P171

Correlation between multi-drug resistant organisms and antimicrobial use among in-hospital patients at a tertiary hospital in the Philippines from July 2010 to June 2014

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Introduction: Infections caused by multidrug resistant organisms (MDRO) are associated with higher morbidity, mortality and healthcare costs. WHO recommends hospitals to monitor antimicrobial use to reduce MDRO prevalence.

Objectives: This 4-year study described the annual MDRO prevalence and annual antimicrobial consumption. It also investigated their relationship.

Methods: Annual antimbiogram of Methicillin Resistant S.aureus(MRSA), ESBL E.coli, ESBL K.pneumoniae, and MDR P.aeruginosa were evaluated. Data on annual consumption (Defined Dose Only) of selected antimicrobials were analyzed. Linear regression was used to analyze trend in antimicrobial consumption and MDRO prevalence. Pearson’s correlation coefficient was used to determine their relationship. A p-value<0.05 and r²>0.5 were considered statistically significant.

Results: There was a significant increase in annual patient days while annual antibiotic usage decreased. The most common antibiotic class used was cephalosporin, followed by beta-lactam/beta-lactamase inhibitors then fluoroquinolones. Individually, piperacillin-tazobactam, ceftriaxone and etampen use significantly increased. The prevalence of ESBL E.coli significantly increased, ESBL K.pneumoniae and MRSA remained stable and MDR P.aeruginosa significantly decreased. The increased consumption of cefazolin, cepfime, meropenem and cotrimoxazole were positively correlated with increased ESBL E.coli prevalence. The higher use of antimicrobials without anti-Pseudomonal activity ceftriaxone and etampen versus piperacillin-tazobactam were positively correlated with decreased MDR P.aeruginosa prevalence. MRSA prevalence positively correlated and mirrored linezolid usage as it is a 3rd line agent for it. The absence of increase in ESBL K.pneumoniae prevalence may be due to decreased fluoroquinolone use.

Conclusion: This study at our institution found that antimicrobial use did not increase despite increase in annual patient days. The prevalence of ESBL E.coli increased, ESBL K.pneumoniae and MRSA remained stable; MDR P.aeruginosa decreased. A positive correlation between antimicrobial use and MDRO prevalence was established. Establishing an antibiotic restriction program is recommended to address the significant prevalence of MDRO.

Disclosure of interest: None declared.

P172

Validation of national hospital antimicrobial consumption data in England

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Introduction: In 2014, the first national report providing surveillance data for antibiotic consumption in England was published by the English Surveillance Programme for Antimicrobial Utilisation and Resistance (ESPARG) [1]. RxInfo and IMS Health are commercial organisations specialising in the provision of prescribing data for healthcare. Data from IMS Health was used to collate information on antibiotic use in secondary care for the ESPARG report. The report showed considerable variability in the extent of antibiotic prescribing across different areas within England. While IMS Health and Rx-info each have formal internal quality assurance processes, there has been no external validation of the data when used for the purpose of comparison or benchmarking. The National Health Service (NHS) England will include validation of hospital prescribing data as part of the antimicrobial quality premium (financial reward for improvements in quality of care) in 2015/16.

Objectives: To develop a national protocol for validating antimicrobial consumption data in acute NHS hospitals in England.
Methods: A validation protocol was designed and piloted in acute NHS hospitals. Each was sent the protocol along with a workbook to enable each hospital to submit antimicrobial consumption data from their own pharmacy system. These data were analysed alongside that from IMS Health and Rx-info. Participating hospitals were also sent a questionnaire to gather feedback on the pilot validation protocol to help inform the final national protocol.

Results: Forty-five (out of acute 156) NHS Trusts participated in the pilot. The pilot protocol and questionnaire feedback enabled the development of a national validation protocol which was published in March 2015.

Conclusion: All acute NHS hospitals in England will be encouraged to use the national protocol to validate antimicrobial prescribing data to ensure correct and meaningful data for the purpose of benchmarking and antibiotic stewardship.

Disclosure of interest: None declared.

Reference

P173
Antimicrobial stewardship program in a pediatric intensive care unit of a tertiary children's hospital in Saudi Arabia – a pilot study

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Introduction: Antimicrobial resistance is a serious global threat that needs urgent attention. Antimicrobial stewardship (AS) programs were proven to be effective in reducing antibiotic days in adults. Pediatric-specific data about the effectiveness of implementation of such programs are limited especially in the Middle East.

Objectives: Our primary objective was to identify the top three antibiotics and measure their specific days of therapy (DOT) per 1000 pediatric intensive care unit (PICU) days per quarter before and after the AS intervention.

Methods: We conducted a pilot prospective quality-improvement interventional study in a 20-bed PICU in a specialized tertiary children’s hospital in Riyadh, Saudi Arabia from April to December 2014. Data about antimicrobial indication and utilization were gathered from study-designed forms. An AS member from pediatric infectious disease team rounded three times per week on all patients in PICU and provided antibiotic-related recommendations based on available bedside information and ensured adherence to antimicrobial restriction policy. Intervention also included educational sessions to physicians and nurses about proper use of antibiotics.

Results: During the study period, 648 children out of 898 PICU admissions (72.2%) were utilizing antimicrobials. Vancomycin, Pipracillin/Tazobactam and Meropenem represented approximately 60% of the 36 antimicrobials used. Per quarter, antibiotic-specific DOT dropped from 348.5 to 320.5 (8.0%, p-value <0.001) for Vancomycin, 356.2 to 294.7 (17.3%, p-value <0.001) for Pipracillin/Tazobactam, 162.0 to 111.1 (31.4%, p-value <0.001) for Meropenem.

Conclusion: Education and bedside real-time AS recommendations significantly dropped the use of Meropenem, Pipracillin/Tazobactam and Vancomycin. Moreover, AS program proved to be effective and promising in reducing antibiotic days in PICU.

Disclosure of interest: None declared.

P174
Antibiotic prescribing in neonatal intensive care units of two tertiary care hospitals at central India

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Introduction: Neonates are vulnerable for systemic infections and wise use of antibiotics is recommended for the group to cut down the risk of development of antibiotic resistance, a global threat. There is a general lack of studies that present antibiotic prescribing practices at neonatal intensive care units (NICUs) specifically from the countries with high birth rate such as India.

Objectives: To compare and describe the situation of antibiotic prescribing at neonatal intensive care units of two private, tertiary care hospitals of Ujjain district in Central India.

Methods: A cross-sectional study was conducted from 2008 till 2011 using customized form. Antibiotics were classified based on WHO anatomical therapeutic chemical (ATC) classification and diagnoses were classified using International Classification of Diseases-10.

Results: Of total 1789 neonates, 1572 were admitted at the NTH and 217 at the TH. Sepsis was most common diagnosis in both hospitals (>30%). Antibiotics were prescribed to higher percentage of neonates with sepis (NTH-97% and TH-94%) than to the rest (NTH-89%, TH-71%). Most frequently prescribed antibiotics for this group were fixed-dose combinations of antibiotics (FDCs, not present in WHO ATC list, 30%) and 3rd generation cephalosporins (28%) in the NTH and 3rd generation cephalosporins and aminoglycosides (36% each) and FDCs (12%) in the TH. The adherence to the WHO’s model list of essential medicines and the Indian national list for children were higher in the teaching hospital than in the non-teaching hospital, 85% and 50% respectively (p<0.01).

Conclusion: Broad-spectrum antibiotics; including new FDCs were prescribed in both hospitals but extensively at the NTH. The adherence to available essential medicines lists was significantly lower at the NTH. An unnecessary exposure of neonates with the higher classes of antibiotics might be seen as a threat for the development of antibiotic resistance. There is an urgent need to develop; a diagnoses specific antibiotic prescribing guidelines for neonates and measures to reduce the prevalences of infectious diseases using antibiotic stewardship programs.

Disclosure of interest: None declared.
continuous fever and neutrophil count. From October 2014, TZP (with prolonged infusion) with or without amikacin replaced carbapenems as the first line therapy of neutropenic fever. Daily defined dosages (DDD) per 1000 patient days were calculated for all antibiotics by the hospital pharmacist for each year.

Results: A total of 913 admissions with 11,544 patient days were followed in 2013; and 1,072 admissions with 11,843 patients days were followed in 2014. An increase was observed in the rate of nosocomial pneumonia, central line associated bacteriaemia and as well as the rate of ESBL and carbapenem resistance in gram negative bacilli infections in 2014 when compared with 2013.

The DDDs/1000 patient days for imipenem, meropenem, vancomycin, teicoplanin, daptomycin, linezolid, colistin, TZP and amikacin in 2013 and 2014 were as follows; 201 vs 19; 1,578 vs1,092; 533 vs 251; 205 vs 159; 56 vs 14; 76 vs 26; 188 vs 154; 157 vs 254; and amikacin 5 vs 41.

Conclusion: Despite the rates of nosocomial infections and antibiotic resistance increased relatively, we were able to decrease the consumption of not only carbapenems but also glycopeptides. The sustainability of such intervention needs to be monitored continuously.

Disclosure of interest: G. Metan Grant/Research support from: Associates of Cape Cod, Conflict with: Member of Advisory board for Pfizer, Gilead, Astellas, L. Kaynar: None declared, N. Yozgat: None declared, F. Elmalı: None declared, C. Altay Kurkuçuglu: None declared, E. Alp: None declared, M. Cetin: None declared.

P176 Perioperative antibiotic prescribing in two private sector hospitals in central India
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Introduction: Antibiotic resistance is increasing globally and high use of antibiotics has been found to correlate with increasing antibiotic resistance. Surgery related prophylactic use of antibiotics is common due to the high risk for patients to develop surgical site infections. In India, the world’s second most populated country there is currently no national prescribing guidelines to be implemented and data, both on overall and prophylactic use antibiotics in surgery is scarce.

Objectives: To analyse the perioperative antibiotic prescribing among patients admitted with surgery indications at surgery departments of two tertiary care hospitals, a teaching hospital (TH) and a non-teaching (NTH).

Methods: The study was conducted in Ujjain, Madhya Pradesh, India. Patients admitted between April 2008 and March 2011 at the surgery wards of the C.R. Gardi Hospital (TH) and Ujjain Charitable Trust Hospital (NTH) were included in the study, 6171 from the TH and 6263 from the NTH. Four diagnosis groups were devised, upper/lower urinary tract and routine/emergency abdominal surgery indications. Patients with simultaneous infections were excluded. Demographic information and antibiotic prescribing data were analysed. DDDs were used to compare dosages. Adherence to the WHO list of essential medicines (WHOLEM) and National list of essential medicines of India (NLEM) were analysed.

Results: At the TH 88% and at the NTH 86% of patients were prescribed antibiotics. The most commonly prescribed antibiotics were imidazole derivates and quinolones at the TH and cephalosporins and antibiotic fixed dose combinations at the NTH. The average duration of hospital stay and duration of antibiotic treatment were 10.0 and 7.6 days at the TH and 3.9 and 3.2 days at the NTH. The overall average DDD/100 patient days were 72.5 in the TH and 110.5 at the NTH. Twenty five percent of prescriptions at the TH and 6% at the NTH were done using generic names. Adherence to WHOLEM and NLEM were seen in 66% and 73% of prescriptions at the TH and 42% and 57% of prescriptions at the NTH.

Conclusion: The result from the study indicates that a large proportion of patients admitted at surgery wards of the study hospitals were prescribed prophylactic antibiotics. It also indicates that the antibiotics are being prescribed in long courses and that there are large differences in the dosages prescribed.

Disclosure of interest: None declared.

P177 Evaluation of surgical antimicrobial prophylaxis practices in a tertiary care center in Oman, 2015
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P177

Introduction: Surgical Antimicrobial Prophylaxis (SAP) is currently considered an essential component of the standard of care in virtually all surgical procedures. It has resulted in reduced post-operative morbidity and mortality. National guidelines for SAP is lacking in Oman.

Objectives: This study evaluates the practices of surgeons regarding SAP in a tertiary care center in Oman, to identify gaps, and to set recommendations.

Methods: Prospective, observational study. All patients from all surgical departments, who had undergone elective, clean or clean contaminated surgery over a 2-month period in 2015, were followed up till discharge from the center. The number & types of antimicrobials used along with duration were noted, described, and compared.

Results: From a total of 478 patients enrolled in the study, 465 (97%) patients received antimicrobials for therapeutic, prophylactic, or both reasons (5%, 71%, and 21% respectively). The antimicrobials used for SAP varied among different departments but, generally, cefuroxime was the most commonly used antimicrobial (58%), followed by amoxicillin/ clavulanic acid (21%), then metronidazole (15%). Most of SAP (74%) were given within one hour of incision in agreement with the international guidelines. However, inappropriate prolonged duration, of SAP administration, for more than 24 hours were noted in 69% of patients. There was a significant difference among different surgical departments regarding timing and duration of SAP (p<0.01), while there was no significant difference between the clean and clean contaminated groups.

Conclusion: There is a great variability in SAP practices among different surgical departments inside the same center. A national guideline for SAP is urgently needed to help standardizing practices. Post implementation auditing of SAP guidelines will help evaluating the compliance of surgical team and its impact on the patients’ morbidity and mortality as well as on the overall use of antimicrobials.

Disclosure of interest: None declared.

P178 “Capacity building to implement state of the art surveillance systems for antibiotic consumption and resistance in Kosovo” results of European Union research project in Kosovo
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Introduction: The project “Capacity building to implement state of the art surveillance systems for antibiotic consumption and resistance in Kosovo” was financed by the European Union and implemented by the National Institute of Public Health of Kosovo in collaboration with the University of Antwerp during 2012-2014.

Objectives: The main objectives of this project were to monitor volumes and patterns of antibiotic use and to establish a comprehensive surveillance system of antibiotic resistant bacteria.

Methods: Total antimicrobial use data were analysed according to the WHO ATC/DDD methodology and expressed in DDD/1000inhabitants/day (DID). Data on antimicrobial use in hospitals were collected in all seven hospitals of Kosovo using the methodology of a point prevalence survey based on ESAC. Survey of consumption in primary care was retrospective and involved 12 Family Medicine Centres covering all 6 regions of Kosovo.

Results: Total antibacterial use in Kosovo was 26.3 DID. The top antibacterial subgroups were penicillins (12.8 DID, 48.7% of all antibacterials) and other beta-lactam antibacterials (4.9 DID, 18.7%). Kosovo had the highest proportional total parenteral use of ceftriaxone in...
Europe (53.9) and lowest use of systemic antymycotics and antifungals (0.08 DDD). Of total number of 1579 enrolled patients in Kosovo hospitals, 769 (48.7%) of them received antibiotics. The most prescribed antibiotic was ceftriaxone (41.5%), followed by gentamycin (12.1%). Antibiotics were administered mainly through parenteral route (73.3%). Empiric antibiotic prescription was higher than etiological (88.28% vs. 11.72%). Of all patients who attended primary care level, 33% received antibiotics. Administration through the parenteral route was 43%. Antibiotic prescription with generic names was noticed only in 31% of cases. The most prescribed antibiotic in primary care level was also ceftriaxone.

Conclusion: Gathered data will serve as a tool for quality improvement in Kosovo and will support the preparation of guidelines and protocols for prudent use of antibiotics.

Disclosure of interest: None declared.

P179
The change of a district hospital antimicrobial consumption in and after national antimicrobial appropriate use intervention, China
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P179

Introduction: Clinical use of antimicrobial was promoted by a national special clinical antimicrobial appropriate use program (2011–2013) and legislation (2012) by the Ministry of Health in China.

Objectives: To investigate the time-phased effectiveness of the national intervention to antimicrobial clinical use in a district hospital, China.

Methods: Multi-strategy according to national special program and legislation to reasonable use of antimicrobial, including antimicrobial prescribe target setting, surveillance on prophylactic use of antimicrobial rate to clean wound surgery and surgical set infection, and, as well as performance feedback etc, were introduced in a district hospital since 2011. WHO Anatomical Therapeutic Chemical classifications of antimicrobial was used in calculated defined daily doses (DDDs). Annual antimicrobial consumption data from 2011.1 to 2014.12 were obtained and converted to DDDs per 1,000 patient-days.

Results: The strength of antimicrobial consumption by DDDs per 1,000 patient-days was decreased in the hospital by 32.20%, 1745.940, 1143.471, 1144.949, and 1183.821, respectively from 2011 to 2014. About 70% of antimicrobials use was stably prescribed in its outpatient settings during the investigation (73.22% in 2011, 70.74% in 2012, 68.39% in 2013, and 68.47% in 2014). The strength of antimicrobial consumption by DDDs per 1,000 patient-days was decreased by 70.32% in the inpatient-units performing surgical procedure with clean wound, 623.819, 337.267, 276.622 and 224.563, respectively from 2011, meanwhile decreasing prophylactic use to class one wound (42.28% [416/984 in 2011], 21.95% [373/1699 in 2012], 14.77% [288/1950 in 2013] and 14.24% [232/1629 in 2014]). During the same time, the strength of antimicrobial consumption by DDDs per 1,000 patient-days was increased by 22.30% in the rest inpatient-units, 383.947, 332.685, 418.225 and 467.484, respectively.

Conclusion: National intervention of antimicrobial judicious use was effective in outpatient clinic and units operating clean procedure in the district hospital.

Disclosure of interest: None declared.

P180
Implementation of a hospital antibiotic stewardship program: first results
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P180

Introduction: Portugal has high rates of healthcare associated infection and antimicrobial resistance. In February of 2013 the National Program on Prevention and Infection Control and Antimicrobial Resistance (PPCIRA) was restructured. In November of 2013 the PPCIRA determined implementation of Antibiotic Stewardship Programs (ASP) in all healthcare facilities.

Objectives: Implementation of a ASP, with mandatory validation of all the prescriptions of carbapenems and quinolones in the first 96 hours, medical education, carbapenems and quinolones consumption reduction and increase of antibiotic free days.

Methods: Establishment of Antibiotic Stewardship Group in a 400 bed acute care hospital, consisting of Infectious Diseases specialists, who advise and validate the prescription, and Microbiologists, with consulting function. A database network was built to monitor the prescription of carbapenems and quinolones, with alerts sent via email to the group. This database was linked to a validation system, allowing monitoring, auditing and information to the prescriber. The result of the audit appears in warning messages when opening the prescription (adequate or inadequate). If it’s “inadequate”, the infectious diseases specialists contacts prescribing physician for advice. The ASP began in October 2014 and had the involvement of the institutional leadershships.

Results: During the first 3 months of the implementation of ASP the prescriptions decreased 38% and the seeking of advice pre-antibiotic prescription increased. From 2013 to 2014 there was a decrease in the consumption of quinolones from 41.5 to 36.9 DDD/100 patients and of carbapenems from 47.8 to 46.3, respectively. The antibiotic free days increased from 43.5 in 2013 to 50.1 in 2014.

Conclusion: Implementation of a ASP in an acute care hospital allowed reduction of consumption of carbapenems and quinolones, as well as an increase of antibiotic free days. Its success is dependent on the involvement of the leadership, coordinated multidisciplinary approaches and education.

Disclosure of interest: None declared.

P181
Consumption of carbapenems in different intensive care units in a Saudi tertiary care hospital
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P181

Introduction: Surveillance of antimicrobial consumption is a necessary step to develop and monitor policies to limit antimicrobial overuse/ misuse and to decrease the risk of bacterial resistance. In Saudi Arabia, such surveillance data are lacking.

Objectives: To quantify the carbapenems use in intensive care unit (ICU) setting and to detect any variability by ICU type.

Methods: We conducted a prospective surveillance study in eight different ICUs; five adult and three pediatric/neonatal ICUs at King Abdulaziz Medical City, Riyadh, Saudi Arabia, from October 2012 through December 2013. We estimated the consumption of carbapenems as days of use (which was defined as the aggregate sum of days for which any amount of meropenem or imipenem were administered) per 1000 bed-days or 100 admissions.

Results: We recorded carbapenem use for more than 3500 bed-days during 15 months in 8 ICUs having a total 131 bed capacity. The overall carbapenem use was estimated at 133.7 days of use per 1000 bed-days and 150.8 days of use per 100 admissions. The use per bed-days was highest in adult medical surgical ICU (357.0) followed by adult step-down (232.4) and burn (195.4) ICUs but lowest in neonatal ICU (27.7) and adult cardiothoracic ICU (64.9). The use per admissions was highest in adult step-down ICU (467.8) followed by burn (394.9) and adult medical surgical (384.0) ICUs but lowest in adult cardiothoracic (31.2) and pediatric medical-surgical (38.9) ICUs.
Conclusion: Approximately, our ICU patients use carbapenems one-eighth of the days spent. There is wide variability in carbapenem use in different ICUs that warrant ICU-specific reporting and pinpoint areas that need more management attention. There is need to identify patient and physician characteristics associated with this high carbapenem consumption.

Disclosure of interest: None declared.

P182
Antimicrobial consumption assessment as a part of infection control surveillance exemplified by bloodstream infection treatment in NICUs
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)p182

Introduction: Newborns are a population in which antibiotic usage is extremely high.

Objectives: The aim of this study was an assessment of antibiotic usage in BSIs treatment in the Polish Neonatology Surveillance Network (PNSN) and determining the possibility of applying this kind of analysis in infection control.

Methods: Data were collected between 01.01.2009 and 12.31.2013 in five tertiary academic neonatal intensive care units (NICU) that took part in the PNSN. The PNSN is a prospective national surveillance system for the most relevant infections in the group of very low birth weight (birth weight <1500 g, VLBW) infants in Poland.

Case BSIs patients (both: early- and late-onset) were defined according to Gastmeier et al. [1] with modifications.

Results: The total duration of antibiotic therapy for 773 cases of BSIs, which are incorporated into the present analysis, amounted to 14 056 DOTs or 381.6 DDDs.

The median length of antibiotic therapy for a single case of BSI, regardless of microbiological confirmation or its lack, amounted to 8 days; whereas the median consumption expressed in DDD was 0.13. In the case of LC-BSI, median DOT was 8 days, and consumption – 0.12 DDD. Median length of therapy was shorter for unconfirmed cases: 7 days, while the consumption of antibiotics was higher – 0.14 DDD (p<0.0001). High consumption of glycopeptides expressed in DOTs was observed in studied population.

Conclusion: Application of classical methods of microbiological diagnostics significantly reduces the consumption of antibiotics expressed by DDD, however, the high consumption of glycopeptides indicates the necessity of applying rapid diagnostic assays.

Nevertheless, the assessment of antibiotic consumption in neonatal units represents a methodological challenge and requires the use of different measurement tools.

Analysis of antibiotic consumption is an essential component of infection control, especially for NICU patients – for effective planning and reliable evaluation of interrelationships between individual elements of control programs.

Disclosure of interest: None declared.

Reference

P183
Cambodia: the first national study of antibiotic prescribing and resistance using mixed methods approach
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)p183

Introduction: Antibiotic resistance is present globally. Contributing factors in Cambodia include self-medication by the community, uncontrolled sale of antibiotics and unregulated antibiotic use in food animals.

Objectives: Our objective was to explore the prescribing practices of physicians in Cambodia and perceptions of antibiotic use and resistance in the country.

Methods: A sample of 482 physicians from 6 national hospitals was surveyed for knowledge and prescribing practices using common disease scenarios. Focus group discussions (FGD) with physicians explored barriers to evidence-informed prescribing. Approval was given by health research ethics committee of Cambodia, UNSW Australia and ITM.

Results: Our preliminary findings from combining the survey and FGD results identified that while physicians were aware of antibiotic resistance and perceived prescribing antibiotics appropriately as difficult, they were unlikely to utilize their diagnostic microbiology service to assist their daily prescribing practice. The most common barrier to evidence-based prescribing was their habitual and routine prescribing practices and that of their peers instead of utilizing the microbiology service. Habitual prescribing practices remain unchanged despite the introduction of microbiology services. Surveyed physicians commonly reported that their patients at the time of admission had self-medicating. During discussions physicians reported that antibiotic choice was based on severity of clinical presentation: milder presentations were prescribed amoxicillin and gentamicin while severe presentations or patients who had self-mediated were immediately prescribed ceftriaxone. Support from microbiology services was only accessed when patients did not respond to this prescribed regimen.

Conclusion: Antibiotic self-medication and resistance are among challenges for Cambodian physicians to prescribe antibiotics appropriately. Yet, their prescription is likely to be driven by their habit rooted from the era when there was no microbiology laboratory rather than seeking evidence from microbiology laboratory they can now access to. Training programs focusing on rational antibiotic prescribing are urgently needed.

Disclosure of interest: None declared.

P184
Review of the annual reports on antibiotic policy data from hospitals, private clinics, and rehabilitation facilities in Paris city
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)p184

Introduction: Each hospital, private clinic (PC), or rehabilitation facility (RF) in France has to produce a computer-based annual report on the organization and actions developed for its antibiotic policy to the French Ministry for Health. This report consists of a list of nationally pre-defined items that the physician responsible for the infection control unit has to fill online. A scoring computer program operates at the end of the process.

Objectives: The aim of the study was to analyze the results of the annual report provided by every hospital, PC, or RF in Paris city in 2014.

Methods: Assessment of the reports was performed by the Regional Agency for Health Ile-de-France, a dependency of the French Ministry for Health.

Evaluation data included the general grade (decreasing from A to E) and the review of all the items structuring every annual report.

Results: The reports of 69 healthcare organizations (comprising 17,483 full-time hospitalization beds) were examined, including 17 university hospitals (UH), 16 public general hospitals (GH), 25 PC, and 11 RF.

Distribution of the classes A and B taken together was 65% in UH, 87% in GH, 92% in PC, and 82% in RF.

Results appeared to be perfectible in the items dealing with the means dedicated to prevention and control activities: only 47% of UH and 36% of PC had a full computerized physician drug-order entry system, and more than one third of PC or RF had no antibiotic therapy specialist.

In contrast with better results from the other healthcare organizations, respectively, 35% of UH and 59% of GH had no defined collaboration between the antibiotic specialist, the pharmacist, and the microbiologist, and had no list of selected antibiotics under increased control.
Less than two thirds of GH or RF complied with the items dealing with antibiotic utilization evaluation.

**Conclusion:** Analysis of the annual reports from all the hospitals, clinics, and rehabilitation facilities in Paris city on the nationally-required activities in antibiotic policy highlighted relatively good global results since over 80% of all these organizations taken together was graded A or B. However, the results in those items dealing with the means allocated to prevention of antibiotic misuse or with evaluation of antibiotic prescribing practices need to be improved.

**Disclosure of interest:** None declared.

**P185**

**Antibiotic consumption in post-acute care and geriatric hospitals in Israel, 2014**

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**Introduction:** In 2012, the Israeli Ministry of Health issued national guidelines for antibiotic stewardship. The guidelines require that all general hospitals, post-acute care hospitals and the ambulatory care sectors of health maintenance organizations report annual consumption of antibiotics. Data regarding antibiotic use in post-acute care hospitals are scarce.

**Objectives:** To describe antibiotic consumption in post-acute care and geriatric hospitals in Israel in 2014.

**Methods:** Hospitals used their computerized pharmacy databases to report all systemic antibacterials (WHO Anatomical Therapeutic Chemical class J01) dispensed. Hospitals also reported patient days, by ward, for 2014. We calculated antibiotic consumption as Defined Daily Doses (DDDs) per 1000 patient-days (PD). To overcome differences in case mix between institutions, we limited our analysis to 4 common ward types: ventilation /respiratory rehabilitation, sub-acute care, rehabilitation, and complex nursing.

**Results:** Seven of Israel’s 15 post-acute care and geriatric hospitals reported at the ward level. Median use of systemic antibacterials in DDD/1000 PDs was 206 (range: 130-313) in complex nursing wards, 232 (range: 172-323) in ventilation wards, 244 (range: 154-379) in rehabilitation wards, and 348 (range: 272-600) in sub-acute wards. By comparison, median use in medical wards in general hospitals in 2014 was 933, range: 629-1340. The most commonly used antibiotic group was penicillins with beta-lactamase inhibitors in ventilation and complex nursing wards and cephalosporins in sub-acute and rehabilitation wards. Fluoroquinolones accounted for 14% -19% of all antibiotic use, depending on ward type. Individual hospitals were consistently either below the median or above the median for all ward types.

**Conclusion:** Antibiotic consumption in the major ward types of post-acute care and geriatric hospitals in Israel is substantial, amounting to over one-fourth of the amount used in acute care hospitals’ medical wards. Our data underestimate total antibiotic use in this patient population because patients may be temporarily transferred to general hospitals for treatment of complex infections. The consistently high or low use in each hospital suggests that antibiotic use is influenced by institutional culture or formal policies that dictate a permissive or restrictive approach.

**Disclosure of interest:** None declared.

**P186**

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**Introduction:** Strategies to prevent nosocomial infections and the spreading of multi drug resistant organisms (MDRO) are broadly discussed in the context of hospital care. But MDRO do not only affect hospitals, but also a variety of other health care institutions and medical professions.

**Objectives:** The conference of German health ministers recommended in 2006 to form regional networks led by the local public health authorities. The aim of these networks was to address all parties involved in the management of MDRO and to promote the implementation of existing guidelines on prevention and infection control measures.

**Methods:** In Bavaria the Ministry of Health initiated in cooperation with the Bavarian Health and Food Safety Authority a two-fold strategy to meet this recommendation. In a first step the Bavarian State Working Group on Antibiotic Resistant Pathogens (LARE) was established in 2008. In a second approach the Bavarian Ministry of Health requested the local public health offices to form networks with all relevant professions and institutions at the state level.

**Results:** Almost all health care associations at the state level participate in this network and strive to implement consistent strategies in the battle against MDRO. Subordinate working groups have successfully prepared and published information for the management of patients with resistant bacteria in the area of occupational health and safety as well as in hospitals and rehabilitation clinics, for patient transportation and in general practice or at home. The annual LARE meetings are well attended by health care workers of all relevant professions. Twice a year the representatives of the participating associations and Bavarian experts get together to discuss actual topics and to consent new publications.

**Conclusion:** The established networks at the regional as well as at the state level have led to marked improvements in the communication and collaboration between participating relevant institutions, organisations and various groups of medical professions. However, the challenges for the LARE and the regional networks still stay diverse and will continue in the future.

**Disclosure of interest:** None declared.
interventions, a knowledge of clinician time, workflow, and thought processes could result in the design of effective nudges.

Disclosure of interest: None declared.

P188

Workload associated with mrsa control in surgery: a prospective study alongside a controlled clinical trial

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P188

Introduction: Controversies regarding control of endemic methicillin-resistant Staphylococcus aureus (MRSA) stem in part from the paucity of data available on the actual costs of implementing MRSA control strategies.

Objectives: To estimate the workloads associated with screening and hand hygiene (HH) promotion interventions for MRSA control.

Methods: Prospective evaluation of costs associated with MRSA control interventions, alongside the MOSAR-Surgery multicenter intervention trial [1], emphasizing the workloads associated with interventions. Interventions under study were (1) universal MRSA screening with contact precautions and decolonization (4 hospitals) and (2) enhanced HH promotion (4 hospitals); 2 hospitals implemented a combined strategy using targeted MRSA screening.

Workloads were estimated from a hospital perspective, using a top-down approach, distinguishing infection control (IC) and ward staff duties, set-up and routine activities, and excluding research-driven tasks.

Results: In the screening arm (13 wards; mean, 27.8 ± 10.4 beds), set-up required 2.6 ± 0.58 weeks of work from the IC team, and the mean annual workload was 2.05 weeks or 8.62 ± 4.39 weeks for a 10-bed ward. In the HH promotion arm (13 wards, 87 weekly beds), the mean annual workload was 12.1 weeks (3.29 ± 3.72 per 10 beds). In the combined arm (7 wards, 44.9 ± 24.6 beds), set-up required 7.0 ± 1.93 weeks, and mean annual workload was 23.7 weeks (5.94 ± 1.84 weeks per 10 beds). The burden on ward staff was relatively limited in most wards.

Conclusion: Workload associated with the MRSA screening strategy is relatively homogenous and predictable. Investment in the HH promotion strategy showed large variations between centers and was maximal for the successful combined intervention. Further research is needed on the optimal implementation of HH promotion interventions.

Disclosure of interest: S. Bahrami: None declared, A. Lee: None declared, S. Harbart: Grant/Research support from: Geneva University Hospitals, Switzerland, Braun, Pfizer, Speaker’s bureau of: BioMerieux, Pfizer, Conflict with: Scientific Advisory Board, Destiny Pharma, DaVolterra, BioMerieux, S. Malhotra-Kumar: None declared, C. Brun-Buisson: None declared, I. Durand-Zaleski: None declared.

Reference


P189

"Screening at the door" - continuous rapid molecular screening for MRSA at emergency department is efficacious and effective

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P189

Introduction: MRSA at patient admission: the right question to identify the colonized patient. A Bispo, C Palos

Objectives: To evaluate the performance of a continuous rapid molecular screening for MRSA before admission.

Methods: We implemented screening for MRSA at the Emergency Department in 2012, using polymerase chain reaction (PCR) after setting up a satellite laboratory just next to the ED. Patients confirmed for admission had nasal swabs done by trained medical technicians who then did the PCR test. Results were ready within 2-3 hrs and routed to Bed Management Unit who then assigned patients to appropriate wards.

Results: Each patient transfer entailed an average of 155 min of nursing and housekeeping and 30 min of doctor’s time. After implementation of screening before bed assignment, there was reduction in transfers of patients to cohort wards from 8% to 2% of all admissions (OR 0.23; 95% CI 0.19, 0.29; P=0.0000)

Conclusion: Continuous rapid molecular screening for MRSA at Emergency Department is Efficacious and Effective in reducing transfers and MRSA bacteremia rates and has been sustainable.

Disclosure of interest: None declared.

P190

MRSA at patient admission: the right question to identify the colonized patient

A Bispo, C Palos

Introduction: Portugal has one of the highest MRSA infection and colonization rates in Europe, so it becomes critical to identify MRSA colonized patients at hospital admission on the Emergency Room (ER), before placement into wards, preventing the mixing of colonized patients with non-colonized ones. Infection Control and Antibiotics Committee (ICAC) developed an Electronic Epidemiological Query at Admission (EEQA) to be answered at patient admission. One of the questions targets MRSA colonization risk.

Objectives: The objective of our study was to identify the positive predictive value (PPV) of the question that targets the MRSA high risk patient: Hospitalization or long term care admission for at least 3 days in the last 3 months, or tracheostomy?

Methods: With the approval of the Clinical Board, the ICAC defined as mandatorily the fulfillment of EEQA to all patients at admission. A positive answer to this question triggers automatically (and without the doctors approval or intent) nasal and perianal screening swabs for MRSA. Infection Control nurse activates pre-emptive contact isolation precautions immediately. Swab results are known after 48h and then precautions can be stopped or room isolation is implemented.

Results: In 2014 we had 13,893 EEQA submitted; from these, 3,523 (23,36%) were positive for at least one of the 8 questions. The question that targets MRSA colonized risk patient had a positive answer in 3,082 EEQA (87,4% of the positive EEQA, and 22,1% of all EEQA submitted). A PPV value of 24,6%, with 759 cultural positive screening results in 3,082 identified risk patient.
Conclusion: Using the EEQA, we’ve obtained a PPV of 24.6% for the question chosen to identify and screen colonized MRSA risk patients. This value represents 759 MRSA patient admissions in one year, who received adequate isolation procedures, preventing their mixing with non MRSA colonized patients during hospital stay. This may have had a decisive role on observed reduction of MRSA nosocomial infection rate at our hospital.

Disclosure of interest: None declared.

P191
Advanced age and long-term care facility stay as risk factors for methicillin-resistant Staphylococcus aureus infection
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Introduction: Methicillin-resistant Staphylococcus aureus (MRSA) is no longer only a nosocomial pathogen. It has emerged as an important cause of community-associated infections.

Objectives: The aim of this study was to analyze risk factors for MRSA infections in geriatric population (60 years and more) in south of Poland and assess antimicrobial susceptibility of the isolates.

Methods: Non-repetitive samples were collected from hospitalized (12 hospitals) and non-hospitalized (outpatient care and three long-term care facilities) patients presenting infections (wounds, lower respiratory infection (LRI), bloodstream and eye infections) throughout the southern Poland (Malopolska and Silesia) in 2013. Relation between age, type of infection, presence of comorbidities and probability and epidemiology of MRSA infection were analyzed.

Results: MRSA prevalence was 17.2%, in patients with advanced age (>90 years) was 42.1% and in LRI was 39.3%. Factors association with MRSA-infection in geriatric population were advanced age, (OR 2.78; 95%CI 1.079-7.163), the presence of lower respiratory tract infection (OR 3.44; 95%CI 1.544-7.644) and staying in the LTCF (OR 5.27; 95%CI 2.02-13.74). Community-acquired infections (prevalence 13.9%) were significantly more often connected with MSSA, than MRSA (OR 0.42; 95%CI 0.24-0.68). MRSA isolates were more often resistant for all studied antibiotics, except teicoplanin and oxazolidinones. MIC50 and MIC90 for vancomycin and teicoplanin were 32 and 64 respectively.

Conclusion: Age 90+ and LTCF staying are important risk factors for MRSA - increased risk of drugresistance almost 3-times. High drug resistance indicates a significant therapeutic limitations, especially in the elderly.

Disclosure of interest: None declared.

P192
Determinants of successful mrsa decolonization among patients included in a clinical trial of polyhexanide
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P192

Introduction: Between January 2011 and July 2014, we performed a Randomized Controlled Trial (RCT) in carriers of methicillin-resistant Staphylococcus aureus (MRSA) to test the efficacy of polyhexanide versus a placebo solution for MRSA decolonization.

Objectives: We assessed determinants associated with successful MRSA decolonization among patients included in this RCT.

Methods: We conducted a retrospective, unmatched case-control study among MRSA-positive patients treated by polyhexanide or placebo and a MRSA screening swab at day 28 after the end of the treatment. Cases were defined as patients with a negative MRSA screening at the end of the study. The control group consisted of patients still MRSA-positive at the end of the study. We tested potential promoting factors using univariate logistic regression analysis. Data were recorded prospectively during the initial RCT with the consent of the patients. A multivariate logistic regression model was then built. We kept as potential candidates for the multivariate analysis promoting factors with a p-value < 0.2. The resulting model was verified using the Hosmer-Lemeshow test.

Results: A total of 135 patients were identified: 46 MRSA-negative cases (34.1%) and 89 MRSA-positive controls (65.9%) at end of follow-up. Cases were younger (Odds Ratio (OR) per 1-year increment; 0.98, P=0.079), lived without assistance (OR 2.97, P=0.005), had only the nose or groin colonized (OR 2.30, P=0.023), had no invasive devices (OR 2.53, P=0.065) and a length of hospital stay until first day of decolonization treatment of ≤ 3 weeks (OR 2.42, P=0.04), were more likely to be without malignancy (OR 2.66, P=0.073) or COPD (OR 2.23, P=0.119) compared to the control group. By multivariate analysis, two independent risk factors were associated with successful MRSA decolonization: independent status (OR 2.83, 95%CI [1.26-6.34]; P=0.011) and only one colonized body site at baseline (OR 2.16, 95%CI [1.03-4.56]; P=0.042; Hosmer-Lemeshow test, P=0.45).

Conclusion: Independent patients with only 1 MRSA-positive body site at baseline (nose or groin) are more likely to be successfully decolonized. This work was funded by B. Braun as an investigator-initiated research project.


P193
SCCmec and SPA typing of methicillin-resistant Staphylococcus aureus isolated from infections from Southern Poland
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Introduction: The spa gene encodes protein A and is used for typing of methicillin-resistant Staphylococcus aureus, MRSA, such as the mec operon carried by staphylococcal cassette chromosome (SCCmec).

Objectives: The aim of this study was the molecular typing of MRSA isolated from different forms of infections for epidemiological purposes using spa typing method and SCCmec classification.

Methods: A total of 90 MRSA isolates coming from eight hospitals from southern Poland were tested. Isolates originated from: bloodstream and respiratory tract infections (36), surgical site infections (30), chronic wounds (24). S. p. typing was performed as described previously [1], using the spa typing website (http://www.sparsetter.idom.de/). Staphylococcal cassette chromosome mec (SCC mec) typing was performed as described previously [2].

Results: The majority of MRSA strains were of SCCmec type II (42.2%) or SCCmec IV (21.1%). Eleven strains was marked as SCCmec III (12.2%), 8 as SCCmec V (8.9%), 4 as SCCmec I (4.4%) and one as SCCmec VI. The spa type t003 was the most frequently observed (37.8% of strains), then t138 (14.4%), t008 and t037 and t041 (4.4%), SCC mec type II and spa-t003 together were characteristic for 25% of the chronic wounds and 27% in SSI, but 39% in invasive infections. SCCmec III and t138 occurred in 10% of the strains from two hospitals, SCCmec IV and t003 occurred in 6.7% strains from two hospitals.

Conclusion: Epidemiological and molecular studies of MRSA isolates allowed to detail insight into the problem of staphylococcal infections. Those methods are less time-consuming than PFGE and give the opportunity for the observation of the current situation and epidemiological trends for resistant strains on the level of ward/hospital or even whole region (supported by a grant DEC-2011/03/B/NZ7/01911).

References

Disclosure of interest: None declared.
Antimicrobial Resistance and Infection Control 2015, Volume 4 Suppl 1
http://www.aricjournal.com/supplements/4/S1
Page 83 of 117

P194
Clonal dissemination of methicillin sensitive and resistant Staphylococcus aureus among indigenous populations of the amazon and the southeast region in Brazil
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Introduction: Hospital-based studies have report high rates of Staphylococcus aureus and MRSA in indigenous populations. However, in Brazil there are no data regarding to native individuals S. aureus colonization or infection, mainly, regarded to S. aureus community dissemination.

Objectives: Determine the molecular epidemiology of methicillin sensitive and resistant S. aureus from samples obtained from indigenous population in Brazil.

Methods: 328 samples (oral/nasal swabs) were taken of healthy indigenous villages located in Feijó and Mâncio Lima in Acre state, (Amazon region), and 115 were taken in Aval, São Paulo State, (Southeast of the country). The samples were identified by traditional methods. Cefoxitin and oxacillin impregnated disks were used for antimicrobial susceptibility determination and PCR was employed for mecA detection and SCCmec characterization. Molecular typing was held by PFGE.

Results: S. aureus carriage prevalence in Amazon region was 55.8% whereas in the southeast region was 59.1%. One nasal isolate was resistant to cefoxitin while 3 oral isolates were resistant to oxacillin; mecA gene was detected in 3 isolates, all of them SCCmec IV. MRSA prevalence in this study was 0.6% in Amazon region while MRSA was not detected in the southeast region. The S. aureus clonal analysis identified 12 clusters (>80% similarity) among native populations of both states; 7 of them with strains belonging to both regions studied. The cluster A, the biggest one with 25 isolates, grouped all the resistant strains to other sensitive isolates.

Conclusion: We verified higher S. aureus prevalence compared to the prevalence in Brazilian non-natives (30%). MRSA was detected only among Amazon natives. The PFGE analysis showed that the resistant and sensitive strains likely have common origin. Thus, the dissemination of S. aureus with similar profiles among indigenous population living in extremely distant states in Brazil suggests a clonal dissemination of a possible peculiar S. aureus clone.

Disclosure of interest: None declared.

P195
Antibiotic resistance profile of Staphylococcus aureus clinical isolates from Nigeria
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Introduction: Hospital-acquired infections with Staphylococcus aureus have increased over the years and the rise in incidence has been accompanied by a rise in antibiotic-resistant strains notably methicillin-resistant S. aureus (MRSA) and more recently vancomycin-resistant strains. In order to have adequate information for treatment of infections caused by S. aureus, it is important to understand trends in the antibiotic-resistance patterns as well as diversity of strains across geographical regions.

Objectives: The aim of this study was to provide information on the antibiotic resistance profile and molecular characteristics of S. aureus strains from Nigeria.

Methods: A total of 209 non-duplicate S. aureus isolates obtained from clinical infections in eight medical centres were analyzed. Identification and antimicrobial susceptibility profile was performed with the automated VITEK-2 system. Detection of antibiotic resistance and virulence genes in the S. aureus strains was by polymerase chain reaction.

Results: Resistance was observed against penicillin (97.1%); trimethoprim/sulfamethoxazole (83.7%), tetracycline (13.8%), levofloxacin (5.7%) and gentamicin (4.8%). All strains were susceptible to azithromycin, clarithromycin, erythromycin, clindamycin, linezolid, vancomycin, nitrofurantoin, fusidic acid, mupirocin and rifampicin. The -lactamase (Pla2) gene was found in 95% of all strains (n=198) while 2.87% (n=6) possessed the mecA gene. The staphylococcal cassette chromosome mec (SCC mec) typing of MRSA strains detected SCC mec type IV in one strain. A particular MRSA strain was the only strain found to be resistant to teicoplanin, tigecycline and fosfomycin. Fifty-six percent of the strains possessed the panton valentine leukocidin (PVL) encoding gene.

Conclusion: A rise in PVL-positive S. aureus strains in Africa is of great concern as this could promote the emergence of highly virulent strains. The continuous surveillance of antibiotic resistance in S. aureus is important to prevent the spread of multidrug resistant strains.

Disclosure of interest: None declared.

P196
One step PCR for detection of Staphylococcus aureus specific sequence gene and mecA gene in Northwestern Nigerian hospitals
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Introduction: Methicillin – resistant Staphylococcus aureus (MRSA) has been noted as one of the main pathogen of public health importance. Detection of the mec A gene by polymerase chain reaction (PCR) is the gold standard for identifying methicillin-resistant Staphylococcus aureus.

Objectives: In order to accelerate the procedure of identification in clinical microbiology laboratories, it is very important to have simple and rapid method for DNA extraction. In this work, a one step PCR assay for the detection of clinically relevant antibiotic resistance gene (mec A gene) harbored by some Staphylococcus aureus isolates and for the simultaneous identification of such isolates at the species level has been described.

Methods: In this work, a rapid method for bacterial DNA extraction directly from a single colony that gave quality DNA for PCR in as little as 15 minutes was used. PCR was used to amplify both the Staphylococcus aureus specific sequence gene and mec A gene of 100 isolates in Northwestern Nigeria with the amplicon size of 107 and 532 bp respectively. The performance and robustness of the assay was evaluated with a control strain of methicillin susceptible Staphylococcus aureus(MSSA)- ATCC 29253.

Results: All the isolates (n=100) expressed Staphylococcus aureus specific sequence gene in their PCR products. Only 5 isolates (5.0%) were confirmed as MRSA based on the detection of mec A gene. This protocol yielded good-quality target DNA for PCRamplification. Amplifications using that DNA gave rise to goodquantities of the expected PCR fragments.

Conclusion: This assay offers a rapid, simple, feasible, specific, sensitive, and accurate identification of MRSA clinical isolates and could be systematically applied as a diagnostic test in clinical microbiology laboratories, facilitating the design and use of antibiotic therapy. Hence, considering that it represents a cost-effective method and helping treatment to be initiated without delay.

Disclosure of interest: None declared.

P197
Comparative genomics to investigate the emergence of community-associated methicillin-resistant Staphylococcus aureus (CA-MRSA) USA300 clone in Geneva, Switzerland
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Introduction: Molecular epidemiological surveys of CA-MRSA revealed a wide diversity of genetic backgrounds with only sporadic identification of USA300 isolates during the period 1994-2012.

Disclosure of interest: None declared.
Objectives: We conducted a comparative genomics approach to trace origin, spreading and diversity of CA-MRSA USA300 clones accounting for 50% of CA-MRSA isolates identified in 2013.

Methods: Solexa-Illumina was used for whole genome sequencing (WGS) of all USA300 isolated in 2013. Comparative genomics identified genomic alterations in this "clonal" population. All features including single-nucleotide polymorphisms (SNPs), ACME gene cluster, SCC mec structure, and mobile elements were documented and enriched with patient information. Published genomes of USA300 were used for comparison purposes and for investigating the relationship between isolates.

Results: From 1994 to 2005, only 4 USA300 strains were identified in our institution. In 2013, among the 46 cases of CA-MRSA, USA300 were found in 22 patients (12 clinical infections, 10 cases of asymptomatic carriage). WGS allowed identifying two groups: (i) ACME positive (n=12) and (ii) ACME negative (n=10). In contrast to ACME-neg, the ACME-pos strains were resistant to ciprofloxacin and erythromycin. Comparison with a reference genome revealed that the ACME-pos group was more homogeneous than ACME-neg showing reduced genome plasticity. Two clusters of 2 strains were identified describing familial transmission events. The vast majority of ACME neg strains were isolated from patients traveling to South America in the 12 last months. SNP position allowing tracing the geographical origin of strains and to observe that ACME-neg group is comprised by strains harboring a SCC mec Nc element.

Conclusion: In 2013, we observe a sudden and worrisome increase in CA-MRSA USA300 isolates in Geneva. WGS showed that acquisition of mobile elements and smaller genomic alterations are signatures of strain origin, probably related to antibiotic utilization. Our epidemiology is rapidly changing. Considering that most of USA300 result from importation events, its emergence coincides probably with loss of fitness of ancient clones.

Disclosure of interest: None declared.
Objectives: To describe a VRE cluster and to evaluate the impact of the control measures implemented.

Methods: This was a prospective outbreak investigation addressing the impact of a bundle strategy on a VRE cluster which took place in two adjacent surgical wards comprising 38 beds, University of Geneva Hospitals from September 1, 2014 to December 2, 2014. The implemented bundle strategy consisted in: screening of all patients in the wards by rectal swabs, promoting hand hygiene compliance and patient education, implementation of contact precautions with private room allocation for all colonized patients, daily disinfection of environmental surfaces and medical devices with a 80% mono peroxyphthalate-based disinfectant.

Results: The index case of the cluster was a patient with cognitive disability which freely circulated within the hospital wards and had been hospitalized for 3 weeks before a urine culture yield VRE, despite the absence of related symptoms. Following that discovery, 141 patients were screened by rectal swab, yielding 5 other VRE-colonized patients (attack rate = 4.25%) and, fortuitously, 10 patients colonized by Extended-Spectrum ß-Lactamase (ESBL) producing-Klebsiella pneumoniae. The bundle strategy was implemented soon after the discovery of the index case, and remained on for 8 weeks, effectively controlling both clusters. The decision to stop it was based on the fact that no new cases of VRE or ESBL colonization were detected by rectal screening for a period of 4 weeks. After the intervention was discontinued, no additional cases were found in the following month (2 point prevalence performed).

Fortunately, no cases of VRE-related infections were detected, and only one patient developed peritonitis due to the ESBL-producing K. pneumoniae, and survived to it.

Conclusion: A VRE-cluster among surgical patients was effectively controlled by the fast implementation of a bundle intervention consisting mainly of reinforced hand hygiene, environmental disinfection, screening and strict contact precautions.

Disclosure of interest: None declared.

Results: - Staff at the emergency departments found that MiBAlert effectively highlighted VRE cases.
- The hygiene team reported of earlier recognition of VRE cases at sector transmissions.
- Staff at departments of radiology, medicine and outpatient clinics found MiBAlert very helpful.
- The prototype alerting VRE-cases was a success.

Conclusion: MiBAlert improves patient safety, in particular during sector transmissions.
- MiBAlert is a valuable tool fighting the nosocomial VRE outbreak.
- MiBAlert is based on a national database and can easily be implemented nationwide.
- Soon other multiresistant bacteria will be included in MiBAlert.

Disclosure of interest: None declared.

Reference

P202 Evaluation of terminal room cleaning and disinfection after patients infected/colonized with vancomycin-resistant enterococci (VRE) discharge in an adult intensive care unit of a medical center

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Introduction: Contaminated environment is a risk factor of hospital-acquired infection. Inappropriate cleaning/disinfection of environment may enhance vancomycin-resistant enterococci (VRE) transmission from environments to patients.

Objectives: The investigation was made after 3 patients with VRE infection/colonization noted in November 2014 in an adult intensive care unit of a medical center in Taiwan.

Methods: Samples were taken from frequently contacted surfaces including bed rails, bed control, monitor control panel, EKG touch panel, work table and drawer handles in rooms previously occupied by VRE infected/colonized patient. The ATP (Adenosine Tri-Phosphate) bioluminescence (normal reference: < 250 Relative Light Unit (RLU)) and swab culture was performed before and after cleaning and disinfection of environment on 6 checkpoints each room. Totally, 36 samples were taken to evaluate the effectiveness of cleaning and disinfection. The swab cultures were also performed on hands of healthcare workers.

Results: Totally 70 samples were taken including 56 samples from environments and 14 samples from hands of healthcare workers. Before cleaning and disinfection, all 18 samples from environments were more than 250 RLU by ATP bioluminescence. The non-qualified rate was 100%. After cleaning and disinfection, 8 out of 18 (44%) check points were detected abnormal by ATP bioluminescence. These 8 check points included 3 samples from bed rails (544~1607RLU), 2 samples from bed controls (1800~3231RLU) and each one sample from drawer handle, EKG touch panel and IV pump control panel (375~1607RLU).

Conclusion: VRE can survive for months on environments and patients. Hands of healthcare worker may transmit VRE and cross-infection between patients may occur. Through emphasizing the importance of environmental cleaning/disinfection and taking appropriate infection control measures, hospital-acquired infection can be prevented. Hand hygiene and environmental cleaning/disinfection are essential to ensure patient safety.

Disclosure of interest: None declared.
P203
Two-year prevalence study of hospital-acquired bloodstream infections in university hospital Trnava, Slovakia
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P203

Introduction: In Slovakia, surveillance data of all health care associated infections, especially bloodstream infections (BSIs) are underestimated. Moreover, reporting methodology of BSIs in the national epidemiologic system is based on ICD code (septicemia).

Objectives: The aim of this study was to assess the prevalence of hospital-acquired bloodstream infections (HA – BSIs) and also to promote HA – BSIs surveillance at hospital level in University hospital Trnava.

Methods: This hospital-based prevalence study was conducted at the Trnava University hospital (618 beds; approx. 25 000 patients per year). We reviewed data from all consecutive positive blood cultures from microbiology laboratory database between 1 January 2013 and 31 December 2014. Hospital onset BSIs were defined as the first positive blood culture occurring more than 48 hours post-admission and were classified on CDC criteria. Data were analysed using R-project, Fisher’s exact test or the chi-square test and differences between groups were considered to be significant when P-value < 0.05.

Results: For the purposes of this study we analysed only laboratory-confirmed, hospital-acquired BSIs (n=256; 61.0% of all reported BSIs). The mean age of patients was 63.5 ±14 years and 59.4% (152) were men. The incidence of HA - BSI was 6.5/1000 admission (3.8 per 1000 admission in non-ICU patients vs. 34.0 per 1000 admission in ICU patients). A total 46.9% (120) occurred in intensive care units and 53.7% (34) were catheter-related infections with an estimated rate 4 CRBSIs/1000 central - line days. In - hospital case fatality rate was 36.7% (43.3% in ICU vs. 23.5% in non - ICU; P=0.001). The most common pathogens were Enterobacteriaceae (42%), followed by coagulase-negative staphylococci and Staphylococcus aureus (15.2% for both) and Pseudomonas aeruginosa (11.6%).

Conclusion: In this study, BSIs related to catheter, which are a leading preventable infectious complication of health care, occurred with high prevalence in our hospital. In near future, we required to establish better surveillance of HA-BSIs at the national level and implementation bundle care strategy for prevention of catheter-related BSIs at the local level.

Disclosure of interest: None declared.

P204
One million global catheters PIVC worldwide prevalence study: building alliances to put vascular access device management and infection prevention on the world stage from Australia to the Democratic Republic of Congo
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P204

Background: Despite the existence of numerous guidelines for peripheral intravenous catheter (PIVC) insertion and care, outcomes for peripheral catheters are reportedly sub-optimal. Furthermore, little is known about PIVC outcomes in developing nations. Optimising infection control of PIVCs is a unique challenge for developing and least developed countries. Following devastating events in 2002, the Centre Médical Evangélique de Nyakunde in Democratic Republic of Congo is slowly rebuilding hospital capacity and tackling the challenges of infection control in difficult conditions.

Aim: To conduct a global prevalence study to analyse current practices of PIVC management, identify areas for improvement in catheter care and infection prevention, and support hospital staff across the world to build research capacity in vascular access device care.

Methods: Interest in the study was spread via professional networks, conferences, newsletters, industry partners, social media, and global research networks. Local investigators assumed the role of study champion, promoting the study in their own country. Participants included staff nurses and physicians, infection control and vascular access clinicians, nurse educators, and nursing and medical researchers. Multiple language options were provided. On a given day, decided by each organisation, consenting hospital patients permitted the details of their PIVC to be collected for the study. No identifying patient data was collected.

Results: More than 750 hospitals in 65 countries participated in the study from June 2014 until April 2015. The Centre Médical Evangélique de Nyakunde will present their reasons for participation and unique challenges faced during the experience of participating in this global study. Key issues identified by this central African hospital included inadequate internet connection, lack of knowledge of best practice in PIVC insertion and management, and subsequent waste of valuable resources.

Discussion: Enthusiasm for this global prevalence study has led to the development of cross-cultural nursing and medical research partnerships in over 65 countries. With networks and research pathways now established, opportunities abound for further collaborative research to improve care of vascular access devices and prevent catheter-related bloodstream infection. It is hoped that twinning opportunities for Centre Médical Evangélique de Nyakunde will arise as a result of participation in this research.

Disclosure of interest: None declared.

P205
Catheter-related bloodstream infections in hemato-oncology paediatric patients
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P205

Introduction: Hemato-Oncology paediatric patients are more vulnerable to the development healthcare associated infections (HAI), due to the condition of immunosuppression, repeated hospitalizations, and long-term use of central venous catheters.

Objectives: The objective was to evaluate the clinical and epidemiological profile of catheter related bloodstream infection (CRBI) in children with hematological and oncological disorders, in patients hospitalized in paediatric haematology and oncology unit, at Hospital Pequeno Principe.

Methods: Retrospective study from January 2008 to December 2012 was performed. Data from the Epidemiology and Infection Control Department and medical records, of hospitalized paediatric patients at Hemato-Oncology unit, consisting of 12 beds, were analysed. All hospitalized patients, in the period of the study and diagnosed with HAI were included. The diagnostic criteria of Centers for Disease Control and Prevention (CDC) were used.

Results: In the period of five years, were admitted to the haematology-oncology unit 3107 patients, and diagnosed 44 episodes of HAI (1.77%) in 32 patients. (1.02%). The mean age of the patients was 5 years old, 47% female and 53% male. The mean hospital stay was 6.6 days. The most prevalent topographies of infection were: 56.81% (25) CRBI 13.63% (6) pneumonia; 20.45% (9) urinary tract Infection; 15% (4) others topography (mouth, vascular access, gastrointestinal tract). The main underlying diseases were: 37.5% (12/32) malignant hematologic disease; 59.37% (19 / 32) solid tumours. Of the 25 episodes of CRBI the etiologic agent was identified in 84%; 28% (7/25) Coagulase Negative Staphylococcus (CONS), 16% (4/25) Enterococcus sp; 12% (2) Pseudomonas aeruginosa; 8% (2/25) Klebsiella oxytoca, 4.5% (1/25) Candida guilliermondii; 4.5% (1/25) Candida albicans; 12% (3/25) others. Catheters used were: 42.85% (6/14) peripherally inserted central catheter, 35.71% (6/14) total implantable venous access port devices; 21.42% (3/14) catheter not specified.

Conclusion: Children undergoing immunosuppressive treatments and catheters are at high risk for the development CRBI. The study of
epidemiology is essential to establish preventive measures. In consensus with the literature, the most prevalent agent was CONS.

Disclosure of interest: None declared.

P206
Central venous catheter-related nosocomial bloodstream infections in children on long-term parental nutrition: the impact of the move to a new university hospital
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P206

Introduction: Insufficient training in CVC management contributes in the development of CRBSIs.
Objectives: This study evaluated the impact of moving to a new university paediatric hospital on the incidence of central catheter-related blood stream infections (CRBSIs) among children on long-term parental nutrition.
Methods: This retrospective study covered from April 2007 to March 2014, starting a year prior to move the children to a new hospital in April 2008, and continuing for 6 years following the move. During this observational period, data from all children hospitalized in a hepato-gastroenterology and nutrition unit of a paediatric tertiary hospital who received parental nutrition (PN) for more than 15 days were analyzed.
Results: During this 7-year study, 183 children aged 4.6 ± 0.5 years received prolonged PN. Intestinal diseases were the main aetiologies (89%), primarily short bowel syndrome (18.4%), Hirschsprung disease and Chronic Intestinal Pseudo-Obstruction syndrome (CIP0) (13.5%) and inflammatory bowel disease (13.8%). The mean durations of hospitalization and of PN during hospital stay were, respectively, 70±2.1 and 55.7±3.6 days. During the study period, 151 CRBSIs occurred in 77 children (the attack rate was 42% of all patients), i.e. 14.8 septic episodes per 1000 PN-days and 12.0 septic episodes per 1000 CVC-days. No patient died of a central venous catheter-related infection.
However, following the move from the older hospital to the newer one, the rate of CRBSIs significantly doubled, from 3.9 to 8.8 per 1000 CVC-days (p=0.02). During the following 4 years, the incidence of CRBSIs tended to increase between the 2nd and the 5th year after the move: 11.3 (p=0.5); 21.4 (p=0.01); 17.3 (p=0.4); 20.3 per 1000 (p=0.6) CVC-days. After evaluations by the Department of Infection Control, nurse training and stabilization of the nursing team, the incidence decreased significantly from 20.3 to 11.1/1000 CVC-days during the 6th year after the move (p=0.001).
Conclusion: Our results revealed the deleterious impact of the hospital move on the CRBSI incidence rate in hospitalized children on PN, and the necessity in having a trained, experienced and stable team of nurses to prevent nosocomial infections.
Disclosure of interest: None declared.

P207
Hospital-acquired bloodstream infections in neurological and neurosurgical units in Hungary, 2005-2013
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P207

Introduction: Hospital-acquired bloodstream infection (HABSIs) is a serious complication of hospitalization with high associated morbidity and mortality, within and outside of the intensive care units. However, information related to HABSIs among neurological and neurosurgical patients is limited.
Objectives: Our objective was to describe the epidemiological trends of HABSIs in this patient population in Hungary performed a nine-year descriptive epidemiological analysis.
Methods: Patient data were recorded and submitted into the national surveillance database (National Nosocomial Surveillance system) by the local infection control practitioners from the reporting hospitals. Based on this database, descriptive statistics were performed using EpiData version 3.1 (http://www.epidata.dk).
Results: The overall incidence rate was 0.4 HABSIs per 100 discharges in both ward types. HABSIs were considered primary in 66.6% among neurological patients and 58.9% among neurosurgical patients. For secondary HABSIs, the primary infection site was respiratory tract infection (19.5% and 17.8%) in both ward type. The most common pathogen was the Staphylococcus aureus (19.3%) in neurological wards and the coagulase-negative staphylococci (17.4%) in neurosurgical wards. The overall case fatality rate was 9.2%.
Conclusion: During the study period, there was a significant increase in incidence trends and high case fatality rates in both ward types. Therefore, facilitating the implementation of existing national guidelines among healthcare and infection control practitioners is essential in order to reduce the incidence rates of HABSIs and to improve the quality of patient care.
Disclosure of interest: None declared.

P208
Device-associated infection and mortality in a Tunisian intensive care unit
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P208

Introduction: Intensive care unit-acquired infections (ICU-AIs) constitute an important world-wide health problem.
Objectives: Our aim was to determine the incidence and attributable mortality due to device associated infection (DAI) in ICU patients in Tunisia.
Methods: We conducted a prospective observational cohort study over a 6 month period in the medical intensive care unit of Farhat Hached University Hospital (Sousse-Tunisia). Patients admitted to the unit were included in the study if they stayed in the ICU for more than 48 hours.
Results: During the study period 105 patients were surveyed; 16 of them (15.2%) developed 17 episodes of DAI (16.6 DAI/1000 days of hospitalization). The most frequently identified infections were central and peripheral venous catheter-associated infection (respectively 21.4% and 10.2%). At ICU discharge, overall mortality was 40%. Independent risk factors for acquiring infection in ICU were the use of central venous catheter (p=0.014) and length stay, those of mortality in ICU were SAPS II of more than 32.5 points (p=0.003), DAI (p=0.002), central venous catheter (p < 10^-3) and mechanical ventilation (p=0.04).
Conclusion: Even if DAI rates in Tunisian ICU were lower than those published in some reports from other North African countries, DAI data, dominated by catheter associated infections show the need for more-effective infection control interventions in our hospital.
Disclosure of interest: None declared.

P209
Bacterial colonization of central venous catheters after heart valve surgery: a risk factor study
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P209

Introduction: In the presence of a prosthetic heart valve, the colonization of a central venous catheter (CVC) has been implicated as a risk factor for endocarditis. Avoiding bacterial colonization of Central Venous Catheters (CVCs) is an everyday challenge for clinicians.
Objectives: This study evaluated EuroSCORE (Score use for predicting surgical mortality) and the preoperative presence of diabetes to identify
patients at a higher risk of a bacterial contamination of the central venous catheter (CVC) after heart valve replacement or valvuloplasty.

**Methods:** An observational evaluation was conducted from January 2006 through January 2013 on prospective data submitted to a database. 1324 consecutive patients after valve surgery were included (from January 2006 to December 2010). The systematic cultures of CVC were performed for all patients regardless of infection symptoms. A long-term monitoring (2 years) was done by phone call (up to January 2013). Patients suspected of prosthetic valve endocarditis had an echocardiography, and a blood analysis (particularly, blood cultures). Statistical analysis was processed by Systat 11 using Chi 2 test; Student’s t test; Kruskal-Wallis test; Fisher exact test and a ‘step-by-step’ logistic regression. A p value < 0.05 was considered statistically significant.

**Results:** The catheter-related bacteremia was 5% or 0.84/1000 catheter days. The values of the additive and logistic EuroSCOREs were not significantly higher in case of CVC colonization. EuroSCOREs higher than 6 were significantly but only moderately involved with the occurrence of CVC colonization (p = 0.034) (Odds Ratio 1.76; 95% CI [1.04; 2.97]). Diabetes was significantly but moderately associated with CVC colonization (p = 0.041) (Odds Ratio 1.87; 95% CI [1.02; 3.43]). Among parameters of euroSCORE, an ejection fraction of < 30% was closely related to CVC colonization (p = 0.004) (Odds Ratio 4.91; 95% CI [1.65; 14.55]). The catheter’s exposure influenced significantly catheter colonization.

**Conclusion:** A poor left ventricular function is the main risk factor in bacterial colonization of CVC. Global risk score and preexisting diabetes are not useful to predict postoperative CVC colonization.

**Disclosure of interest:** None declared.

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**P210**

Peripheral venous catheter in cardiology: root cause analysis of an adverse event during patient transport in radiology

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**P210

**Introduction:** The insertion of peripheral venous catheter (PVC) is a basic and trivialized act of nursing with significant associated infection risks. There are few publications about PVC complications compared to those of central lines and the root causes of such events are not well known. In 2014, a survey was conducted to measure the frequency of complications associated with PVC insertions and manipulations.

**Objectives:** To select an adverse event (AE) and identify the root causes of its occurrence in order to improve the quality and safety of care of patients with PVC.

**Methods:** Daily monitoring of patients and their PVC was carried out by the infection control team during a two months period in a cardiology department. The monitoring data collected were of clinical signs and symptoms as well as of mechanical events. After the selection of an incident, a root cause analysis was performed by Alarm method following the classic plan: chronology of care until the AE occurrence, identification with the nursing team of the immediate causes and of the contributing factors (patient, tasks, individual), team, environment, organization, institution), and action plan.

**Results:** A total of 324 PVC were evaluated for 207 hospitalized patients. No major complications were observed during the study. At least one clinical sign or one mechanical problem was identified for 62% of patients and 58% of the PVC. The AE was a partial removal of the PVC associated with obstruction and signs of inflammation occurring during the patient transport for a radiological examination. A root cause analysis was conducted with both the cardiology and the patient transport teams. The main contributing factors identified were factors related to the team and the work environment.

**Conclusion:** This epidemiological study led us to a better understanding of the PVC complications and led the care giving teams to a better perception of the risks associated with these devices. In-depth analysis of the causes of this incident resulted in a detailed action plan with a focus on the transportation management of perfused patients. For optimal management of PVC, this approach should be completed by the analysis of other AE identified during the study.

**Disclosure of interest:** None declared.

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**P211**

The effect of bundle care on central line associated bloodstream infections in two medical ICUS

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**P211

**Introduction:** Central lines are useful medical devices commonly used in the intensive care units (ICUs), whereas central line associated bloodstream infection (CLABSI) is also a common nosocomial infection in the ICUs. CLABSI may increase the use of antibiotics, hospital days, medical costs, and even the mortality rate. Therefore, developing and implementing adequate infection control measures to prevent CLABSI is always an important clinical question.

**Objectives:** In this study, we investigated the effect of implementing bundle care for bloodstream infection (BC-BSI) in medical ICUS on reducing CLABSI.

**Methods:** This study was conducted in two medical ICUs in a medical center in southern Taiwan from March, 2010 to December, 2014. These two units started implementation of BC-BSI on September, 2011. The BC-BSI included: (1) hand washing, (2) maximal barrier precautions (from head to toe), (3) skin preparation with 2% chlorhexidine, (4) avoidance of femoral insertion sites, (5) changing dressing every 48 hours (gauze dressing) or 7 days (transparent dressing), (6) daily review of the necessity of lines with prompt removal of unnecessary lines. We compared the rate of CLABSI and the use of central lines before and after the implementation of BC-BSI.

**Results:** After the implementation of BC-BSI, the rate of CLABSI decreased from 5.45% to 4.25% and the use of central lines decreased from 59.60% to 55.55%.

**Conclusion:** The implementation of BC-BSI effectively decreased the use of central lines and the rate of CLABSI in medical ICUs. With the target of zero-tolerance to nosocomial infection, BC-BSI should be promoted and implemented in daily clinical practice to improve the quality of critical care.

**Disclosure of interest:** None declared.

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**P212**

Reducing central line associated blood stream infections at intensive care unit

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**P212

**Introduction:** Central Line Associated blood stream infections (CLABSIS) is High Risk and High Volume problem, it prolongs hospitalization by mean of 7 days. Attribute cost per blood stream infection are estimated to be between 3700 $ and 29000$. Central line (CL) bundle is evidence-based practices which when implemented has demonstrated striking reduction in the rate of both central line related infections.

According 2012 Risk Assessment at King Saud Medical City, reduction of Central Line Associated Blood Stream Infection Rate in Adult ICU was a prioritized goal and planned to be achieved through implementation of central line bundle of care.

**Objectives:** Reduce CLABSI rate at ICU by 20% annually starting in 2013. Achieve 90% CL Bundle compliance by end of 2014.

**Methods:** FOCUS PDCA Performance Improvement Project implemented. Team formulated of Infection control staff, ICU nurses and physicians and
ICU director and the current practice of insertion and maintenance of Central Line catheter has been discussed. Improvement strategies include:

- Education about Central Line Bundle of Care for ICU staff.
- Make the supply available in ICU to maintain bundle of care for central line (e.g. full size drape, CHG applicator and CHG impregnated dressing).
- Checklist developed for bundle variables and placed at patient Medical Record.
- Supervised central line insertions by secret observer.
- Nurses are empowered to stop any central line insertion in case of any breach of infection control guidelines and practices.
- Replaced povidone iodine with CHG which is superior.
- Encourage strict adherence to hand hygiene practices.
- Discouraged the use of suboptimal site such as the femoral by means of email alerts.
- Communication with emergency room team to reduce the femoral central lines coming from ER.
- Replacing CVL inserted under emergent situation within 48 hours.
- Audit sheet used to calculate bundle compliance.
- Doing daily bathing with CHG for the patients.

**Results:** 40% reduction of CLABSI occurred within 2 years (from 11.3 in 2012 to 6.8 in 2014).

**Bundle compliance changes between 84% to 97% during 2014.**

**Femoral insertions declines from 10/month to 1-3/month in 2014.**

**Conclusion:** Involving process owner champions, consistent availability and accessibility of required supply for Central Line Bundle and continuous Staff education and monitoring with feedback for caregivers are effective strategies to reduce CLABSI.

**Disclosure of interest:** None declared.

### P213

A multifaceted approach in reducing central line associated bloodstream infections (CLABSI) in pediatric iuc at a tertiary hospital

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**Introduction:** Studies have shown that collaborative efforts of multidisciplinary teams led to the reduction of CLABSI rate. However, no published studies had been reported from the Kingdom of Saudi Arabia (KSA) which examined the impact of team approach in reducing CLABSI rates. We examined CLABSI rate at the 20-bed Pediatric Medical/Surgical intensive care unit (PICU) at King Abdulaziz Medical City (KAMC), Riyadh, KSA before and after collaborative efforts.

**Objectives:** Our interventions were directed at reducing CLABSI rate to zero.

**Methods:** Using the guidelines from the Institute of Healthcare Improvement (IHI) and the National Healthcare Safety Network (NHSN), a 24-month prospective surveillance was conducted from the 2nd quarter of 2010 to the 1st quarter of 2013.

Central line insertion bundle was initiated throughout the study period. The PICU formed a CLABSI team during the 3rd quarter of 2012 through the Improvment (IHI) and the National Healthcare Safety Network (NHSN), a multidisciplinary collaborative team approach composed of nurses, physicians and Infection Preventionists (IPs).

**Measures initiated include:**
- Creation of a central line cart;
- Standardizing practices using competency checklist;
- Engaging the empowered staff to stop any unsafe practices and enforcing aseptic technique;
- Shifting from scrubbing the hub to using an alcohol cap; and adding daily maintenance to the central line bundle component.

**Results:** From the 2nd quarter of 2010 to the 1st quarter of 2013, the PICU CLABSI Team monitored 4,792 central line days. For the 3 quarters of 2010 the CLABSI rate ranges from 3.3 to 3.6. A steady decline was noted in 2011 when it reached the lowest rate at 1.6. Yet it rose sharply in the 2nd quarter of 2012 to a rate of 4.8. Most of the positive cases occurred 5 days post insertion. Lastly, after the implementation of the interventions, the rate over the last 2 quarters (4th quarter of 2012 and 1st quarter of 2013) dropped to zero.

**Conclusion:** Our team approach effort was associated with a sharp decline in CLABSI rate to zero for two quarters, yet further surveillance studies need to be conducted to evaluate if the team’s effort can sustain zero CLABSI rate for a long time.

**Disclosure of interest:** None declared.

### P214

Sutureless securement of central venous catheters and peripherally inserted central catheters with a novel securement system

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**Introduction:** The use of central venous catheters (CVC) represents a standard of care intrinsic to advanced medical practice worldwide. While the use of these catheters has transformed patient care for the good, adverse events can occur as a result of migration of the catheter and systemic infection. Central venous catheters share the common feature of ending near the atrium but commonly can enter the body through the subclavian and internal jugular veins or can enter through the veins of the arm (PICC). Securement has been shown to be an important factor in reducing the risk of infection. We describe the results of the development of a system of securement that does not require sutures.

**Objectives:**
1. Analyze strength of securement to the skin/catheter migration using preclinical models.
2. Analyze clinically assessed securement in a spectrum of the continuum of care.
3. Assess skin damage with securement device.

**Methods:** Confocal microscopy was used to assess skin damage following attachment and removal of the securement device. Clinical assessment of skin damage using standard dermatological assessment was used as a complement to the confocal microscopy and included measures for erythema, irritation and maceration. Preclinical model testing measured migration of the catheter from the entry site. Migration and catheter loss were assessed clinically.

**Results:** Testing for catastrophic failure demonstrated no loss of the system’s ability to maintain system securement. The use of a silicone component to secure the lumens of multi-lumen catheters resulted in little to no skin damage upon removal. Securement was equivalent to existing methods (adhesive anchors and dressings for PICC; sutures for CVC).

**Conclusion:** The use of a securement system that includes both dressing and securement device resulted in comparable securement when compared to existing methods (adhesive anchors, sutures, dressings). The use of silicone adhesive as a critical component of attachment to the skin coupled with classical acrylate based adhesive in the remaining portions of the system provided for adequate securement while minimising skin damage.

**Disclosure of interest:** K. Gregerson Employee of: 3M Company, L. Rutledge Employee of: 3M Company, P. Parks Employee of: 3M Company.

### P215

Outbreak of bacterial phlebitis related to peripheral intravenous catheters at a general hospital in Brazil

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**Introduction:** Device related infections are prevalent all over the world. Peripheral intravenous catheters are the most used intravascular devices and the less associated with infections.

**Objectives:** To describe the investigation and control measures of an outbreak of bacterial phlebitis at a general hospital in São Paulo, Brazil.

**Methods:** Bacterial phlebitis was defined according to the Centers for Disease Control criteria. Each patient’s data were collected from their medical files. After tabulation of the data, we could find common factors and propose control measures.

**Results:** From January to June, 2013, 11 cases of bacterial phlebitis related to peripheral intravenous catheters were reported. We could not find only one factor associated. Most of the cases occurred after 2 days due to...
of the puncture (42%), and 72% of them were performed at the emergency department. We noticed that 37% of these catheters were manipulated in the ICU and 48% of the punctures were localized at the antecubital fossa. Of these cases, only one patient suffered with bloodstream infection, and this was due to Staphylococcus aureus methicillin sensible. We performed observational auditing of insertion and manipulation of these catheters, and we could notice that the most frequent process problems were hand hygiene and hub disinfection. There was no change in the kind of material used in the hospital. Based on these findings, we proposed several measures for infection control, including a hand hygiene campaign, discussion of every case with the multiprofessional team, a global training of 100% of the healthcare team regarding puncture and manipulation of the catheters, reinforcement of daily evaluation of the need of maintaining the catheter and prioritization of more distal puncture. The outbreak was controlled in August 2013.

Conclusion: Active infection control programs, including infection surveillance and implementation of prevention measures are important for all types of intravascular devices, including peripheral intravenous catheters, in order to improve patient safety.

Disclosure of interest: None declared.

P216 Evaluation of a campaign to reduce the catheter associated urinary infection

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P216

Introduction: Like the majority of nosocomial infections, catheter associated urinary infection (CAUTI) causes an increase in morbidity, mortality, costs and antibiotics consumption.

Objectives: To analyze the impact of a campaign to promote good practices in patients with urinary catheter in a 120 bed medicine department.

Methods: Before the implementation of the campaign it was evaluated the urinary catheter rate and the CAUTI rate, as well as maintenance practices. Campaign implementation: during a week it was distributed different information daily with reminders to professionals sent by e-mail and flyer distribution focusing on the following information: urinary catheter indications; aseptic technique in catheter insertion; correct technique to empty collector bag and standard guidelines in patients with urinary catheter. Visits were carried out to the different units to promote the good practices. At the end of the week a open lecture was done to all professionals. Evaluation of the impact of the campaign was done by audits three and six months after.

Results: The urinary catheter rate was 25.8%, 16.6% and 20%, before campaign, 3 and 6 months after, respectively. The CAUTI rate was 61.5%, 35% and 58.3%, before campaign, 3 and 6 months after, respectively. Audits showed errors in catheter maintenance, namely deficient perineal hygiene and insufficient decontamination of the collector bag tap. The implementation of this campaign contributed to reduce the urinary catheter rate and CAUTI rate. It also allowed correcting inappropriate practices.

Disclosure of interest: None declared.

P217 Change management with empowerment of nursing staff to reduce catheter associated urinary infection

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P217

Introduction: Catheter-associated urinary tract infections (CAUTI) are the most common nosocomial infections.

Objectives: We used a multi-modal interdisciplinary intervention to reduce CAUTI with three key elements: stringent indications for UC insertion, shifting the task to decide on urinary catheter (UC) removal from physicians to nurses and an automatic electronic alert for catheter removal as key elements.

Methods: Non-randomized intervention study.

Patients and methods: We included all patients with a newly inserted UC at any time during hospitalization. The 13-months study comprised a baseline and 2 intervention phases. Clinical endpoints included the number of catheter days per 1,000 hospital days, the duration of catheterization as well as the rates of inserted catheters and CAUTI. Process endpoints compared changes in attitudes and knowledge about UC and CAUTI between physicians and nurses.

Results: Overall, 9,306 patients were screened for newly inserted UC, of them 513 (5.5%) were included. In these 513 patients, the number of catheter days was reduced from 88.5 to 31.9 days per 1,000 hospital days (p < 0.001) with a mean and median reduction of the duration of catheterization from 7.2 to 3.8 and 5 to 3 days, respectively (p < 0.001). The number of overall CAUTI was reduced with a risk ratio of 0.31 (95% CI 0.19-0.49) per 1,000 hospital days and of 0.35 (95% CI 0.21-0.57) per 1,000 hospital admissions. Significant changes in task-shifting from physicians to nurses and in indications for UC were documented.

Conclusion: Behavioral changes including the empowerment of nurses resulted in significant reductions in the rate and duration of urinary catheterization as well as CAUTI.

Disclosure of interest: None declared.

References

P218 Careful indication of the indwelling urinary catheter: impact on catheter-associated urinary tract infection rates

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P218

Introduction: Catheter-associated urinary tract infection (CAUTI) among critically ill patients and can provoke a high incidence of morbidity and mortality.

Objectives: Evaluate the impact of the implementation of a checklist to evaluate the use of indwelling urinary catheter (IUC) in the occurrence of CAUTI in critically ill patients of a tertiary university hospital.

Methods: This is a prospective study before-and-after that evaluated the IUC utilization rates and the occurrence of CAUTI after the implementation of training. The training consisted of early removal of this device, as well as everyday completing a checklist to review the need for IUC. The study was carried out from 2005 to 2010 (pre intervention) and from 2011 to 2014 (post intervention). Daily infection control committee (ICC) performed surveillance of CAUTI according to the criteria of (CDC / NHSN). The Student t test was applied to compare average of IUC utilization rates and the rates of CAUTI.

Results: The utilization rates of this device in pre intervention period were 70, 75, 84, 72, 71 and 71%, respectively with an average of 74%. In the post-intervention period utilization rates were 60, 65, 54 and 49, with an average of 57%. We could observe a significant reduction in the use of IUC in critically ill patients of about 17%, p = 0.0024. Before using the checklist (pre-intervention) CAUTI rates had an average of 9.63 per 1,000 catheters-day, and the post intervention period the average was 3.58, with p = 0.005. We emphasize that throughout the study (pre and post intervention) CAUTI prevention measures were performed as: use of aseptic technique for catheter insertion; 2) accomplishment of catheter insertion and maintenance by educated personnel only; 3) emphasis on handwashing...
The use of daily checklist for indication and maintenance of E. coli was the most common organism isolated in cancer patients (11%) and P. mirabilis (4%). The objective was to study the migration speed of clinically-relevant bacteria in catheter systems used after urostomy.

Objectives: The objective was to study the migration speed of clinically-relevant bacteria in catheter systems used after urostomy.

Methods: We carried out an in-vitro experiment in a commercially-available urinary incontinence system applied in a urostomy. This involved connecting two storage vessels: the first containing splints which had previously been rinsed once with artificial urine; and the second containing a bacterial suspension of the test bacteria (E. coli, P. aeruginosa and P. mirabilis), which had previously been soaked in artificial, sterile urine. The two storage vessels were incubated at 36°C for 24 to 72 hours. The splints were cut into segments of 5 cm after 24 hours, 48 hours and 72 hours. The colony-forming units (CFU) on the pieces were determined. Each experiment was carried out nine times before the average values and standard deviations were subsequently determined.

Results: After 24 hours the bacteria migrated into the splint, on average, as follows: E. coli 26.7 ± 20.6, S. aureus 27.2 ± 10.6 and P. mirabilis 12.8 ± 16.2. After 48 hours the bacteria migrated as follows: 35.0 ± 11.2 (E. coli), 51.7 ± 7.5 (S. aureus) and 41.7 ± 23.6 (P. mirabilis). The results after 72 hours were: 49.4 ± 14.5 (E. coli), 60 ± 16.0 (S. aureus) and 67.8 ± 3.6 (P. mirabilis).

Conclusion: The test bacteria grew relatively quickly through the catheter. It is likely that bacteria would grow through catheters with 80 cm length within a week at the latest. In this case, these is a direct infection risk for bladder and kidneys of the patient. These results should be taken into consideration during clinical use of the catheter systems in case urostomy.

Disclosure of interest: F. Brill Grant/Research support from: partially by Coloplast, Germany, D. Hegeholz Employee of: Coloplast, Germany, W. Droste None declared.

P220
Antimicrobial prescribing for urinary tract infections in patients undergoing total hip or knee arthroplasty (THA/TKA)

Introduction: Patients undergoing THA/TKA were screened pre- and postoperatively with urinalysis (UA) including urine dipstick & microscopy. We hypothesized that: 1) many patients without evidence of urinary tract infection (UTI) receive antibiotics if clinicians base treatment on UA results alone; 2) a protocol for screening patients for UTI would decrease treatment for UTI without increasing surgical site infection (SSI) rates.

Objectives: To identify determinants of treatment for UTI among patients undergoing THA/TKA, to assess the effect of implementing a protocol for screening patients for UTI before THA/TKA on antimicrobial use and SSI rates.

Methods: We conducted a retrospective cohort study of 200 consecutive patients undergoing THA/TKA from 2/21 - 6/30/2011 & a prospective cohort study of 50 patients undergoing these procedures from 5/21 - 7/17/2012 to identify factors influencing treatment for UTIs. We conducted a before-after study to assess the outcome of implementing a screening protocol.

Results: The strongest determinants of pre- or postoperative treatment for UTI were positive leukocyte esterase (LE; P < 0.0001; P < 0.0001) and urine white blood cell count > 5 (P = 0.01; P = 0.01). At least 59.7% of patients treated did not have clinical evidence of UTI. The screening protocol was revised such that all patients with a positive LE or nitrite test have urine cultures. Patients were treated for UTIs if the cultures grow > 100,000 CFU of 1 organism. Subsequently, the number of patients receiving antimicrobial treatment for presumed UTI decreased 80.2%; the SSI rate did not increase.

Conclusion: A new protocol for diagnosis and treatment of UTIs was associated with a significant decrease in treatment for presumed UTI but the incidence of SSI did not increase. These results suggest that most patients with positive LE do not need treatment for UTI before THA/TKA.

Disclosure of interest: None declared.

P221
Urinary tract infection in cancer patients in a tertiary cancer setting in India: microbial spectrum and antibiotic susceptibility pattern

Introduction: In immunocompromised cancer patients, urinary tract infection (UTI) is one of the major causes of fever and morbidity. Screening for UTI is important as atypical presentation is not uncommon in such patients.

Objectives: To determine the common organisms implicated in UTIs in cancer patients and to study their antimicrobial susceptibility patterns. This would help formulate empirical antibiotic policy in this group of patients.

Methods: A retrospective analysis of cancer patients suspected to have UTI in the year 2014 was carried out. A total of 497 midstream urine samples collected from cancer patients suspected to have UTI, were sent to the microbiology lab for urine routine and culture examination. Samples were processed as per standard microbiological procedures. All isolates were identified up to species level and antimicrobial susceptibility tests performed as per CLSI guidelines.

Results: Of the 497 samples processed, 100 were positive for bacterial growth. Overall, E.coli (40%) was the predominant isolate followed by Klebsiella pneumoniae (25%), Pseudomonas aeruginosa (11%), Enterococcus spp (11%) and Proteus mirabilis (5%). Susceptibility of Gram negative bacteria to colistin was highest (100%) followed by the carbapenems (72%). Resistance was found to be higher to the aminoglycosides (46%), cephalosporins (67%) and fluoroquinolones (90%).

Conclusion: E. coli was the most common organism isolated in cancer patients with UTI. There is trend of increasing resistance to aminoglycosides, cephalosporins and fluoroquinolones among Gram negative bacilli.

Disclosure of interest: None declared.

P222
Multidrug resistant bacterial isolates causing nosocomial urinary tract infection in a tertiary care hospital, Nepal

Introduction: Multidrug resistant bacteria are a major cause of recurrent nosocomial urinary tract infection (UTI). The aim of this study was to assess the aetiology and susceptibility patterns of these organisms in a tertiary care hospital.

Objectives: To identify the types of multidrug resistant bacterium causing UTI, their susceptibility patterns and clinical outcomes.

Methods: We conducted a prospective study of all patients admitted to our hospital with a clinical diagnosis of nosocomial UTI from November, 2013 to October, 2014. Patients were screened for UTI using a urine culture sample. Sensitivity testing was done for all organisms against selected antibiotics using an agar dilution method.

Results: A total of 180 patients with nosocomial UTI were screened and 120 were positive for bacteria. The commonest organisms isolated were Staphylococcus aureus (50%), Pseudomonas aeruginosa (15%), Klebsiella pneumoniae (10%) and Enterococcus spp (5%). The resistance rates were highest for cephalosporins (63%) and fluoroquinolones (47%).

Conclusion: Multidrug resistant bacteria are a major cause of nosocomial UTI. There is a need for the development of empiric antibiotic regimens based on local susceptibility patterns.

Disclosure of interest: None declared.
Introduction: Nosocomial infection is becoming a leading problem in medical practitioners now-a-days placing an extra burden on individual patients worldwide. Nosocomial urinary tract infection caused by multidrug resistant (MDR) pathogens is a major threat of the patients in developing county which are increasing numbers in Nepal.

Objectives: The aim of this study was to determine the etiology of nosocomial urinary tract infection caused by multidrug resistant bacterial pathogens.

Methods: A total of one hundred twenty two bacterial strains isolated from the patients diagnosed of nosocomial urinary tract infection were studied during 2011-2012 at Tribhuvan University Teaching Hospital (TUTH). Antibiotic sensitivity test was determined by modified Kirby Bauer Disc Diffusion method as described by Clinical and Laboratory Standards Institute (CLSI). Data were analysed by using SPSS version 17.0 software.

Results: Nosocomial urinary tract infection was caused by Escherichia coli 51(41.8%) was found to be more predominant which was followed by Acinetobacter calcoaceticus baumannii (Acb) complex 19(15.6%), Klebsiella pneumoniae 11(9%) and Enterococcus spp. 18(14.8%) and Staphylococcus aureus 11(9%). Of the total isolates, 74.6% was MDR which is much higher in Klebsiella pneumoniae 100% which was followed by Escherichia coli 90.1%.

Conclusion: The emergence of MDR bacterial strains causing nosocomial urinary tract infection are increasing in number. The high prevalence of MDR has demanded the special attention to the management of such patients and prevention of dissemination of such strains into hospitals.

Disclosure of interest: None declared.

References

P224
Management of a Serratia marcescens outbreak in a neonatal unit – improving hand hygiene does the job
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P224

Introduction: Many outbreaks due to Serratia marcescens among neonates have been described in the literature. While the source was rarely identified, the emphasis primarily was given to the role of the environment on the chain of transmission.

Objectives: To describe a S. marcescens outbreak and to evaluate the impact of the control measures implemented.

Methods: Between February and March 2013, 2 infants and 2 neonates were found to be colonized by S. marcescens in our tertiary care university-affiliated hospital. The two infants were hospitalized in the neonatal unit before having been transferred to the unit of small infants. An investigation was launched with environmental sampling in April 2013 and five point prevalence surveys (nasopharyngeal and rectal swabs) were performed between mid-April and mid-June. All identified pathogens were genotyped. Audits of best practices and hand hygiene (439 direct observations) were performed and an intensive hand hygiene promotion programme offered.

Results: A total of 160 environmental samples were obtained and 202 neonates were screened. Twenty-three neonates were found to be colonized by S. marcescens, which were all genotypically identical (attack rate = 11.9%). No invasive infections due to S. marcescens occurred. Hand hygiene compliance improved from 51% in April 2013 to 79% in May 2013 following the training programme, and remained high in the following months. No formal source was identified and all environmental samples were negative. No S. marcescens were identified in point prevalence surveys conducted in June and October 2013.

Conclusion: Improving best practices and particularly hand hygiene proved to be effective in ending this outbreak, which highlights the role of hand hygiene in the successful management of S. marcescens outbreaks among neonates.

Disclosure of interest: None declared.

P225
MRSA outbreak at neonatal ICU in Saudi Arabia
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P225

Introduction: The incidence of MRSA infections at the Neonatal Intensive Care Unit (NICU) of the King Abdulaziz Medical City (KAMC), Riyadh, Saudi Arabia was highest in February of 2014 when an outbreak occurred. Our department conducted a thorough investigation.

Objectives: To rapidly identify the cause of the outbreak and implement strict measures to contain the further spread of MRSA.

Methods: Our investigation employed the following modalities over a nine month period: Placing all neonates in contact isolation as a precautionary measure; conducting weekly Point Prevalence Surveillance screening (PPS); strict enforcement of hand hygiene by healthcare workers (HCWs) and visiting family members; curtailing of nonessential movement of neonates; enhancement of environmental cleaning protocols with florescent gel
and ATP validation and nasal swab screening of HCWs. Speciation of all MRSA identified was performed by Pulse field gel electrophoresis (PFGE).

**Results:** 533 and 201 nasal swabs were performed on the neonates and HCWs respectively with a positive MRSA culture in 17 neonates and 5 HCWs. Four different strains of MRSA were identified by PFGE. All 5 MRSA positive HCWs were furloughed and had undergone with MRSA decolonization regimen. Assessment of the environmental cleaning process revealed significant defects.

**Conclusion:** Our investigation revealed that the outbreak was not caused by spread of a single MRSA clone. The causes were likely multifactorial and mostly likely relate to a breakdown of infection control practices, highlighted the importance of strict adherence to infection control practices, including, but not limited to proper environmental cleaning.

**Disclosure of interest:** None declared.

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**P226**

**Burden of nosocomial rotavirus gastroenteritis in the paediatric population in Slovakia**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P226**

**Introduction:** Rotavirus gastroenteritis (RVGE) is most common nosocomial infection in paediatric department worldwide.

**Objectives:** The aim of this study was assessed prevalence of nosocomial RVGE in children younger than 5 years in Slovakia during the last five years surveillance period.

**Methods:** We assessed burden of hospital-acquired RVGE in Slovakia from national epidemiologic surveillance systems (EPIS) in period 2009 to 2013. Nosocomial RVGE was defined i) when the child was admitted with a diagnosis other than gastroenteritis ii) when the first symptoms of RVGE appeared not earlier than 24 h after admission iii) when the family reported no signs of diarrhoeal diseases iii) when the child was re-hospitalized at the children’s department within 3 days (incubation period for RVGE) with symptoms of gastroenteritis after the first admission iv) when RVGE was confirmed by laboratory testing (ELISA or rapid immunochromatographic test).

**Results:** RVGE was clinically and laboratory confirmed in 11 967 in children younger than 5 years. Each year were reported on average 2393±576 (1803 – 3222) cases, of them 78,9 % required hospitalisation. According the criteria for nosocomial infection totally 1533 (12,8 %) cases were nosocomial RVGE. Additionally, in Slovakia immunisation of infants with rotavirus vaccines has been implemented since 2006 and vaccination coverage reached 17,5% in year 2013.

**Conclusion:** Nosocomial RVGE represents a serious epidemiological and economical problem in Slovakia. Mandatory vaccination covered by health insurance and better practise in hospital hygiene, especially improvement in compliance to multimodal strategy for hand hygiene, could reduce prevalence of nosocomial RVGE on paediatric department in Slovakia in the next decades.

**Disclosure of interest:** None declared.

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**P227**

**A Legionnaires’ disease outbreak associated with cooling towers in Warstein, Germany, August 2013**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P227**

**Introduction:** Legionnaires’ disease (LD) results mainly from inhalation of aerosols containing the bacterium Legionella pneumophila, which may cause atypical severe pneumonia. Between the 1st of August and 6th of September an unusual cluster of patients with LD of unknown etiology in Warstein, North Rhine-Westphalia, Germany was notified to the public health authorities.

**Methods:** Laboratory investigation was performed according to requirements of European case definition. A questionnaire had been used to narrow down possible sources of infection. A case-control study was conducted to identify possible sources of infection. Cases and controls were matched for age-group and sex. Odds ratio (OR), 95% confidence interval (CI) and p-values were calculated by logistic regression. Values of p<0.05 were considered statistically significant.

**Results:** The outbreak accounted for 159 suspected and 78 laboratory-confirmed cases including one death. Legionella pneumophila, serogroup 1, subtype Knoxville, sequence type 345, could be identified as the epidemic strain. Cases were 19 to 94 years old, 64% were males. The case fatality rate was 1.28%, 91% of cases were hospitalised, 17% of those needed intensive care. In univariable analysis cases were almost five times more likely to smoke than controls (OR 4.81; 95% CI 2.33-9.93; p<0.0001). Furthermore cases were twice as likely to live within a 3 km distance from one identified infection source as controls (OR 2.14; 95% CI 1.09-4.20; p<0.027).

**Conclusion:** This is the largest outbreak of LD in Germany to date. Due to a series of uncommon events, this outbreak was most likely caused by multiple sources involving industrial cooling towers. Quick epidemiological assessment, source tracing and shutting down potential sources as well as rapid laboratory testing and early treatment are necessary to reduce morbidity and mortality. Maintenance of cooling towers must be reliable to prevent such LD-outbreaks in the future.

**Disclosure of interest:** None declared.
**P229**

A nosocomial hepatitis viral c transmission in an auto-dialysis center: risk factors using a patient-to-patient analysis

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**Introduction:** Hemodialysis is one of healthcare settings where HCV transmissions have been frequently reported.

**Objectives:** This work aims to identify the contributing factors of a patient-to-patient HCV transmission in an auto-dialysis centre.

**Methods:** An investigation was conducted based on observation of healthcare practices and interviews of the nursing staff. A root-causes analysis was performed to identify patent and latent failures involved in HCV transmission using the association of litigation and risk management method (ALARM).

**Results:** On the 17th of January 2014, the referral centre for infection control received a report about a case of HCV seroconversion in an auto-dialysis centre in March 2013. The contamination period was estimated to be between October 2012 and February 2013, during which the patient was dialyzed on the same day as another patient known to be infected with HCV. The two viral strains compared by the National Center of Reference for hepatitis were identical.

The main patent failures were: non-optimal compliance with standard precautions, lack of patients’ hand hygiene, blurred job descriptions for hospital cleaning personnel and non-compliance with the safety period between two consecutive dialysis sessions.

Contributing factors were linked to: the patients, poorly trained in hygiene protocols before their arrival at the dialysis center, sometimes aggressive and asking to be quickly connected for dialysis as soon as they arrived; to the professionals, who underestimated the viral risk of splashing and did not audit the patients’ hand hygiene; to the team, the same pair of nurse and hospital cleaning personnel had been providing care to the same, which has contributed to the deterioration of their relationship.

Latent failures were: Institutional, with an inadequate safety culture; Organizational, with a minimal leadership and the absence of job descriptions.

**Conclusion:** Clinical management should be better promoted to control viral nosocomial transmission, including team work and safety culture. The root-causes analysis using ALARM is an effective, reproducible and comprehensive approach to identifying deep causes related to institutional, organisational and management factors.

**Disclosure of interest:** None declared.

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**P230**

Implementing an Euregional database webtool for transborder surveillance of notifiable infectious diseases

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**Introduction:** There are surveillance data on notifiable infectious diseases to date. Hence we need regional data for joint transborder action in infection control.

**Objectives:** A webtool facilitating the transborder cooperation of public health stakeholders in infection control was developed in the Dutch German EurSafe Health-net project (http://www.eursafety.eu). Comparing the infectious disease reporting systems of The Netherlands and Germany we determined which routine data are available based on comparable case definitions on both sides of the border.

**Methods:** Routine data on 11 notifiable infectious disease (hepatitis A, hepatitis B, hantavirus-infection, legionellosis, leptospirosis, listeriosis, measles, meningococcal disease, paratyphus, ornitosis, q-fever) can be imported i.e. weekly in the pilot euregional database tool. Based on historical data expected values are calculated. The deviation of current values from the expected ones (z-values) can be visualized, which may indicate clusters of infections.

**Results:** For the first time infectious disease specialists of the public health services on both sides of the border can monitor the 11 notifiable infectious diseases of the border region up to the level of the local public health services in a joint system. In case of unusual cluster of notified infections they can quick contact each other to investigate the outbreak by a joint analytic study and close the uncommon source of infections.

**Conclusion:** Surveillance of notifiable infectious diseases is developed in Europe at country level. Especially in border regions we timely need these data on regional level for transborder infection control. Useful surveillance of infectious diseases for transborder infection control can be based on routine notification data, standard software technology and should be easy to use and to maintain.

**Disclosure of interest:** None declared.

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**P231**

Epidemiological investigations in a digital era: methods and tools to identify infectious disease outbreaks

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**Introduction:** Outbreak investigations are time-consuming. Containing an outbreak requires quick analysis and response. At the Tel Aviv Sourasky Medical Center Epidemiology Department, we developed methods and tools based on several computerized algorithms to identify infectious diseases outbreaks and assist in their investigation.

**Objectives:** To describe the methods and share the tools we developed for outbreak identification and investigation.

**Methods:** We use databases that contain data gathered from various systems in the hospital and then integrate, clean and reorganize them in an optimized way for advanced analysis. We developed algorithms that scan the databases and automatically identify outbreaks; then, queries alert us when an outbreak occurs. Additional queries detect the index patient and identify patients and staff who were exposed to the index and require screening or isolation.

**Results:** Compared to the non-automated methods used earlier, the new system has identified nearly 3 times the number of contacts who require screening. Moreover, because we are able to identify and isolate the index case more quickly, the number of positive contacts per index case has declined by half. The system has shortened the time needed for each investigation from several days to a few hours.

**Conclusion:** Tools to assist with outbreak investigations can be developed relatively easily building upon existing databases in the hospital. Such tools improve the efficiency and accuracy of the investigations, and ultimately lead to reduction in transmission.

**Disclosure of interest:** None declared.

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**P232**

Antibiotics’ consumption to early detect epidemics of P. aeruginosa in a burn center: a paradigm shift in the epidemiological surveillance of nosocomial infections

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**Introduction:** The control of antibiotic resistance and nosocomial infections are among the major challenges for specialized burn centers.
Early detection of those epidemic outbreaks is crucial to limit the human and financial burden.

**Objectives:** We hypothesize that data collected in the frame of antibiotic consumption medico-economic surveys could be used as warning signal to detect early nosocomial outbreaks.

**Methods:** Retrospective analysis including all burn patients staying more than 48 h and receiving systemic therapeutic antibiotics admitted to the Lausanne BICU between January 2001 and October 2012. Infection episodes were characterized according to predefined criteria. Antibiotic consumption data, obtained from the quarterly surveillance of drug consumption surveys, were translated in defined daily doses (DDDs).

**Results:** 297 out of 414 burn patients stayed more than 48 h for a total number of 7458 burn-days. We identified 610 infection episodes (burn wound [32.0%], respiratory [31.1%], catheter [21.8%]), due to 774 microorganisms. *Pseudomonas aeruginosa* (26.2%), *Staphylococcus aureus* (11.5%), *Candida albicans* (7.0%) were the main pathogens. We observed three distinct outbreaks of *P. aeruginosa* infections (2002-2003, 2006 and 2009-2011). These outbreaks were correlated with an increase in the DDD of anti-*Pseudomonas* antibiotics.

**Conclusion:** Our data support a paradigm shift in the epidemiological surveillance of nosocomial *P. aeruginosa* epidemics in Burn Centers, by using the rise in antibiotic consumption as an early trigger to initiate molecular typing of *P. aeruginosa* strains and reinforcement of standard infection control procedures.

**Disclosure of interest:** None declared.

**P233**

**Proactive infection control measures to prevent hospital outbreaks in a regional hospital in Hong Kong: approaching zero outbreaks in a 5-year time period**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P233**

**Introduction:** Hospital outbreaks of epidemiologically important pathogens are usually caused by lapses in infection control measures and result in increased morbidity, mortality and cost. However, there is no benchmark to compare the occurrence of hospital outbreaks across hospitals.

**Objectives:** It is worth considering setting up such surveillance data for hospital outbreaks, similar to surgical site and device related infections as found in the National Healthcare Safety Network (NHSN) report and International Nosocomial Infection Control Consortium (INICC) respectively.

**Methods:** We implemented proactive infection control measures with an emphasis on timely education of healthcare workers and hospitalized patients about directly observed hand hygiene on outbreak prevention in Queen Mary Hospital (QMH), a teaching hospital. Our benchmarked performance (outbreak episodes per 1 million patient discharges and 1 million patient days) was compared with those of other regional public hospitals without these measures between 2010 and 2014.

**Results:** During the study period, QMH only had 1 hospital outbreak, resulting in 1.48 and 0.45 outbreak episodes per 1 million patient discharges and patient days respectively, which were significantly lower than the corresponding overall rates in 7 acute regional hospitals (24.26 and 6.70 outbreak episodes per 1 million patient discharges and patient days respectively, p<0.001) and that of all 42 public hospitals in Hong Kong (41.62 and 8.65 outbreak episodes per 1 million patients discharges and patient days respectively, p<0.001).

**Conclusion:** This large study on benchmarked rate of hospital outbreaks per patient discharges or patient days suggested that proactive infection control interventions may minimize the risk of hospital outbreaks.

**Disclosure of interest:** None declared.

**P234**

**Barriers to investigate and to report nosocomial outbreaks to health authorities in São Paulo, Brazil: a mixed method approach**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P234**

**Introduction:** Nosocomial outbreak investigations (NOI) may provide relevant insights into the field of healthcare-associated infection. Nevertheless, in the last ten years only a quarter of all published NOI were reported to the health authorities (HA) in São Paulo State, Brazil (SPS).

**Objectives:** We aimed at to identify barriers to investigate and to report NOI to the HA in São Paulo.

**Methods:** A mixed methods approach was performed in a convergent parallel design. The quantitative branch of the study was a statewide survey by means of an electronic questionnaire. The qualitative branch was carried out by means of focus groups (FG). Infection control practitioners (ICP) working in SPS were recruited. Data were processed individually in a descriptive analysis (electronic survey) and a content analysis (FG).

**Results:** ICP enrolled were 87 and 22 respectively in the electronic survey and FG. A similar proportion of nurses (60%) and physicians (40%) were included in both branches of the study. Data from the survey and FG were convergent regarding to: i) although most ICP believe themselves with enough knowledge on NOI, they find difficult translate this knowledge into practice; ii) ICP perception is that sufficient human and material resources are present in hospitals, but overall there is weak planning in infection control activities; iii) ICP do not feel supported by hospital managers; iv) ICP know the channels to report outbreaks to HA (84%), but they perceive it as meaningless; vi) ICP don’t report to HA because they get concerned about potential punishment (64%) or institutional image damage (52%). There were two divergent results regarding to: i) laboratory support: In the survey ICP informed that good laboratory support (59%), however, in FG participants complained about that; ii) interaction with HA: in the electronic survey participants referred good interaction (50%) and no punishment (84%) related to HA, but in FG they declared a poor interaction.

**Conclusion:** Our results showed that barriers to NOI and reporting to HA are knowledge, skills and hospital manager support. HA should overcome these barriers by rebuilding its strategies to approach health care services as well as delivering translational educational programs to support improvement NOI skills.

**Disclosure of interest:** None declared.

**P235**

**Signalling disease outbreaks: cost-effectiveness analysis of early warnings and response systems in the case of dengue control**

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P235**

**Introduction:** Early warnings and response systems (EWS) are of up-most importance to identify disease outbreaks and to initiate life saving interventions. Up to date disease and vector-surveillance function as early warning systems to detect dengue outbreaks at early stages, so as to respond early to outbreaks and save resources. Currently, there is no vaccine or causal treatment for dengue fever, and methods to reduce the life saving burden relying on EWS, and early warning responses. This paper investigates the cost-effectiveness of EWS for Brazil, based on a decision analytical model.

**Objectives:** Assess the cost-effectiveness of early warnings and surveillance systems of infectious diseases: the case of dengue.

**Methods:** Based on the SINAN database (national notifiable diseases information system), we extracted the severity distribution of dengue illness. WHO Unit Costs were adjusted to IS, to create a severity-based cost-function for direct costs of dengue illness. Effects were presented as DALYs averted. Costs and Severity were adjusted to the Oxford risk map incidence number. A decision-tree model including 3 response efficacies (70% outbreak prevention, 50%, and 30%) was constructed to assess the cost-effectiveness of an early warning system at a state-level for Brazil. Tornado diagrams were performed to investigate the impact of chosen variables on the expected ICER value.

**Results:** With a sensitivity of 0.57, false alarm rate of 0.12, and a 70% chance of preventing an outbreak, the implementation of an EWS is very cost-effective (ICER < 1 GDP/capita) in 25/27 states in Brazil. For the medium
Implementing early warning systems with a medium or a high efficacy EWS, 22/27 states would benefit from its implementation, and for the lower efficacy early warning responses, only 8 states profit from an EWS. The expected ICER value was among others influenced by the costs of the EWS, the response costs, and the false alarm rate.

Conclusion: Implementing early warning systems with a medium or a high efficacy showed efficiency gains, which is cost-effectiveness. We hereby provide a model, which can be adjusted by imputing country specific data, but to fully assess their impact, more studies need to be conducted on the adequacy and feasibility, on reliable alarm signals and especially the outcome of interventions.

Disclosure of interest: None declared.

P236
National results and 6 years trends of nosocomial infection surveillance in French intensive care units (REA-RAISIN network)
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P236

Introduction: Healthcare associated infections surveillance is a priority in intensive care units (ICUs). Since 2004, French national surveillance in adult ICUs (REA-RAISIN network) has targeted device-associated infections, for which control measures are essential.

Objectives: To present 2014 national results and highlight the impact of prevention programmes over the last six years.

Methods: Six months a year, ICUs collected data for each patient hospitalised more than 2 days. Surveillance focused on ventilation associated pneumonia (VAP), central venous catheter related infection or bacteraemia (CRI/CRI) and bloodstream infection (BSI) according to European protocol (ECDC). Analysis included patient’s characteristics, device exposures, ICU-acquired infections (microorganisms, antimicrobial resistance) and incidence ratios including ICU distributions and temporal trends (2009-2014). Multivariate analyses introducing the year of participation as a risk factor were performed for VAP and CRI.

Results: In 2014, 212 ICUs included 34,226 patients and 10.7% presented at least one infection. Overall incidence rates were calculated: 14.26 VAP/1,000 intubation-days, 3.53 BSI/1,000 ICU-days, 6.66 CRI and 0.51 CRI/1,000 catheter-days.

In comparison with 2009, patients were more predisposed to infections due to significant evolution of their characteristics (age, SAPS II, antibiotic treatment at admission, immunosuppression) meanwhile device exposure decreased. All incidence rates of device-associated infections decreased significantly: VAP (-4.2%), CRI (-40.5%) and CRI (-43.3%), meanwhile device exposure is not significant for BSI (-1.1%). Multivariate analysis confirmed this reduction in 2014 for VAP (adjusted OR: 0.90; CI: 0.84-0.97) and CRI (adjusted OR: 0.56; CI: 0.44-0.71).

Conclusion: This surveillance network, including 50.4% of French ICU beds, represents a national reference and appears effective in describing and monitoring infectious risk in ICUs.

The significant decrease in 2014 for VAP and CRI can be related to practice improvement and higher level of patient safety.

Disclosure of interest: None declared.

P238
Surveillance of healthcare associated infections in bavarian intensive care units
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Introduction: Surveillance of health care associated infections (HAI) has been mandatory in Germany since the year 2001.

Objectives: The Bavarian Health and Food Safety Authority (LGL) aimed to assess whether this legal demand was met by the hospitals and if the results of surveillance induces changes concerning management of hospital hygiene.

Methods: Prior to a Bavarian wide monitoring program performed by the public health offices the special unit for hospital hygiene (SEI) of the LGL developed a checklist in order to facilitate a standardized monitoring. This checklist was evaluated by the SEI in a pilot study comprising intensive care units (ICU) of 40 hospitals. In the following year 284 ICUs of 395 Bavarian hospitals were monitored by the public health offices. The checklists were returned to the LGL and were analyzed by the SEI.

Results: 75 % of hospitals stated that they perform HAI surveillance in their ICUs, 19 % answered the question in the negative and 6 % of data were missing. The surveillance system KISS provided by the National Reference Institute was used in 33% of the ICUs, in 35 % an in-house method based on KISS and in 18 % some other kind of method was used. Some hospitals had implemented several methods for surveillance. ICUs using other methods than KISS did not have written standards to define the specific HAI they were looking for or a denominator in almost a third of the cases. The data for surveillance were collected and analyzed predominantly by the infection control staff. However, there seems to exist a communication gap. The data are not shared with the head of the ICU in 15 %, the ward doctors in 23 % and the nursing staff in 35 %. The quality management is not informed in 53 % and the data are published rather seldom in the official quality reports of the hospitals (15 %). Not only the communication of data could and should be improved but also the understanding why these data are collected in the first place. Nearly all ICUs answered that they would react on data in general, but 16% did nothing specifically.

Conclusion: In summary the monitoring program showed that most hospitals performed some method of surveillance for HAIs in their ICUs.

P237
Risk factors for enterobacter cloacae colonisation at a neonatal intensive care unit in the Netherlands
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Introduction: Following an outbreak of Enterobacter cloacae complex ESBL at a neonatal intensive care unit (NICU) in a large tertiary care hospital in the Netherlands, a routine E. cloacae complex screening of all neonates was introduced. Literature on colonisation rates and risk factors for neonatal colonisation with E. cloacae are limited.

Objectives: To determine the colonisation and risk factors for colonisation with E cloacae complex at the NICU.

Methods: Neonates who were admitted at the NICU between March 2013 and April 2014 and who were screened for E. cloacae were included in this study. Microbiological screening data was extracted from the medical microbiology database. Demographical, clinical and admission data and information on birth weight and gestational age were extracted from the electronic patient records. Colonisation rates and risk factors were determined for all neonates and a subgroup of those with gestational age of 30 weeks or below.

Results: Out of 353 neonates who were included in the study, 42 were positive for E. cloacae (11.9%; 95% confidence interval 8.8-15.6%). Risk factors for colonisation were: a lower birth weight, a lower gestational age, lower 1 minute APGAR score and longer duration of admission at the NICU. In neonates who were born ≤30 weeks of gestational age, longer duration of admission and lower gestational age remained independent risk factors for colonisation with E. cloacae.

Conclusion: The colonisation rates were highest in the most vulnerable neonates, i.e. those with a lower gestational age, lower birth weight and a lower age at admission at the NICU. These factors are all interrelated and part of (extreme) prematurity. In situations where screening is performed in response to a suspected outbreak, it is helpful to know the background colonisation rate in order to interpret the colonisation rates. When limited resources are available a cost effective strategy could be to limit screening to neonates born after pregnancy duration <30 weeks.

Disclosure of interest: None declared.
but that partly deficiencies which would be fairly easy to overcome are still in place.

Disclosure of interest: None declared.

P239
Skin decontamination in critically ill patients. Comparison of two daily bathing methods: traditional bath versus 2% chlorhexidine gluconate (CHG) cloths
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P239

Introduction: Healthcare Associated Infections (HAI) in Intensive Care Units (ICU) settings are still a challenge; skin decontamination is a recommended intervention to interrupt pathogen transmission through "source control". Various studies1,2,3 investigated the effectiveness of 2% CHG cloths compared with the use of traditional bathing (soap and water) or pre-impregnated cloths with soap solution (no antiseptic) for the reduction of MDROs acquisitions and blood-stream infections in Intensive Care Unit settings.

Methods: The system used for daily patient hygiene at the General Intensive Care Unit (ICU) of the Rimini hospital until April 2013 consisted of a "traditional" method (water and soap). Since May 2013, 2% CHG cloths were introduced for daily bathing of colonized/infected patients (targeted decolonization)3. Afterwards, since October 2013, a new procedure was introduced to extend daily bathing with 2% CHG cloths to all patients in the ICU (universal decolonization)3. Patients between periods had similar characteristics.

Results: Results compare two periods in which data were collected and analyzed: Period A - November 2012 / April 2013 - 6 months of daily hygienewith soap and water - Pre-intervention. Period B - October 2013 / July 2014 - 10 months of daily hygiene with 2% CHG cloths (universal decolonization) Intervention. Number of patients Colonized/Infected: decreased by 51.21% (p-value = 0.00141). Positive blood cultures decreased by 68.32% (p-value = 0.01699) Return on investment (ROI): estimated decrease of 50% of the total costs, intervention period vs. pre-intervention period.

Conclusion: Daily bathing with 2% CHG cloths significantly reduces the number of patients colonized/infected and MDR0 acquisitions. The results and the estimated ROI obtained at the General Intensive Care Unit(ICI) of the Rimini hospital, confirm the opportunity of implementing a universal decolonization protocol in ICU settings.

Disclosure of interest: None declared.

P240
Demographic profile and susceptibility pattern of bacterial isolates from endotracheal aspirates of ventilator assisted patients admitted in the medical intensive care unit of a tertiary hospital: a retrospective cross sectional study
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P240

Introduction: Hospital-acquired, ventilator-associated pneumonia, and healthcare-associated pneumonia are important causes of morbidity and mortality despite improved antimicrobial therapy, supportive care, and prevention.[1] Empiric antibiotic treatment is widespread especially in patients admitted in ICU, leading to multiple resistances of bacteria to certain drugs. Hence, this study aims to provide local data for bacterial isolates among ventilator assisted ICU patients, leading to a better choice of initiating antibiotic coverage by the physicians and medical residents in relation to patients’ demographic profile.

Objectives: To describe the demographic profile and susceptibility pattern of bacterial isolates from endotracheal tube aspirates (ETA) of patients admitted in the Medical ICU of Cardinal Santos Medical Center.

Methods: This is a retrospective cross sectional study. All adult patients who were intubated and admitted in the Medical ICU from January 2013-December 2013 were included. Data were reviewed using charts and bacterial isolates through computer generated census in the Section of Microbiology. Frequencies and percentages were used to summarize nominal data. Means and standard deviations were computed for continuous variables. To test for statistical significance, Fisher’s exact test was used for categorical variables.

Results: Over a 12 month period, 157 intubated patients were admitted in the Medical ICU and 59 patients met the inclusion criteria. Most common isolates identified were Klebsiella pneumoniae (26.47%) and Pseudomonas aeruginosa (25%).

Conclusion: Hypertension, diabetes mellitus and malignancy are the common co-morbid conditions among patients admitted in the ICU with pneumonia. Susceptibility patterns of the different organisms identified in the study showed highest sensitivity with Meropenem (73.5%). Prolonged hospitalization and ICU stay increases the risk of patients for developing Escherichia coli and the reasonable empiric treatment options are Carbapenems. Continued antibiotic resistance surveillance should be performed.

Disclosure of interest: None declared.

Reference

P241
Decrease ventilator-associated pneumonia by bundle care in cardiac surgery intensive care unit
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P241

Introduction: Ventilator-associated pneumonia (VAP) is major healthcare-associated infections in intensive care unit (ICU), which increases length of stay, medical cost and mortality.

Objectives: The infection density of cardiac surgery ICU in a tertiary teaching hospital in southern Taiwan was 4% during January 2011 to December 2012 which is higher than 2% in the other ICUs. In order to decrease the incidence of VAP, bundle care was applied in this ICU.

Methods: After observing nursing care procedures in 24 intubated patients, some measurements were inappropriate, including mouth care once per day, odor smell in patient’s mouth, poor compliance of hand hygiene before and after patient contact, head elevation less than 30 to 45 degrees, no regular evaluation of extubation daily. Therefore, bundle care of VAP with following options was applied, including evaluation of oral hygiene every eight hours, oral hygiene with toothbrush and 2% chlorhexidine-containing fluid every hour or every eight hours based on individual difference, audit of hand hygiene, reminding symbol for head elevation at bedside, evaluation the necessary of extubation by physician, nurse practitioner and respiratory therapist daily.

Results: After leading in bundle care and interprofessional practice, the infection density decreased from 4% during January 2011 to December 2012 to 0% during January 2013 to August 2014. The infection density remain zero for twenty months.

Conclusion: VAP is common healthcare associated infection in ICU and leads to unexpected outcomes in patient care. All the medical staffs should place importance on the concept of bundle care to decrease the incidence of VAP.

Disclosure of interest: None declared.

References
P242  

**Pneumonia in trauma patients**

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1)P242

**Introduction:** Ventilator associated pneumonia (VAP) is the main infection in multiple trauma patients in the Intensive Care Unit (ICU). The invasive treatment and clinical trauma conditions of these patients increase the risk of infections.

**Objectives:** To study the incidence, etiology and risk factors associated with the development of ventilator associated pneumonia (VAP) in trauma patients admitted in an ICU.

**Methods:** The study is a retrospective cohort study, of patients who developed VAP during hospitalization in a Trauma ICU, on a referral trauma center, with 220 beds, the Hospital do Trabalhador (HT). The study period was between January 2012 from December 2013. Diagnosis criteria of Centers for Disease and Control (CDC) were used. We developed an active search record, which was filled with information from medical records and the database of the Epidemiology and Infection Control Center from HT.

**Results:** A total of 969 patients were hospitalized in ICU in the study period, and 125 were diagnosed with Ventilator Associated Pneumonia (VAP). Usage rate of ventilator was 58.32%. The sample was composed of males (79.2%), with ages ranging from 18 to 94 years, with an average of 42.7 years. The main mechanism of trauma was the automotive (48%), with the most prevalent being Traumatic Brain Injury (TBI) with 34.4% of the cases followed by the thoracic (32-2%). The mean ICU stay was 26.6 days (SD 21.8) and on mechanical ventilation (MV) 19.4 days (SD 17.7). The prevalent bacterial etiological agents of pneumonia were MSSA and MRSA, both with 21.6% followed by Acinetobacter baumannii (16.8%) and *Pseudomonas aeruginosa* (16%). The therapy choice was piperacillin-tazobactam in 96 patients, corresponding to 58.4% of the sample.

**Conclusion:** The incidence of PAV on trauma was associated with car accident and TBI, which is an independent predictor of mortality risk. Yet there was association between length of stay in ICU with PAV, and found a higher rate of patients with positive blood cultures in comparison with literature due to trauma patients have higher risk for sepsis.

**Disclosure of interest:** None declared.

P243

**Oral care quality improvement intervention results in decreased ventilator associated pneumonia ratio and increased productivity**

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1)P243

**Introduction:** Ventilator associated pneumonia (VAP) is associated with increased morbidity and mortality, increased length of stay, and excess costs. Effective VAP prevention requires multiple interventions, including compliance with an oral care regimen.

**Objectives:** A quality improvement (QI) initiative was implemented at a hospital in Japan to assess the effectiveness of a modified oral care regimen on the VAP ratio and caregiver productivity.

**Methods:** The QI initiative modified the standard of care for oral care provided to ventilated patients. During the “before” period, standard of care was every 8 hour oral care with toothpaste, toothbrush, and fresh water. During the “after” period, the QI intervention was oral care provided every 4 hours with Q-Care® (Sage Products LLC), consisting of a kit designed for cleaning, debridging, suctioning and moisturizing. Metrics compared included the VAP ratio and time consumption before and after the QI intervention.

**Results:** The QI intervention resulted in a 59% reduction in VAP ratio from 2009 through 2011. The standard of care time consumption was 9.8 minutes per oral cleansing, compared with 5.7 minutes per oral cleansing with Q-Care®.

**Conclusion:** The QI initiative resulted in a decreased VAP ratio and increased productivity.

**Disclosure of interest:** None declared.

P244

**Interdisciplinaries impactando actions on prevention of ventilator-associated pneumonia in patients of trauma intensive care unit**

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1)P244

**Introduction:** Ventilator associated pneumonia is the most common among hospital infections, especially in intensive care unit patients Trauma. With the concern to improve the quality provided in assistance to patients on mechanical ventilation, intensive care created a multidisciplinary group to develop, evaluate and implement the necessary measures to prevent ventilator-associated pneumonia.

**Objectives:** Reduce the incidence of ventilator-associated pneumonia in the intensive care unit of trauma.

**Methods:** This is a quantitative prospective study, conducted from January 2010 to December 2014 in a 10-bed intensive care unit of trauma high complexity hospital, at Sao Paulo, Brazil. In 2009 we implemented the multidisciplinary group: supervision of nursing, medical coordinator, intensivist and physiotherapist intensive care, pharmacy, nutrition and infection control. The adopted actions taken over the years were: Weekly discussion of cases with evaluation of the clinical condition of the patient, sedation interruption and weaning; protocol review as oral hygiene, threshold evaluation; Review of materials and respiratory care equipment.

**Results:** The year 2009 was the beginning of VAP prevention actions of the multidisciplinary group, with only 4 reviews, and no case of infection. In 2010, the first year of follow up were 785 assessments with 25.85% of the membership shares and 0 (zero) EPI density. In 2011-2014 were 1216, 680, 1096 and 814 reviews respectively, 85.2%, 88.5%, 89.5% and 88.6% compliance actions. In relation to EPI density enters these years were: 0.85; 2.81; 1.02 and 0 (zero) in the year 2014. In evaluating the past eighteen months (July 2013 to December 2014), we found that there was no case of pneumonia associated with mechanical ventilation, a fact that motivated the drive to celebrate importance of working together.

**Conclusion:** The interdisciplinarity of the sectors involved in the activities highlighted the importance of teamwork in order to better results in processes and quality of care.

**Disclosure of interest:** None declared.

P245

**Rates of ventilator-associated pneumonia in critical care units in three Arabian Gulf countries; six-year surveillance study**

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*Antimicrobial Resistance and Infection Control* 2015, 4(Suppl 1)P245

**Introduction:** Data estimating the rates of ventilator-associated pneumonia (VAP) in critical care units in three GCC countries are either limited in some countries or completely lacking in other countries.

**Objectives:** To estimate VAP rates in GCC hospitals and to compare such rates with published reports of US National Healthcare Safety Network (NHSN) and International Nosocomial Infection Control Consortium (INICC).

**Methods:** VAP rates and ventilator utilization between 2008 and 2013 were calculated from aggregated VAP surveillance data using NHSN methodology pooled from 6 hospitals in 3 GCC countries; Saudi Arabia, Oman, and Bahrain. Standardized infection ratio (SIR) of VAP in GCC hospitals were compared with published reports of NHSN and INICC.

**Results:** A total 368 VAP events were diagnosed during 6 years of surveillance covering 76,749 ventilator days and 134,994 patient-days. The overall VAP rate was 4.8 per 1000 ventilator days (95% CI ranged between 4.5 and 5.3) with an overall ventilator utilization of 0.57. The VAP rates showed a wide variability between different types of intensive care units (ICUs) and were decreasing overtime. After adjusting for the
Introduction: Nosocomial meningitis (NM) is a life-threatening complication following neurosurgery. Risk factors for NM are a subject for rigorous investigation.

Objectives: Our aim was to study the impact of external ventricular drainage (EVD) on NM incidence at neurosurgical intensive care unit (NICU).

Methods: A prospective surveillance of nosocomial infections at NICU was conducted in 2010 - 2014. Data on 1749 patients stayed at NICU for longer than 48 hours were daily collected into electronic medical records system. Definitions of nosocomial infections developed by Centers for Disease Control and Prevention (CDC, USA) were used as criteria for meningitis diagnosis. External ventricular drainage (EVD) was placed before the manifestation of NM in 404 patients, which were selected for the analysis.

Results: EVD-associated meningitis (EVDAM) occurred in 89 patients representing 22.0 ± 2.1 (CI 18.0 - 26.2) per 100 patients with EVD. The incidence of EVDAM per 1000 days of EVD functioning was 17.3 ± 1.5. The incidence of meningitis in all patients treated at NICU longer than 48 hours was 12.6% ± 1.0% (CI 10.74% - 14.66%). The relative risk (RR) of meningitis associated with EVD was 4.4. Patients with EVDAM did not differ significantly by gender, age and comorbidity from the rest of patients with EVD (p > 0.05). CSF leakage was more common in patients with EVDAM (14.6% vs. 5.4%, p < 0.05). NM developed within 6 days after EVD placement in 50% of cases, 75% of NM cases occurred within 11 days. The etiology of NM was verified in 62.7% of cases. Coagulase-negative staphylococci (26.0%) and Acinetobacter baumannii (21.0%) were the main pathogens.

Conclusion: EVD was a significant risk factor for NM leading to 4.4-fold increase in NM incidence at neurosurgical intensive care unit.

Disclosure of interest: None declared.

P246
Bacterial contamination of the hands of intensive care unit staff during respiratory tract care: preliminary results

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P246

Introduction: Optimal care of the respiratory tract (RT) is critical to prevent ventilator-associated pneumonia in ICU. The dynamics of microbial cross-transmission by the hands of health care workers (HCW) during RT care is currently unknown.

Objectives: To study the level of HCWs' hand contamination during RT care.

Methods: Structured observations of RT care sequences were conducted by trained external observers. At the beginning and the end of each care sequence observed, imprints of the 5 fingertips of the dominant hand, with and without gloves, were taken on blood agar plates. Bacterial colony-forming units (CFUs) were quantified after 18 hrs of incubation at 35°C. The primary outcome was the number of CFU/plate at the end of the care sequence and before performing hand hygiene, expressed as medians and interquartile range.

Results: A total of 207 structured observations were performed: nasal care (n=31), nasal care with fixing of the naso-gastric tube (NGT;n=31), oral care with water (n=29), oral care with chlorhexidine (CHX;n=50), fixing of respiratory tube (n=33) and ento-tracheal aspiration (n=33). Hand hygiene compliance before aseptic care was 70%. Gloves were used for 94.2% of care sequences and a gloves’ contamination >10 CFUs before care was observed in 24.2% of care sequences. When considering RT care activities with ≤10 CFUs on hands or gloves at the start of care, we observed a median of 49 [6-88], 111 [37-277], 140 [50-317], 43 [14-168], 156 [15-308], and 4 [1-18] CFU/plates for nasal care (n=23), nasal care with fixing of the NGT (n=21), oral care with water (n=23), oral care with CHX (n=33), fixing of the respiratory tube (n=21) and ento-tracheal aspiration (n=26), respectively.

Conclusion: Among different types of RT care in intubated patients, fixing of the NGT or respiratory tube and oral care with water showed the higher levels of bacterial contamination. Oral care with CHX was associated with lower contamination levels than oral care with water. Further analyses will be conducted to model the dynamics of bacterial contamination according to the duration of care.

Disclosure of interest: None declared.

P247
Nosocomial meningitis associated with external ventricular drainage at neurosurgical intensive care unit

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Introduction: The level of bacterial contamination according to the duration of care. Further analyses will be conducted to model the dynamics of bacterial contamination according to the duration of care.

Disclosure of interest: None declared.

P249
Survey of infection control resource and services in outpatient settings in China

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P249

Introduction: Nosocomial meningitis (NM) is a life-threatening complication following neurosurgery. Risk factors for NM are a subject for rigorous investigation.

Objectives: Our aim was to study the impact of external ventricular drainage (EVD) on NM incidence at neurosurgical intensive care unit (NICU).

Methods: A prospective surveillance of nosocomial infections at NICU was conducted in 2010 - 2014. Data on 1749 patients stayed at NICU for longer than 48 hours were daily collected into electronic medical records system. Definitions of nosocomial infections developed by Centers for Disease Control and Prevention (CDC, USA) were used as criteria for meningitis diagnosis. External ventricular drainage (EVD) was placed before the manifestation of NM in 404 patients, which were selected for the analysis.

Results: EVD-associated meningitis (EVDAM) occurred in 89 patients representing 22.0 ± 2.1 (CI 18.0 - 26.2) per 100 patients with EVD. The incidence of EVDAM per 1000 days of EVD functioning was 17.3 ± 1.5. The incidence of meningitis in all patients treated at NICU longer than 48 hours was 12.6% ± 1.0% (CI 10.74% - 14.66%). The relative risk (RR) of meningitis associated with EVD was 4.4. Patients with EVDAM did not differ significantly by gender, age and comorbidity from the rest of patients with EVD (p > 0.05). CSF leakage was more common in patients with EVDAM (14.6% vs. 5.4%, p < 0.05). NM developed within 6 days after EVD placement in 50% of cases, 75% of NM cases occurred within 11 days. The etiology of NM was verified in 62.7% of cases. Coagulase-negative staphylococci (26.0%) and Acinetobacter baumannii (21.0%) were the main pathogens.

Conclusion: EVD was a significant risk factor for NM leading to 4.4-fold increase in NM incidence at neurosurgical intensive care unit.

Disclosure of interest: None declared.
work besides education. More needs to be done to improve the current situation of infection prevention and control in China.

Disclosure of interest: None declared.

P250
Understanding barriers to the provision of hand hygiene products in Africa – a WHO POPS/APPs project

Introduction: The availability of alcohol-based handrub (ABHR) and its component parts to enable reliable use in health care are variable around the globe. Three initiatives from the World Health Organisation (WHO) have addressed this inequity. The WHO guidelines on hand hygiene (2009) promote the use of ABHR as an easy and effective way to ensure clean safe hands at the point of care. WHO Private Organisations for Patient Safety (POPS) harnesses industry strengths to align and improve implementation of WHO recommendations, to hand hygiene in the first instance. WHO African Partnerships for Patient Safety (APPs) focuses on supporting safer healthcare delivery in hospitals with hand hygiene as a linchpin for safe quality care. In 2013, a one-off project was launched through POPS to provide empty bottles to APPS hospitals so that operational barriers to implementation of locally produced ABHR could be addressed.

Objectives: 1. To describe an implementation-focused project spanning three WHO programs responding to locally identified barriers. 2. To describe the process involved in providing a short-term solution to the identified problem. 3. To systematically identify barriers and recommendations to the problem.

Methods: A tripartite approach was employed involving an open call to POPS companies, a targeted call to APPS hospitals that had previously completed a WHO training program on local production of ABHR, and brokering of the interaction between POPS and APPS via the WHO APPS team. A preparation, logistics and communications plan was adopted.

Results: One company provided 27,990 bottles to 6 hospitals in 5 countries in Africa. It took 6 months from the start of the project until final delivery of all hardware to the hospitals. Key challenges related to mode of transportation, barriers to entry, storage and identification of reliable routes from port to hospital. Acknowledgement was received by hospital managers regarding the impact on ABHR availability at point of care.

Conclusion: This project allowed the logistics process to be scrutinized and lessons are informing the next stage of work to address barriers. Availability of ABHR and other required resources in the African region continues to be constrained and action to address this inequity remains a key priority for WHO and POPS informed by this project.

Disclosure of interest: None declared.

Reference

P251
Impact of the involvement of hospitals in Benin in the actions of the world program “Save Lives: Clean Your Hands” edition 2014

Introduction: Benin is engaged in the promotion of the patient safety through the Minister of health. Convinced by the role of hand hygiene in the fight against the spread of pathogens both in hospitals and in the community, the Ministry of Health has encouraged Benin Hospitals which belong to the global initiative “Saves Lives: Clean Hands Yours”.

Objectives: Improve Patient Safety through the promotion of an intervention-oriented program based on hand hygiene.

Methods: The staff of 40 health facilities (public and private) of Benin was sensitized for two months. Twenty-nine of them accepted to participate in two major WHO surveys in 2014. Data were entered into the http://www.who.int/gpsc/S5may/register/fr/site. All hospitals have been associated with the official celebration of the World Day for Hand Hygiene May 5, 2014.

Results: A lack of harmonization and bad evaluation of antibiotic prophylaxis in surgery protocols was found in 55% hospitals, 35% of hospital laboratories have a section dedicated to microbiology. Monitoring of multi-resistant bacteria is insufficiently. The Minister of Health has signed on behalf of the Government the commitment of Benin for the management of care associated infections. Benin was recognized in the 2014 Global-Map published by WHO reflecting the involvement of Benin hospitals in promoting hygiene Hands.

Conclusion: Benin’s Hospitals should be encouraged by the continuous training of the promotion of correct hand hygiene. The Ministry of Health must be supported to adopt a comprehensive policy and set up a National Patient Safety Program and Risk Management.

Disclosure of interest: None declared.

Reference
P253

Preventing infection transfer from health facilities to rural communities

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P253

Introduction: In developing countries especially sub Saharan Africa, the pressure of increased population has led to increasing new concerns for a proper and affordable waste disposal treatment in health care facilities. Effluents of hospital wastes are discharged into streams which are the major source of water supply for inhabitants of most communities. The non-existence of portable water supply in most communities has led to dependence on these streams for drinking, irrigation and other domestic chores which in turn results in outbreak of gastrointestinal infections in surrounding communities.

Objectives: To examine the impact of infectious waste transfer from health facilities to rural communities.

Methods: Fecal samples and sewage obtained from effluent streams adjacent to health facilities, ill maintained waste treatment plants and control samples from patients at nearby health facilities were screened for parasitic ova, cyst and larva. Graded doses of Calcium Hydroxide (Ca (OH)2) was added into these samples and re-screened for parasites.

Results: Distribution of parasites in effluent streams and waste plants adjacent to health facilities showed significant occurrence (P<0.05) of C. sinensis (38.4%), A. lumbricoides (23.1%), T. trichura (33.3%), S. stercoralis (44.4%) and I. belli (33.3%) respectively. Lime (Ca (OH)2) treatment caused a significant reduction in the number of parasites at pH 8.0 and 10.0. Higher PH, increase in temperature and longer exposure to pretreatment with (Ca (OH)2) were observed as important factors for parasite eradication in these samples.

Conclusion: Inefficient waste disposal systems, non-functional waste treatment plants, poor supply of portable water as well as government’s general neglect of health issues has greatly increased enteric diseases in developing countries. Hence it is necessary that human waste be properly treated to eliminate all pathogenic organisms before disposal. Lime Stabilization technique has proven to be a simple, safe, cost effective, easily available and environmentally protective alternative model for waste treatment especially in resource constrained settings. It is worth suggesting in the light of this work that lime be added in sufficient doses into septic tank of hospitals before disposal in order to avoid contamination by parasites including residues reaching effluent streams.

Disclosure of interest: None declared.

P254

Interventions for enhancing an online infection control course for Latin American countries

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P254

Introduction: In 2010, St Jude began a 12-week infection control (IC) course using e-learning & face-to-face methodologies to train Latin-American infection preventionists in IC competencies. In 2014, we added a weekly hands-on practicum for reinforcing learned course elements. It consisted of using the Infection Control Assessment Tool (ICAT) developed by USAID and Management Sciences for Health, and the WHO Hand Hygiene Self-Assessment Framework (HHSAF); these validated tools aligned with course competencies.

Objectives: We aimed (1) to compare the knowledge gain among participants with hands-on practicum vs. control, (2) to assess 6-month implementation of quality improvement (QI) projects based on ICAT/ HHSAF results, and (3) to determine user acceptance of the electronic format of ICAT/HHSAF tools.

Methods: We assigned 43 students to an intervention (IC 2014) or control group (IC 2013) and measured knowledge gain over time (pre/post-test); this constituted a 2-group by 2-within repeated measure design. In a 6-month follow-up of the intervention group, participants were asked to use our ICAT/HHSAF electronic format and complete an evaluation.

Results: Using a two factor repeated measures design we found a significant interaction between the course and knowledge gain over time, F (1,41)= 6.07, p = .018. Knowledge gain was 31% among the intervention group (n=25, p <.001) and 21% among the control group (n=18, p <.001). Exam scores were not different between the courses at pre-test, (t(41) =1.295, p=.968. Follow-up of QI projects indicates that 67% of respondents implemented QI projects based on tool results and 67% have used at least one of the tools again (n=6). Additionally, respondents found the ICAT/ HHSAF electronic format to be more attractive (100%), reduce error (67%), and provide improved understanding of results (100%).

Conclusion: Incorporating hands-on applications to online IC courses can enhance participant learning outcomes. Validated tools such as the ICAT and the HHSAF are feasible options. Interventions for adoption of systematic use of IC needs assessment tools among preventionists in Latin America are needed.

Disclosure of interest: None declared.

P255

Prevention of nosocomial bacteremia associated with Staphylococcus aureus in Benin

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P255

Introduction: Nosocomial bacteremia due to Staphylococcus aureus seem to be increasing in some hospitals in Benin according the first nationwide survey on the prevalence of nosocomial infection.

Methods: Too many too soon - fever following PET CT may be due to infections process. We reviewed the laboratory results and anti-infective therapy in Benin: results of the first nationwide survey. In 2012, Antimicrobial Resistance and Infection Control 2014, 3(17):2-6.

Results: A total of 12 hospitals were involved in this study. Five of them had an effective infection control program (category I) and the other without structured program (category II). The incidence of bacteremia was 5.2 % in category I versus 17.2 % in category II. The rate was 1.42 cases per 1000 patient per days in category I versus 4.83 cases per 1000 patient per days for category II. The proportion of S. aureus bacteremia was 5.2 % in category I versus 17.2 % in category II. The incidence of bacteremia began to decrease on January 2014, the primary site was discernible in 90% of bacteremia episodes only in hospitals category I.

Conclusion: This study showed a significative reduction in the incidence of S. aureus bacteremia in hospital that had an effective infection control program based on African Partnership Patient Safety Program.

Disclosure of interest: None declared.

References

P256

Too many too soon - fever following PET CT

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P256

Introduction: Too many too soon fever following PET/CT is common. We retrospectively analyzed the cases and reviewed the sepsis guidelines.

Methods: We assigned 43 students to an intervention (IC 2014) or control group (IC 2013) and measured knowledge gain over time (pre/post-test); this constituted a 2-group by 2-within repeated measure design. In a 6-month follow-up of the intervention group, participants were asked to use our ICAT/HHSAF electronic format and complete an evaluation.

Results: Using a two factor repeated measures design we found a significant interaction between the course and knowledge gain over time, F (1,41)= 6.07, p = .018. Knowledge gain was 31% among the intervention group (n=25, p <.001) and 21% among the control group (n=18, p <.001). Exam scores were not different between the courses at pre-test, (t(41) =1.295, p=.968. Follow-up of QI projects indicates that 67% of respondents implemented QI projects based on tool results and 67% have used at least one of the tools again (n=6). Additionally, respondents found the ICAT/ HHSAF electronic format to be more attractive (100%), reduce error (67%), and provide improved understanding of results (100%).

Conclusion: Incorporating hands-on applications to online IC courses can enhance participant learning outcomes. Validated tools such as the ICAT and the HHSAF are feasible options. Interventions for adoption of systematic use of IC needs assessment tools among preventionists in Latin America are needed.

Disclosure of interest: None declared.

References
**Introduction:** Contaminated medical equipment and intravenous fluids are well known causative factors for procedure related bacteremia.

**Objectives:** Outbreak investigation we carried out in May 2014 in our PET CT unit.

**Methods:** Four of our patients who had PET CT in May 2014 presented with acute onset febrile illness shortly after the PET. All patients who had PET CT at that time were followed up. Three out of 4 patients grew *Serratia* in blood. Culture of medication samples including contrast and saline bottles along with environmental samples and hands of staff were carried out.

**Results:** Four patients had fever following PET CT procedure in May 014. All four patients had a PET CT as a part of evaluation of malignancy. Three out of four had *Serratia* marcescens bacteremia with the same antibiogram. Investigation for the possible source revealed that a normal saline bag (multi dose vial) that was used to reconstitute the contrast was the point source for the outbreak. Sample from the bag grew *Serratia* with the same antibiogram as that of the bacteremic patients. Although analysis by pulsed-field gel electrophoresis (PFGE) was not carried out, there was no other obvious source of contamination and the patients who developed bacteremia had no other intervention other than the PET scan. Post investigation corrective action was termination of the practice of using multi dose normal-saline bag and replacing those with single use saline flush for each patient. There were no further cases of *Serratia* bacteremia in PET CT unit since then. All the three patients recovered on antibiotic treatment.

**Conclusion:** It is extremely important to be vigilant to detect outbreaks at the outset itself, especially in units where investigations are carried out in an out patient basis. The study also underscores the importance using single dose vials/single saline flush for all procedures including radiology ones.

**Disclosure of interest:** None declared.
Results: A total of 440 children (110/village) of a mean age 43 months (±SD 14) were included (52% were girls). Half of the children had moderate to severe stunting (n=200) and a third had moderate to severe wasting (n=121). Median number of persons in the household was 7 and two thirds of the children were >4th in the sibling order (n=260). Median number of past pregnancies in the mothers was 2 and median time from the last pregnancy was 2 years. Children living in the 2 NV had a significantly lower height-for-age z-score defining stunting (OR 0.84: 0.72 to 0.98) compared to those living in NNV, a smaller arm circumference (OR 0.77: 0.62 to 0.95), were more frequently >5th in the sibling order (OR 2.30: 1.39 to 3.82), were less often exclusively breastfed for a 4-6 month duration (OR 0.30: 0.17 to 0.53) and used more frequently a mix of water, sand or water and coal for their dental care than water alone (OR 11.38: 2.81 to 46.07).

Conclusion: Life conditions and dental behaviors of children living in NV were different from those living in NNV, reinforcing the theory of environmental triggers explaining a differential incidence of noma by geographical areas in the region of Zinder (Niger).

Disclosure of interest: None declared.

Reference

P260
Congenital rubella syndrome exposure in a pediatric hospital: experience from developing world
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Introduction: Congenital rubella syndrome (CRS) is a rare disorder with devastating ocular and systemic consequences. Although efforts to eradicate the disease have been in place for some time, developing world continue to be affected by this disease.

Objectives: We describe an exposure to a six month old infant with congenital rubella syndrome (CRS) in the pediatric hospital and the successful management of exposure and prevention of rubella cases among exposed staff with limited resources.

Methods: In January 2015, a six month old infant with a patent ductus arteriosus was admitted to a 50 bedded tertiary referral pediatric hospital in South India. The infant was seen & managed by cardiologist initially followed by cardio thoracic surgery team, pediatricians, intensivists and ophthalmologist. Although CRS was mentioned in the differential diagnoses of several physicians, the patient was not isolated until the 8th day of hospitalization. This may be part due to the unrecognized nature & duration of infectivity of CRS.

Results: Totally thirty five health care workers (HCWs) exposed to CRS child during his initial 8 days of stay in the hospital. Majority of the exposure happened during his stay in multi bedded general ward (18/35), followed by cardio thoracic intensive care unit (4/35) and in the operating room (3/35). Two of the exposed employees were pregnant that time. An attempt was made to prevent an outbreak of additional exposures by the isolation (both contact & droplet precautions) of the infant, rubella Ig G antibody testing of both pregnant health care workers with unknown or uncertain history of rubella vaccination (both were immune) and prompt administration of rubella vaccine to significantly exposed persons.

Conclusion: Outbreaks of CRS that occur in pediatric hospitals in the developing world are of special concern. Testing of all employees for rubella antibody and immunization of those determined to be seronegative should be considered. Infants with congenital rubella syndrome shed rubella virus in large quantity for prolonged periods in urine and saliva. They need to be kept in both contact & droplet isolation for minimum 1 year to avoid unprotected exposures among HCWs.

Disclosure of interest: None declared.

P262
Urinary tract infections caused by Pseudomonas aeruginosa among children in southern Poland
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P262

Introduction: Urinary tract infections (UTIs) are an important cause of morbidity and mortality during the first 2 years of life. Knowledge of the antimicrobial resistance patterns may help clinicians choosing the empirical treatment.

Objectives: The aim was to analyze the resistance and virulence of PAR causing UTIs among children in Southern Poland.

Methods: PCR-screening for lasB, exoS, pilh, aprK and pilB and antimicrobial-susceptibility were performed. MDR was non-susceptible to one antimicrobial in ≥3 antimicrobial classes. Extensively-drug resistant (XDR) was susceptible to ≤2 antimicrobial classes. PCR-screening for VIM, IMP and KPC was performed.

Results: Median age (Q1;Q3) of the population (25 children) was 1.5 year (1;3). The most prevalent virulence gene was exoS (92.3%), modulating bacterial phagocytosis and invasion into cells. LasB gene (degrades of human competent molecules), was present among 80.8% of the isolates. AprA (aeruginosin that degrades biologically important proteins) was present in 61.5%. PilB gene was not detected. Of the isolates, 92% were susceptible to gentamycin, tobramycin or cefepime, only 8% to amikacin. A large number of isolates were resistant to meropenem (38.5%) or imipenem (19.2%). All were susceptible to colistin. Two isolates were XDR, 1 was MBL-positive. No KPC, IMP, VIM were found.

Conclusion: Empirical selection of the antibiotics should be based on the knowledge of local antimicrobial susceptibilities of pathogens rather than on universal guidelines to maximize the benefit for patients and minimize
the risk of developing drug-resistance. In this study, gentamycin and beta-lactams were shown to be the most appropriate for UTIs empiric therapy among children. Supported by 2012/05/N/NZ7/00786.

Disclosure of interest: None declared.

P263
Perineal hygiene in recurrent urinary tract infections - protective or predisposing?

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Introduction: Recurrent urinary tract infection is a common problem in pediatric clinical practice. Unsatisfactory perineal hygiene considered to be a main predisposing factor in theoretical background as the etiology of the condition is opportunistic microorganisms found in the perineal commensal microbiota. The impact of perineal hygiene on the occurrence of urosepsis is not well studied in Sri Lankan community.

Objectives: The objective of this study is to evaluate the role of different perineal hygiene practices in recurrent urinary tract infections among Sri Lankan paediatric population.

Methods: 45 female patients with recurrent urinary tract infections and age matched 45 controls were evaluated for perineal hygiene practices. All subjects were in the age of 1 to 5 years. Recurrent urinary tract infection was defined as 3 or more episodes of treated urosepsis within last one year period. Chi square test was used with the significance level of 0.05 for statistical analysis.

Results: Recurrent urinary tract infections were encountered in 13, 04 and 28 children in the categories of washing with soap and water, washing with water and no washing respectively. Recurrent urinary tract infections were not found in 02, 21 and 22 children in the categories of washing with soap and water, washing with water and no washing respectively.

Conclusion: There is a statistically significant difference (P < 0.05) of UTI occurrence among different perineal hygiene practices. Washing with water seems to be protective whereas washing with soap and water seems to be predisposing.

Washing with water probably remove pathogenic microorganisms thereby preventing infections and washing with soap probably remove considerable amount of commensal organisms there by promoting colonization by pathogens. A prospective randomized controlled study with a bigger sample is recommended for more reliable information.

Disclosure of interest: None declared.

References

P264
Successful containment of a nosocomial outbreak of Burkholderia cepacia in a special care baby unit of a base hospital in Sri Lanka

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Introduction: Burkholderia cepacia a known cause of nosocomial infection, is capable of surviving in nutrient-poor water. It’s intrinsically resistant to most antibiotics.

Objectives: To present the first nosocomial outbreak of B. cepacia reported in Sri Lanka.

Methods: Patient and environmental sampling data obtained during the outbreak were retrospectively reviewed. Blood cultures(BCs) were performed using the BacT/ALERT® automated system. Environmental samples were cultured in brain heart infusion broths. API 20NE was used for biochemical identification. Antibiograms(ABs) were carried out according to CLSI guidelines.

Results: Over 6 days in May 2013, 4 BCs out of 14 in the special care baby unit of Base Hospital Avisawella, grew B. cepacia. BCs became positive after a mean of 3.5 days since admission. All four neonates developed high levels of inflammatory markers and thrombocytopenia. Organism showed identical ABs in all isolates, with sensitivity to meropenem, cefazidime, ciprofloxacin and resistance to trimethoprim and aminoglycosides. All babies were successfully treated with meropenem.

A 10% dextrose solution used for the neonates grew B. cepacia on culture. This solution is not readily available in our setting and it’s prepared in the unit, using 5% and 50% dextrose combination. It was used for different babies at multiple times throughout the day by several nurses. Other samples that grew B. cepacia included a bottle of normal saline used as a multiple dose vial for preparation of intravenous (IV) drugs, a galilipot of sterile water used for suction of airway of a ventilated baby, 2 incubator humidifiers and a ventilator humidifier. ABs were identical to those of patient isolates. Unit policy was changed to preparing IV fluids for all babies at the same time, twice a day by a designated nurse wearing sterile gloves. Remaining IV fluid was discarded. Single use normal saline bottles were purchased. A fresh galilipot of sterile water was used for airway suctioning each time. Humidifier cleaning technique was optimized.

Conclusion: In a resource limited tropical setting, cessation of the use of multiple dose IV fluid vials and simple hygienic measures proved to be effective in controlling and preventing outbreaks of B. cepacia.

Disclosure of interest: None declared.

P265
Late presentation of paediatric patients to clinics: a major barrier to uptake of laboratory services in nigeria

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Introduction: In Nigeria, paediatric patients present to health clinics at critical states that leave the medical doctors with no other choice but to blindly prescribe drugs without proper diagnostic tests.

Objectives: This study was aimed at determining effect of late-presentation of paediatric malaria cases to the hospital on uptake of laboratory services.

Methods: Conducted study at the Medical Centre, University of Nigeria, Enugu Campus. Reviewed medical records contents of fifty-six paediatric patients from January 22 to March 23, 2014. Records were taken during clinic days at the OPD section. Malaria parasite test showing 3++ and PCV below 39% of the patients involved were used as a major basis for sampling. The following inclusion criteria were used: age bracket of 1-12years, late presentation, very weak with severe fever, malaria test of 3++ and PCV below 39% while exclusion criteria included adults, early presenters and patients presenting symptoms not related to malaria. The following were the main instruments used: structured questionnaires, medical records and Micro-haematocrit centrifuge.

Results: 55% patients admitted did not use laboratory services until their first line of anti-malaria therapy ended; their PCV reading was recorded as 39%. 45% of the patients presented to the medical centre during the weekend when the Lab Scientist was not on duty; they recorded lower PCV reading of 38% during the week day when the Lab scientist had resumed.

Conclusion: Late presentation which comes either in the form of:

- Patients presenting late to the clinic with severe malaria symptoms. This leads to anti-malaria therapy for the paediatric patients without the necessary diagnostic tests in a bid to save their lives, or.
- Patients presenting to the medical centre during the weekend when the only Lab Scientist working at the medical centre is off-duty.

All these act as barriers to uptake of laboratory services.

Disclosure of interest: None declared.
P266
ORION, a new method for root cause analysis of blood and body fluid exposures
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P266

Introduction: Blood and Body Fluid Exposures (BBFEs) involve a complex sequence of events combining technical, human and organizational factors. Performing root cause analysis (RCA) of these events is promoted to improve safety. We conducted a RCA of a BBFE in a radiology unit using a recently developed French method called Orion.

Objectives: The objective was to identify how the BBFE had happened and to implement actions to prevent its reoccurrence.

Methods: The starting point of the RCA was the report of a BBFE by a radiologist to occupational medicine. BBFE occurred during a non-scheduled breast biopsy. Analysis was conducted in collaboration with occupational medicine and the Southwestern Centre for Healthcare Associated Infection Control. ORION comprises six steps: collecting data; rebuilding the chronology; identifying gaps; identifying contributing and influential factors; proposing actions to implement; writing the analysis report.

Results: The detailed chronology of events before, during and after the BBFE identified many gaps. The main influential factor was a sub-optimal organization during the breast biopsy: no protocol, inadequate room and time slot. Three corrective measures were retained: providing adequate safety container closer to the care procedure; providing adequate medical device to drag the carrot, reorganizing the care with an additional microbiopsy session close to RMI session.

Conclusion: This first use of the ORION method to analyse a BBFE proved successful. This method seems quasi-intuitive and easier to conduct than previously described methods because it relies on a detailed chronology. It allows the implementation of BBFEs preventive measures and promotes collaborative teamwork.

Disclosure of interest: None declared.

P267
Commissioning for infection prevention
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P267

Introduction: The changing face of healthcare commissioning within England provided Infection Prevention Specialists with an opportunity to embed Infection Prevention and Control (IPC) into the heart of contractual arrangements. The Infection Prevention Society (IPS) collaborated with the Royal College of Nursing (RCN) to help support members in meeting the challenge of ensuring this key element to achieve quality and safety is embedded in the emerging commissioning landscape.

Objectives: This paper will outline the work of the Commissioning Network in influencing IPC commissioning.

Methods: A joint scoping day was with members of the IPS and RCN to gain an understanding of the implications to commissioning in IPC. Agreed outcomes included the immediate release of a joint position statement to inform external stakeholders of the value of commissioning for IPC and plans for the development of assurance framework and key IPC indicators. As emerging guidance regarding the NHS commissioning landscape came to the fore, in 2011, priority was given to the development of additional tools to support and inform members, these included an option appraisal and mapping documents, both of which outlined the function and future form of IPC in the new commissioning organisations. Following further consultation with members, the network produced the first IPC Commissioning Toolkit in March 2013 and this has been updated in March 2015. The toolkit provided commissioners with a set of IPC indicators for use in healthcare contracts. Additional resources have also been developed including two briefing paper documents which aimed to highlight the challenges regarding the changes within the new commissioning system and the potential impact on commissioning safe services with respect to IPC. These documents were released prior to the implementation of the changes in October 2013 and it was revised following the changes in March 2015.

Results: The evaluation of the resources was positive, many alluded to the usefulness of the documents during a challenging period of uncertainty and used them to inform local decisions. There was also evidence that the toolkit had been used by commissioners and also providers in determining key performance indicators for IPC.

Conclusion: Following the positive evaluation of the commissioning toolkit, there are plans to develop a third edition which will encompass various health care settings and social care.

Disclosure of interest: None declared.

P268
The right patient in the right place: the central role of infection control
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P268

Introduction: The Portuguese reality of high prevalence of Epidemiologically Important Microorganisms (EIM) combined with the shortage of single rooms led to the implementation of a real-time action strategy, in order to achieve best practices of isolation, starting on admission.

Objectives: Optimization of site management of patients, centered on the Infection Control and Antibiotics Committee (ICAC) on a paper-free hospital.

Methods: ICAC implemented a methodology based on the relationship between the Electronic Medical Registry (EMR), Lab, Infection Control Nurse (ICN) and the Site Manager Nurse (SMN), comprising the following steps: 1) At inpatient admission, namely on the Emergency Room (ER), a 8 question tool named Electronic Epidemiological Query on Admission (EEQA) is fulfilled by the physician in charge of the patient, generating automated micro prescriptions and isolation procedures; 2) ICN daily (Monday to Friday) receives data from the micro lab and alerts from hospital information system. Based on the analysis of this information, each patient is studied and the need of isolation is assessed. ICN works along SMN and nurses and physicians on the wards, deciding their allocation into single rooms or into cohorts; 3) An Infection Control Note is written on the patient’s EMR, which migrates automatically to its Discharge Note; 4) SMN acts according to data from the EEQA, the ICN and also from physicians and nurses in charge of patients; 5) Finally, a phone contact to the staff on duty is made in order to transmit the right isolation needs and an email is sent to the respective Medical Director and Head Nurse.

Results: According to this strategy, in last December an average of 3.29 daily changes (placement on individual rooms, negative pressure rooms or cohorting) were made in patient’s allocation on a total of 3.274 admissions.

Conclusion: Based on this model, ICAC ensures that all patients admitted were properly allocated, according to information obtained from the Electronic Epidemiological Query on Admission and EIM detected. Infection Control Nurse has a central role along with Site Manager Nurse, thus reducing the risk of cross-transmission and contributing to Patient Safety on a context of shortage of single rooms.

Disclosure of interest: None declared.

P269
Medical device-vigilance in Tunisian Center Est University Hospital: knowledge, attitudes and practices of medical staff
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)P269

Introduction: In the framework of better risks management in hospital environment and in perspective to improve quality and safety care, university hospital center Farhat Hached Sousse (Tunisia) has developed a medical device-vigilance system in order to monitor incidents or risks of
incidents that may arise through using medical devices allowed-on in market.

**Objectives:** Our objective is to determine medical staff knowledge’s, attitudes and practices in university hospital center Farhat Hached Sousse (Tunisia) regarding medical device-vigilance system establishment.

**Methods:** We conducted a descriptive study, type KAP (knowledge’s, attitudes, and practices), in December 2014, among all medical staff exercising at university hospital center Farhat Hached Sousse (Tunisia) who are in direct contact with medical devices. Measuring instrument used is a self-administered questionnaire, preestablished, and pretested. Seizure and data analysis was made by the SPSS software 20.0.

**Results:** More than half of participating physicians do not know, nor institution correspondence local (69.5 % (IC 95 % (60 to 77.9 %))), neither existence of standardized form for reporting (56.8% (IC 95 % (47.4 to 66.3%))). Concerning attitudes, majority of investigations (89.5 % (IC 95 % (83.2 to 94.7 %))) shall notify interest of creating medical-device-vigilance system. Participants in study report their desire to receive more information about standard precautions and disposal system but they relate their desires to follow a training (57% (IC 95 % (47.4 à 64.7))).

**Conclusion:** Our study highlights lack of information and training in field yet sensitive and heavily regulated. This needs to affirm medical nature relatively to medical device-vigilance by integrating it into health care professional’s curriculum study but also by strengthening awareness and communication around medical device-vigilance system. Success system’s functionality must be supported by promulgation laws and regulations and better organization of regulatory agencies.

**Disclosure of interest:** None declared.

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**P270**

Knowledge attitude and practice towards infection control measures amongst healthcare workers in a medical teaching hospital of Calicut District, Kerala, India

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**Introduction:** Healthcare workers must know the various measures for their own protection. They should improve organization of work, implement standard precautions and dispose biomedical waste properly to prevent occupational exposure. This study aimed at assessing the Knowledge and attitude towards infection control measures amongst the healthcare workers in a medical teaching hospital of Calicut district, Kerala, India.

**Objectives:** The objective of the study was to assess the Knowledge and attitude towards Infection control measures amongst the healthcare workers in a medical teaching hospital of Calicut district, Kerala, India.

**Methods:** This cross-sectional study was conducted by using a pretested semi-structured proforma, by interview cum observational technique. One hundred and twenty healthcare workers (70 hospital staff including nurses and technicians and 50 medical interns) were selected using convenient sampling and their Knowledge, attitude and practice towards infection control measures were studied.

**Results:** Of the 120 participants, the majority (85.8%) was aware of disposing used needles and syringes in puncture-resistant containers but only 55.7% were actually practicing it. Three-fourths (75.8%) of the participants were aware about not recapping the needles after use but on observation, only 35.4% were practicing this. All healthcare workers were aware about the indication for using masks and gloves while handling patients, while only 77.1% were using them. We also found that only 61.8% washed their hands after attending every patient, 94.3% cleaned the area with a sterile swab before giving injections and only 35.7% of the labs/wards/operation theatres had three colored bags. Few (11.7%) of the workers have already been exposed to infectious blood samples and some (19.2%) are still not immunized against Hepatitis B.

**Conclusion:** There is a need for improvement in the Knowledge, attitude and practice of infection control measures among healthcare workers for both self and patient’s protection. They should also get themselves immunized against Hepatitis B and report accidental exposure to infectious samples to the infection control committee.

**Disclosure of interest:** None declared.

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**P271**

Patient’s safety culture among health care professionals in Tunisian Center-Est University Hospital

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**Introduction:** Nowadays, patients’ security arouses more and more decision-makers and health workers. Development of safety culture is fundamental pillar to any strategy for improving quality and safety care. Thus, we conducted our work in order to measure level of patients’ safety culture among healthcare professionals, in our hospital.

**Objectives:** Measure level of patients’ safety culture among healthcare professionals in order to improve strategies of healthcare quality and safety in our hospital.

**Methods:** We conducted, in 2013, a descriptive study among all licensed physicians (n = 116) and a representative sample of paramedical staff (n = 203) exercising at university hospital center Farhat Hached Sousse (Tunisia). Measuring instrument used is a valid questionnaire containing ten safety culture dimensions.

**Results:** Participation rate was 90.5%. 44.9 % of respondents felt that security level of their services is low. Overall score of different dimensions varies between 32.7% and 68.8%. Dimension having most developed score (68.8%) was perception of “Frequency and reporting adverse events”. Dimension with lowest score (32.7 %) was “Management support for safety care”.

**Conclusion:** Our study has allowed us to conclude that all dimensions of patients’ safety culture need to be improved among our establishment’s professionals. Therefore, more efforts are necessary in order to develop a security culture based on confidence, learning, communication and team work and rejecting sanction, blame, criminalization and punitive reporting.

**Disclosure of interest:** None declared.

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**P272**

Improving the knowledge and adherence of nursing staff to infection control recommendations: a quality improvement pilot program

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**Introduction:** Since 2003, all nursing staff at HUG follow a mandatory course in infection control in the context of an institutional program. As part of a quality improvement pilot program we implemented a knowledge assessment tool in 2 units of a 300-bed geriatric hospital.

**Objectives:** We aim to assess the nursing staff’s theoretical knowledge of infection control and its application in everyday practice.

**Methods:** During the first period (01-04/2014) all nurses and nursing assistants in the 2 participating units were assessed for their theoretical knowledge of infection control during a 30-minute interview using a predefined questionnaire with 12 items. During the same period adherence to hand hygiene was measured based on the WHO framework. During a second period (4-6/2014) individual and group-level feedback about knowledge scores and hand hygiene adherence was provided. Individuals with suboptimal performance in either domain were targeted for individual training sessions. During a third period (6-12/2014) hand hygiene compliance and the implementation of infection control measures was audited.

**Results:** 21 nurses and 13 nursing assistants were assessed during the 1st period. None remembered to have received training in infection control. 5 caregivers reached the maximum knowledge score and had hand hygiene adherence > 80%. 5 caregivers reached the maximum knowledge score but had a hand hygiene compliance < 50%. 1 caregiver reached low scores both with regard to knowledge and hand hygiene compliance. During the 3rd period overall hand hygiene compliance of 6 randomly selected caregivers having participated in the 1st phase increased from 59 to 98 %. 14 infection control measures were audited and all fulfilled the predefined criteria for adequacy.
Conclusion: Despite a long institutional culture of patient safety and infection control only 15% of the nursing staff had very good theoretical knowledge of infection control and were able to implement this knowledge into good adherence to hand hygiene. This quality improvement pilot program made the whole team reflect on their practices and made it possible to identify caregivers in need of individualized training.

Disclosure of interest: None declared.

P273
Prevention and infection control programs related to health assistance: diagnosis of hospitals in the state of Paraná, Brazil
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Introduction: Prevention and Infection control programs associated with health assistance (PCIRAS), besides the contribution to reduce the number of these infections, build up relevant components of quality evaluation system from health assistance.

Objectives: To characterize the performance of these programs in hospitals in the state of Paraná-Brazil.

Methods: Prospective and transversal study of processual evaluation, through an instrument previously validated, built up by four indicators whose contents are the expected development of these programs in relation to Brazilian and international literature requirements. The indicators are: 1) Technical operational structure (TOS); 2) Operational Guidelines (OGS); 3) Epidemiological Surveillance System (ESS); 4) Control and Prevention Proceedings (CPP). The study was performed from 2013 to 2014 in 50 hospitals statistically defined by access.

Results: The general conformity obtained by these programs were 71.0%, with dispersion (dp) of 23.86. The conformities of each indicator were: TOS - 79.4% and 18.9dp; ESS - 76.0% and 30.5dp; OGS - 65.5% and 26.9dp; CPP - 63.2% and 39.5dp. The general development was a bit below those previously expected (75%), due to OGS and CPP indicators. The programs presented minimum data to be operated and to provide epidemiologic observation, but then it is damaged due to quantitative and qualitative insufficiency of operational and action norms to the control and prevention of these infections. The presence of health quality certification, internal fiscalization control, presence of an exclusive nurse to work on the Hospital Infection Control Service (HICCS), presence of contracted and state physicians, longer hours of exclusive dedication and wider experience of physicians and nurses, present great association to improve the development of 11 PCIRAS, respectively.

Conclusion: As Paraná is one of the most developed states in Brazil, the result of this study is something to be worried about. It motivates the necessity to recognize and characterize these programs in other regions of Brazil.

Disclosure of interest: None declared.

P274
The effectiveness of hepa filtered rooms plus fluconazole prophylaxis for prevention of invasive fungal diseases in allogenic stem cell transplant patients
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Introduction: In our hematopoietic stem cell transplantation (H SCT) center, prevalence of invasive fungal diseases (IFDs) for the patients who did not experience IFDs previously is based on performing allogeneic SCT in rooms with “high efficiency particulate air” (HEPA) filters and administration of fluconazole prophylaxis.

Objectives: We aimed to evaluate our prophylaxis policy to ensure if preventive measures are working.

Methods: Erciyes University Hospital is a 1300-bed tertiary centre with a 38-bed HSCT center. We retrospectively reviewed records of 146 ASCT episodes between January 2012 and December 2014 to detect the patients with IFDs before engraftment. Patients who experience IFDs before ASCT were excluded from the study. As fluconazole has no activity against Aspergillus spp, an early diagnostic policy for invasive aspergillosis (IA) was guided by twice weekly Aspergillus Galactomannan antigen detection from the day of neutropenia until engraftment and radiological interventions when clinically required. The European Organization for Research and Treatment of Cancer and the Mycoses Study Group criteria were used to categorize the patients as having proven, probable, or possible IA. IA is accepted as nosocomial if patient was hospitalized more than seven days and no history of previous IFDs in the last six months.

Results: The 105 out of 146 ASCT episodes were from matched related donor, 10 were from matched unrelated donor, and 31 were haploidentical ASCT. Possible IA was diagnosed in 10 patients, probable IA was diagnosed in 3 patients, proven IA in 1 patient, and fungemia was detected in 4 patients. Candida mucositis was diagnosed in 7 patients. The crude mortality rate in three months after ASCT was 10.4% (4 patients with IFDs vs 11 patients without IFDs) in 144 ASCT patients who were followed by our center.

Conclusion: ASCT in rooms with HEPA filters with positive pressure, combined with fluconazole prophylaxis prevented IFDs in 82.8% of the 146 ASCT episodes in pre-engraftment period.

Disclosure of interest: C. Altyay Kurkcuoglu: None declared, G. Metan Grant/Research support from: Associates of Cape Cod; Conflict with: Member of Advisory board for Pfizer, Gilead, Astellas, L. Kaynar: None declared, F. Elmali: None declared, E. Alp: None declared, M. Cetin: None declared.

P275
Surveillance of healthcare associated infections in Dutch nursing homes
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Introduction: Elderly residents of nursing homes have a higher risk for an infection and are at risk due to underlying chronic illnesses, dependence on care, sharing of facilities and living in a close contact with others. Still, systematic surveillance on prevalence of healthcare-associated infections (HAI) in this population is scarce.

Objectives: The aim of this study was to determine the prevalence of HAIs in nursing homes in the Netherlands in order to identify the burden of and risk factors for infection.

Methods: Since 2009 the Dutch national surveillance network for HAIs in nursing homes (SNV) organizes biannual crosssectional prevalence surveys. For all residents in participating nursing homes baseline characteristics, information on the presence of gastroenteritis, lower respiratory tract infection (LTI), urinary tract infection (UTI), bacterial conjunctivitis, bloodstream infection and antibiotic use were collected from 2010 till 2014. Coding of infections was based on clinical definitions.

Results: On average 25 nursing homes participated per survey (range: 3-49). Most nursing homes participated for several years. In total 17241 residents were included and 534 HAIs were registered. The overall prevalence of HAIs in this population is scarce.

Conclusion: Repeated surveys support evaluation of local infection control policies, interventions and guides national policy making. Based on 5 years of biannual prevalence studies a decreasing trend in the prevalence of HAI’s and particularly urinary tract infections was observed as well as a decline in percentage of residents having antibiotics. This may suggest improved infection prevention measures in the participating nursing homes. Further,
in depth analysis is needed to study factors associated with the decrease in HAI and to possibly identify best practices.

Disclosure of interest: None declared.

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**P276**

**Surveillance of hospital acquired infections according to ECDC definitions in Polish hospital - a pilot study**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P276

**Introduction:** Hospital acquired infections (HAIs) registration is one of the essential elements of the infection control programs. In 2011 Polish Society of Hospital Infections has developed HAIs surveillance program convergent with current recommendations in the European Union based on the ECDC HAI-Net system.

**Objectives:** The aim of this work was to analyse epidemiological situation in six intensive care units from the hospitals taking part in the surveillance system based on ECDC HAI-Net recommendations.

**Methods:** This work presents the results of HAIs registration in the intensive care units, collected on the basis of guidelines and criteria for infections’ identification according to HAI-Net recommendations. Twenty one hospitals, mainly from the southern Poland, participated in the program since 2012. Presented data were gathered in six intensive care units, reporting cases of hospital acquired pneumonia (PN), bloodstream infections (BSIs) and urinary tract infections (UTIs), in 2013 and 2014. Continuous, active surveillance method was used. HAIs cases were detected by infection control teams.

**Results:** Epidemiological situation in the studied wards was diverse – HAIs cases were reported in between 6.25% - 26.64% patients hospitalized in these units (for 100 admissions). The highest incidence rates were observed for PN (max. 19.47%). The incidence rates for all forms of infections varied in the broad range between the studied wards: for PN: 0.76%-19.47%, primary BSI: 1.10% - 16.81%, secondary BSI: 0.37% - 7.25% and for UTI: 0.0% - 13.27%.

The most often identified forms of PN were PN-4 and PN-5. Only in two ICUs hospital acquired pneumonia cases were microbiologically confirmed according to PN-1 definition criteria.

**Conclusion:** Presented results point at significant differences in epidemiological situation in individual wards. There were also important differences in the routinely used microbiological methods of PN confirmation.

Introducing HAI-Net recommendations concerning HAIs surveillance in Polish hospitals encounters difficulties connecting with the lack of principles and requirements on the national level.

Disclosure of interest: None declared.

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**P277**

**Point prevalence survey of healthcare-associated infections in Slovakia: from zero to real data**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P277

**Introduction:** Inadequate compliance to surveillance systems and lack of infection control professionals still exist in Slovakia, making it difficult to accurately assess the present burden of health care-associated infections (HAI).

**Objectives:** In this study we presented data from European Centre for Disease Prevention and Control (ECDC) point prevalence study of HAI in Slovakia in comparison with data from Slovak mandatory incidence surveillance systems.

**Methods:** Point prevalence survey of HAI was carried out according to a standardized methodology developed by the ECDC at 40 hospitals in Slovakia providing acute health care in June 2012. Data were collected at the country level, hospital level and the patient level according to standard protocol.

**Results:** From 8397 patients included in the survey, HAI occurred in 298 (3.5%; 2.7% - 4.6%) patients. The highest prevalence of HAI was found on the intensive care units (12.4%). The most common types of HAI were urinary tract infections (26.2%), pneumonia and other lower respiratory tract infections (22.0%), surgical site infections (15.7%), bloodstream infections (9.9%), infections of the eye, ear, upper respiratory tract infections (8.3%) and skin and soft tissue infections (5.2%). The most frequent isolated microorganisms were *Escherichia coli* (15.0%), *Klebsiella spp.* (12.5%) and *Pseudomonas aeruginosa* (10.8%).

More than half of observed patients (60.5%) had at the time of monitoring introduced invasive medical device: central vascular catheter (3.4%), peripheral vascular catheter (40.8%), urinary catheter (41.4%) or were intubated (2.1%). According to data from Slovak mandatory incidence surveillance systems, HAI occurred long time only in 0.5% of hospitalised patients.

**Conclusion:** Improving compliance to surveillance systems of health care-associated infections represents an important and growing challenge in Slovakia. In this setting we urgently need to establish infection control teams in Slovak health care facilities according ECDC standards.

Disclosure of interest: None declared.

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**P278**

**Hospital acquired infection prevalence survey: is there any Franc-Comtois paradox?**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1) P278

**Introduction:** Hospital acquired infection (HAI) prevalence surveys have been conducted in French healthcare facilities (HCF) since 1996. Overall HAI prevalence rate remained steady around 5.0% in France from 2006 to 2012. A decreased by 10.8% was found when a multilevel analysis was applied and contrasting trends were shown: no significant change for short stay hospitalization (from 5.3% to 5.6%) whereas a significant decrease by 21% was observed in the others. In Franche-Comté (FC), from 2006 to 2012, an unexpected increasing HAI prevalence trend by 17.3% (from 5.2% to 6.1%) was observed.

**Objectives:** To assess if the FC HAI prevalence trend is in line with the national trend.

**Methods:** All adult patients in the 10 FC HCF that have participated every year from 2006 to 2013 were enrolled. The outcome was patient infected status. Sets of confounding factors were considered at 2 levels: patient and HCF. Almost factors were dichotomous: sex, immune-compromised status, exposure to invasive device and to surgical procedure, type of stay. Dummy variables were generated for ordinal variables (age, Mac Cabe status, hospital size) taking the lowest category as the reference group and year as a continuous variable. Multilevel analysis was applied using the Poisson regression. Statistical analysis was performed using MiWim software.

**Results:** From 2006 to 2013, 20,629 patients were enrolled. The HAI prevalence rate increased from 4.5% to 6.3% and a crude linear time trend was statistically significant (RR=1.03 95%CI[1.01 – 1.06], p=0.01). For short stay, the linear time trend wasn’t statistically significant (RR=0.98 95%CI[0.91 – 1.06], p=0.59). To be exposed to invasive device (RR=3.65 95%CI[2.44 – 5.47], p<0.01) and to have been exposed to surgical procedure (RR=1.77 95%CI[1.03 – 3.05], p=0.04) were the only statistically significant risk factors. By contrast, in other type of stay, all studied factors were statistically significant as the linear trend and (RR=0.73 95%CI[1.00 – 1.06], p=0.05).

**Conclusion:** FC HAI prevalence trend does not match the national one. The crude linear time trend was statistically significant. To be hospitalized in short stay was associated to a lower risk of HAI whereas to be hospitalized in other type stay was at higher risk.

Disclosure of interest: None declared.
**P279**

Electronic epidemiological query on admission: one year results of an e-health based tool designed to risk assessment and infection control

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**Introduction:** Patients admitted to hospitals represent a threat as they may be infected or colonized by Epidemiologically Important Microorganisms (EIM). Their detection allows screening and isolation procedures and should start early, preferably at Emergency Room (ER).

**Objectives:** Assessment of the results obtained from 1 year of Electronic Epidemiological Query on Admission (EEQA) fulfillment.

**Methods:** EEQA is a 8 question tool obligatory fulfilled at admission. It automatically generates orders (swabs, Cdiff toxin and GDM), isolation procedures, e-mail, and ultimately allows detection of colonization/infection by EIM (MRSA, Carbapenem-resistant Acinetobacter baumannii, VRE), or infection by Clostridium difficile or pulmonary Mycobacterium tuberculosis.

**Results:** On 2014, 13.893 EEQA were fulfilled. 25% resulted positive. Question (Q)1 (Previous hospital or institutional stay of >3 days, or tracheostomy) contributed to 87.4%. Q2 (EIM present on admission) was positive on 7.5%. Q3 (Dialysis, chemotherapy or immunossupressive therapy on the last 3 months) was detected on 10.8%. Q4 (Pulmonary Tuberculosis suspected or confirmed) contributed to 1.4%. Q5 (Confirmed pneumonia caused by Group A Streptoc, Mycoplasma, Adenovirus or H. influenza. Flu, Meningitis... confirmed or suspected) was positive on 0.7% of cases. Q6 (Diarrhea associated with antibiotics administration on the last month, or in the context of contact with other patients with diarrhea, or in patients older than 65y without other cause) represented 3.5%. Q7 (Diarrhea without context defined on question 6, or any exudative wound or drain without containment) was present on 3.1%. Q8 (Post-transplantaplastia) contributed to 0.2% of positive EEQA.

**Conclusion:** EEQA is a simple tool aimed to early detection of high risk patients for infection or colonization by EIM, allowing early and adequate selective screening and isolation procedures according to international guidelines [1], even after micro results are known. This protects healthcare workers, students, other patients and visitors from exposure to these patients, thus minimizing the risk for nosocomial infections.

**Disclosure of interest:** None declared.

**Reference**


**P280**

PDCA cycle reports: a quality tool to improve physician hand hygiene compliance

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**Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)**

**Introduction:** Physician hand hygiene (HH) compliance is often found to be lower than that of nurses in the literature. In our institution HH compliance among physicians was about 40% despite many ongoing activities supported by WHO Multimodal HH Strategy to improve it. In 2013, a HH improvement PDCA (Plan-Do-Check-Act) category was created and the best works awarded at annual institutional Quality Exhibits.

**Objectives:** Describe a strategy aimed at HH physician compliance improvement using a quality tool in 2013 and 2014.

**Methods:** Descriptive study at a private institution with inpatient (650-beds) and six outpatient facilities, where voluntary and multidisciplinary groups developed HH improvement programs engaging patients and healthcare workers (HCWs) using a quality tool cycle – PDCA in 2013 and 2014. There were many strategies and metrics applied, including HH compliance, HH products consumption, HH knowledge and perceptions by HCWs and patients. For HH compliance there was a pre and post intervention measure.

**Results:** In 2013, there were 30 PDCA works from outpatient and inpatient units/facilities, but 13 aimed at physician HH compliance. There were 1159 and 1393 opportunities and mean HH compliance of 35.2% and 54.6% pre and post intervention, respectively. In 2014 there were fewer PDCA works (19) presented and 6 aimed at physician HH compliance: 729 and 534 opportunities and mean HH compliance of 38.8% and 59.4% pre and post intervention, respectively. Engaging patients, HCWs and specially physicians was the main strategy used. The mean institutional HH compliance among physicians was 47.3% and 45.9% in 2013 and 2014 respectively.

**Conclusion:** This strategy aimed at physician HH compliance improvement increased 35.1% and 53% in 2013 and 2014 respectively. Comparing HH compliance post intervention, the mean was higher in 2014, reaching 59.4%. The involvement and commitment of the team members as well as the managers and the coordinators was fundamental for the strategy successful.

**Disclosure of interest:** None declared.

**References**


**P282**

**Nursing schools curricula: good hand hygiene guaranteed?**

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**Introduction:** Hand hygiene compliance is poor among graduated nurses. Hand hygiene behaviour is complex and shows great variation, that can be attributed to the healthcare worker’s educational background.

**Objectives:** The objective was to quantify the level of attention given to hand hygiene in the course curricula of nursing schools in Belgium.

**Methods:** A questionnaire was distributed during the Federal Public Service’s (FPS) Hand hygiene campaign introduction session 2011 for nursing school staff involved in teaching hand hygiene.

**Results:** Response was 100% (n=49). The attending teachers represented 53% of all Belgian nursing schools. With each year of education, HH related knowledge (1st: 98%, 2nd: 49%, 3rd: 29%), attitude and skills (1st: 98%, 2nd: 71%, 3rd: 55%) receive less attention. Competencies are evaluated during clinical practice (90%), by means of written exams (90%), skills tests at school (57%) or ‘other’ (18%). Most popular teaching methods include live demonstration (98%), skills training sessions (71%) and video demonstration (59%). Courses are being held up to date using books (64%), publications of the Superior Health Council (44%), scientific publications (26%) and the FPS HH website (16%). Sixty-one per cent of the study books have not been updated in the past two years. The average time spent on infection control and hand hygiene was respectively 19.68hrs (sd 14.18, min 2 max 64) and 7.07hrs (sd 6.98, min 2 max 25).

**Conclusion:** Hand hygiene education in Belgium shows great variation. Hand hygiene competencies are not systematically acquired nor assessed during the 3-year course. Moreover, teaching and assessment methods show considerable room for innovation.

**Disclosure of interest:** None declared.

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**P283**

**Lessons in hand washing: what we should know?**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P283

**Introduction:** Most communicable diseases are transmitted by hand; from nosocomial to community acquired diseases. Consequently, hand washing is strictly advocated in hospital, eateries and public places where contact by hand is frequent.

**Objectives:** The effect of hand washing in reducing the microbial load of the hand in line with specified hand washing guidelines was determined.

**Methods:** Two categories of volunteers, supervised and un-supervised hand washing were studied and percentage of subjects in each category showing microbial load reduction by 50%, 80% and 99% was recorded. Swab samples were collected with moistened swabs before and after hand washing. Samples were cultured and assessed qualitative and quantitative.

**Results:** Supervised washed hands yielded 93, 75 and 38 percent reduction of microbial load by 50%, 80% and 99% respectively contrast reduction by similar proportion by 68, 15, and 7 percent in the un-supervised washed hands. The difference in reduction of bacterial load in supervised and unsupervised groups was significant (p<0.01). An increase in bacterial load was seen after hand washing in 18-26% of volunteers with higher extreme occurring in unsupervised hand wash. Bacterial that persisted or increased in number following hand washing were Pseudomonas aeruginosa, Klebsiella, spp, Enterobacter spp and Escherichia coli. There was no gender preference but, persons with long nails yielded more microbiota in type and population.

**Conclusion:** Adequate hand washing and the use of germicidal soap may represent the rule in preventing transmission of diseases communicable by hand.

**Disclosure of interest:** None declared.

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**P284**

**Promoting hand hygiene in intensive care: “PICI Licence”**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P284

**Introduction:** Improving hand hygiene (HH) compliance among healthcare workers (HCWs) in ICUs requires innovative, specific and customized strategies.

**Objectives:** To implement an innovative training strategy to improve HH compliance and decrease MRSA attack rates in a large (36 beds) mixed adult ICU.

**Methods:** We used an innovative multimodal approach (“PICI License”) for HH training, based on courses originally designed within the aviation regulation EASA and the risk management program “Air crew”. Efforts, focused on ICUs and HCWs, were built on theoretical as well as practical components and included a video, in which the participant him/herself is placed as a HH observer. Course completion required a final skill/knowledge examination requiring 75% minimum to pass. We monitored HH according to the WHO “My Five Moments for Hand Hygiene” concept. The attack rate of methicillin-resistant Staphylococcus aureus (MRSA) cross-transmission was monitored based on active surveillance screening.

**Results:** Between June 2013 and June 2014, HCWs of the Infection Control program and ICU conducted together 32 training courses. A total of 170/230 (74%) nurses and nursing assistants and 26/32 (81%) physicians followed the training. Skill/knowledge evaluation results were the following: success, 75% or more: 61% (n = 140); partial success, between 75% and 50%: 11% (n = 25); failure, lower than 50%: 5% (n = 11); 20 (10%) staff were reviewed individually. In 2014, 910 opportunities for HH were observed in the ICU; overall performance was 66.2% compared to 64.8% in 2013 (486 opportunities) and 60.4% in 2012 (840 opportunities). The MRSA attack rate decreased in parallel from 2.4 ICU-acquired cases/1000 patient-days in 2012 to 2.3 in 2013, and 1.3 in 2014.

**Conclusion:** ICU staff compliance with HH improved following the proposed multimodal approach, while MRSA attack rates decreased. The program proved to be an excellent example of collaboration between ICU and infection control staff, working together to reduce the burden of ICU-acquired infections.

**Disclosure of interest:** None declared.

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**P285**

**Train the trainers: replicating the message of hand hygiene promotion through the training of national experts, preliminary results**

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**Introduction:** Despite being the most effective preventive measure against health-care associated infections (HAI), hand hygiene (HH) practices are still suboptimal all around the world, with compliance among healthcare workers generally falling below 50% of the opportunities to perform it. One of the potential strategies for HH promotion at national level is to “Train the Trainers”, i.e., to train well-recognized national experts on the implementation of the World Health Organization (WHO) Multimodal Strategy for HH Improvement.

**Objectives:** We aimed to describe the realization of a “Train the Trainers” course, and to evaluate its immediate impact on the participant experts knowledge about HH.

**Methods:** This is a quasi-experimental study based on a questionnaire, applied to all participants immediately before and after the course, which took place in Rio de Janeiro, Brazil, from February 23 to 25, 2015. The questionnaire consisted of 15 multiple affirmatives that should be judged as true or false by responders. Questions addressed HH issues around the use of alcohol-based handrub (n=5), soap and water (n=5), and surgical hand preparation (n=5). McNemar’s test was used to compare the results before and after the training.
Results: A total of 33 infection control practitioners attended the course and completed both questionnaires. Overall, the rate of correct answers was 77.0% before and 89.7% after the course (p<0.001). Regarding handrubbing with alcohol, the rate of correct answers was 88.2% before and 92.1% after the course (p=0.001). Regarding handwashing, the rate of correct answers was 76.4% before and 92.1% after the course (p=0.029). Regarding surgical hand preparation, the rate of correct answers was 70.3% before and 84.9% after the course (p<0.001).

Conclusion: An intensive 3 days course about the WHO Multimodal Strategy for HH Improvement proved to be effective in enhancing the corresponding knowledge of participant experts. Further studies should access the training program effectiveness to improve HH practices at national level.

Disclosure of interest: None declared.

P286
Medical students’ knowledge of the very basic principles of hand hygiene
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Introduction: Performing hand hygiene (HH) procedures by the medical staff is a key element in infections prevention. Proper hand hygiene in all situations requiring its use in the Polish health care-settings is still not perfect. In order to improve this situation continuous education of medical personnel using more effective methods should be undertaken. The first stage of such education is the education of medical students of all specialties.

Objectives: The aim of this study was to examine the state of knowledge of the most basic principles of HH among medical students of Jagiellonian University Medical College.

Methods: The study was performed by the use of an anonymous questionnaire consisting of 14 questions. The questions concerned the basic data related to the field of study, e.g. type of clinical practice and experience, forms of trainings in the field of HH and HH knowledge. Total number of 414 completed questionnaires was analyzed. The study was conducted from October to December 2014, among medical students of different specialties. Statistical analysis of the categorical variables was performed using the chi-square test, for the remaining variables - Mann-Whitney and Kruskal-Wallis tests.

Results: The correct answer to the question about the situation in which HH is necessary was given only by 52.9% of respondents. The correct answer to the question on the choice between hand disinfection and washing, depending on the situation, was given only by 6.5% of respondents. The percentage of correct answers to the questions mentioned above was significantly higher in the group of medical students of the more advanced course. There was no correlation between the duration of clinical practice, or work experience in health care, and knowledge of the principles of HH. As many as one in five respondents declared that clinical practices were not preceded by any training on hospital hygiene.

Conclusion: The results of this study indicate a basic lack of knowledge in the field of hand hygiene procedures among medical students. Survey results reflect in particular the lack of well-established beliefs of Polish medical staff concerning hand disinfection with alcohol-based hand-rubs. Both, education within the subjects realized in the course of study, and during the clinical training, require improvements, including the implementation of more effective methods.

Disclosure of interest: None declared.

P287
The effects of immediate and delayed feedback on hand hygiene compliance
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Introduction: Audit and feedback is widely used as a part of a multimodal strategy to improve hand hygiene (HH) compliance. Few studies have investigated the effect of different feedback strategies.

Objectives: To compare delayed versus immediate feedback.

Methods: A prospective 5-step interventional study was conducted between 2012-2014 in 2 pediatric intensive care units (PICU and HPICU) at a tertiary medical center in Israel. The intervention steps included (1) baseline observations (2) training (3) providing delayed feedback in PICU versus both delayed and immediate feedback in HPICU (4) providing immediate feedback in PICU (5) final assessment stage. HH observations were conducted according to the 5-moment HH model. A Mixed Linear regression analysis was used to examine the models with repeated measurements. Each stage was defined relative to the baseline stage in 5 moments. In addition, each stage was defined in comparison to the previous stage.

Results: A total of 8,159 observations were completed during the study period. HPICU HH compliance increased from 33.4% in the baseline stage to 71.8% at the final stage; PICU HH compliance increased from 30.92% to 67.1%. When each stage was compared to the baseline, HH compliance rates of all WHO’s 5-moment were significantly improved (p<.0001).

Assessment the impact of each step showed that only immediate feedback was associated with a significant increase in HH compliance before clean/aseptic contact (HPICU 16.3% (step 2) versus 45.0% (step 3); PICU 25.8% (step 3) versus 48.4% (step 4), p<0.001).

Conclusion: Implementation of a multifaceted intervention was associated with sustained improvement in HH adherence. Delayed feedback contributed to a slow but gradual increase at all stages, while immediate feedback contributed to a significant increase in HH compliance before clean/aseptic contact.

Disclosure of interest: None declared.

P288
The role of direct feedback in improving hand hygiene technique
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Introduction: Electronic equipment helps to improve hygiene-related behavior giving instant feedback concerning the quality of hand hygiene performance.

Objectives: This study was designed and conducted to analyze the lasting effects of instantaneous objective feedback to the staff regarding the hand rubbing technique.

Methods: Our study involved 9 wards from 3 hospitals and was based on Hand-in-Scan Medical Trainer device that employs digital imaging and computer image processing to identify all missed areas on the hand, and display them unambiguously to the healthcare worker. The equipment was present for 3-4 weeks. Participants were identified with RFID card and had the opportunity to use the device once every day. A total of 572 measurements were performed involving 129 healthcare workers.

Results: The surface of hand was divided into 20 regions for clustered evaluation. For each measurement, the number of missed spots in each region was compiled by an expert based on recorded images. Performances were classified as correct or erroneous based on the total number of mistakes. Our study showed that average number of mistakes dropped significantly between the first and the second hand rubbing occasion. Another relevant improvement was detected when we compared the outcome of the 2nd–4th occasions (clustered) with the 5th–10th ones (clustered). Considering all records, the baseline value 1.5 of average number of mistakes dropped to 0.35 after five hand rubbing events.

Conclusion: Direct feedback of Hand-in-Scan device supports correcting wrong practices and eliminating erroneous habits. During 3–4-week-long follow-up studies, the average number of missed spots on the hands reduced significantly at every site.

Disclosure of interest: None declared.
P289
Implementation of an interactive training module on hand hygiene
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P289

Introduction: In most cases, hands of caregivers are the vehicle for the transmission of germs to the patient. Therefore, it is crucial to help medical staff and healthcare workers acquiring the skills necessary for optimal hand hygiene (HH) in order to ensure quality of care and patient safety.

Objectives: To give the caregivers a training tool well adapted to their needs and integrated into a blended learning (class and distance).

Methods: The Hygiene Prevention and Infection Control (HPCI) Unit - Vaud, the Preventive Medicine Service of Center Hospital Universitary of Vaud (SMPH) in partnership with the collective of the Federarion of Vaud Hospital, the Commission e-learning of University to Lausanne, the Center for Education and Audiovisual Communication, have developed an interactive training module of HH in 3 steps.

Conception: - Identification of the academic content.
- Development of a teaching strategy fitted to any learning styles.
- Selection of the interactive teaching resources.

Development: - Development of academic learning content.
- Development of practical content (care situations cut out in various interactive e-lessons).
- Tutorial construction (integration of multimedia elements and interactivity).

Implementation: - Module overview by infection control professionals in Vaud institutions.
- Module provision through training platforms (Moodle, MyTeacher).
- The Module is freely accessible on the internet.

Results: After a brief theoretical reminder (common to all healthcare workers), the module content covers aspects of skills through simulation exercises. Care situations are specific for each category of professionals (doctors, nurses). Throughout the course, a knowledge assessment evaluates the benefits of training.

Conclusion: The training module meets the predefined goals. This e-learning module broadens infection control class offer and is part of the five areas of the WHO multimodal HH strategy. The educational effectiveness will be evaluated after 9-12 months by a query filled up by the caregivers, by the participation rate, and by reality in practice (assessed during audits).

Disclosure of interest: None declared.

P290
The role of parents on hand hygiene promotion in the pediatric setting
– a systematic review
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P290

Introduction: The parental instinct of offspring protection has evolved and perpetuated for millennia across a wide range of species. When a child is sick and particularly when it is hospitalized, parents and other caregivers have to share their natural and social role of child protection with the healthcare workers. This may create conflict but also the opportunity for establishing a partnership between all actors in favor of delivering safe care to the child. One of the main issues on that partnership is the promotion of hand hygiene (HH) because both parents and healthcare workers must respect HH, which is considered the most effective preventive measure against health-care associated infections (HAI).

Objectives: We aimed to review the scientific evidence available about the parents’ participation in hand hygiene promotion in the pediatric setting.

Methods: We performed a systematic search in Pubmed using the following search term: [(“hand hygiene” OR “hand wash” OR “hand rub”)] AND (“caregiver” OR “parent” OR “mother” OR “father” OR “family”), All quantitative and qualitative studies addressing the role of caregivers in HH promotion and published until 31 December 2014 were eligible.

Results: We found 86 articles in the system, but only 5 original articles addressed the study question. All studies were observational and used questionnaires or interviews. Their main findings were as follows: most parents are aware about the risk of HAI; parents recognize HH as a relevant tool for HAI prevention; their knowledge on the HH indications (“5 moments”) and on the efficacy of alcohol-based handrub was variable, however, as well as their willingness to remind healthcare workers about a HH opportunity when HH was not performed. One study found that parents felt more prone to actively intervene on HH promotion if they received a formal invitation to do so from healthcare workers.

Conclusion: Literature on the subject is very scarce and we found no randomized clinical trial addressing it. Parents’ promotion of HH should be further explored by research as a potential intervention for enhancing patient safety on the pediatric setting.

Disclosure of interest: None declared.

P291
Patient empowerment in hand hygiene
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Introduction: Patient empowerment is an integral part of the WHO hand hygiene multimodal strategy. In spite of the usage of educational tools and reminder, the participation rate of patients in hand hygiene programs remains very low in wards.

Objectives: To investigate the reasons of low participating rate in hand hygiene practice in Chinese patient group during their hospital stay.

Methods: A survey was conducted from April 2013 to March 2014. A total of 952 orthopedic patients/family members, age 12 to 79 years old were interviewed. They have to answer the four simple questions and the reason for their answers.

1. Do you think hand hygiene is an important practice within the hospital? Why?
2. Would you request the attending doctors or nurses to clean their hands before approaching you? Why?
3. Is it difficult to ask doctors or nurses to perform hand hygiene? Why?
4. Do you find the hand hygiene poster and educational pamphlet useful? Why? These collected data will then be analyzed by our infection control nurses.

Results: 94% of the interviewee did not think hand hygiene was an important practice in the general ward. 90% of the interviewee expressed they would not request health professionals to practice hand hygiene. 99% of the interviewee said it is difficult to ask professionals to practice hand hygiene.80% of the interviewee thought that the hand hygiene educational material was not useful to them.

Qualitative analysis identified the following main points: Patient empowerment programs remains very low in wards. 90% of the interviewee expressed they would not request health professionals to practice hand hygiene. 99% of the interviewee said it is difficult to ask professionals to practice hand hygiene.80% of the interviewee thought that the hand hygiene educational material was not useful to them.

Conclusion: Although patient’s engagement in hand hygiene is appealing, a few points need to be addressed when planning patient empowerment programs. Furthermore, the patient educational material should be simple and focus on patients more so that the message can be delivered to patients easily. Therefore, higher engagements rate in hand hygiene practice can be achieved.

Disclosure of interest: None declared.
**P292**

**Message to the caregivers: communicating to patients on hand hygiene improves your practices!**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

**Introduction:** Since 2012, in order to improve caregivers-to-patient information and awareness about hand hygiene (HH), a communication campaign has been launched in healthcare facilities (HCF). The patients have been systematically informed of practices which are recommended during cares.

**Objectives:** To identify and characterize changes in caregivers HH practices after patient information.

**Methods:** In 2013 and 2014, an evaluation of caregivers HH changes was proposed to voluntary HCF. In the participating services, reporting was organized for caregivers using standardized questionnaire including different HH possible changes: better HH compliance, systematic use of handrub products, withdrawing hand jewelry.

**Results:** A total of 22 HCF participated in the study. The questionnaire was completed by 269 caregivers (115 nurses, 105 nurses aides and 49 others professions), of whom 32% declared no need to change because they were already following recommendations and 49% reported having changed at least one practice. No change in HH practices was declared by 18% of the caregivers. Among caregivers who changed their HH practices (n=132), 63% (n=83) used more systematically handrub products, 58% (n=76) increased their HH compliance and 34% (n=45) withdrew their hand jewelry. The global proportion of HH changes was not different in nurses and aides but differences were found by profession for the reported changes.

**Conclusion:** After the patient information on hand hygiene, half of participating caregivers have declared a change in their HH practices. However, the sustainability of the changes remains to be verified. This study could be supplemented by observations of practice or a measure of the hand-rub consumption to confirm these encouraging results.

**Disclosure of interest:** None declared.

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**P293**

**Alcohol-based hand rub consumption surveillance in German hospitals – latest results**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

**Introduction:** HAND-KISS is a unit-based surveillance system of alcohol-based hand rub consumption (AHC). It is part of the German national nosocomial infection surveillance system (KISS).

**Objectives:** We analyzed the development in AHC between 2007 to 2014.

**Methods:** Participating hospitals transfer data on patient days and AHC per unit once a year to HAND-KISS. The system calculates the data as AHC in milliliter (ml) per patient day (PD) stratified by unit type (intensive care units (ICU) and non-ICU) and specialty (medical, surgical, pediatrics, neonatal etc.). The distribution of all participating wards are published annually as HAND-KISS reference data.

To evaluate AHC changes over the years, we selected all hospitals and wards which continuously provided surveillance data over the whole period of 8 years. For all ICUs and non-ICUs we estimated the median AHC (interquartile range, IQR) for every year and compared the results.

**Results:** 188 hospitals with 334 ICUs and 1,954 non-ICUs transferred AHC data for 2007 (6,045 hospitals, 890 ICUs and 6,063 non-ICUs for 2014) in 101 hospitals with 130 ICUs and 760 non-ICUs continuously provided surveillance data over a period of 8 years. In 2007, the median AHC in the ICUs was 69 ml/PD (IQR, 52 ml/PD - 95 ml/PD), and in 2014 the result was 115 ml/PD (IQR, 84 ml/PD - 140 ml/PD) corresponding with an increase of 54%. The median AHC on non-ICUs was 15 ml/PD (IQR, 12 ml/PD - 18 ml/PD) in 2007 and 26 ml/PD (IQR 26 ml/PD - 32 ml/PD) in 2014 corresponding with an increase of 83%. The hospital-wide progression is 81%.

**Conclusion:** HAND-KISS is widely accepted in Germany. It is an established benchmarking tool to characterize hand hygiene behavior in an individual hospital.

**Disclosure of interest:** None declared.

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**P294**

**Use of hand hygiene agents as a surrogate marker of compliance in hungarian long-term care facilities: first nationwide survey**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

**Introduction:** Hand hygiene practice is an important measure for preventing infections in long-term care facilities (LTCFs). However, low compliance with hand hygiene has been reported in a number of studies.

**Objectives:** The purpose of this study was to provide an overview of the first reference data collected on alcohol-based handrub (ABHR) and antisepic soap consumption, as surrogate markers for hand hygiene compliance by healthcare workers (HCWs) in Hungarian LTCFs. The objective was to inform stakeholders on the need of hand hygiene improvement in these settings.

**Methods:** Between 5 May and 30 September 2014, we conducted a nationwide, cross-sectional survey using a standardized self-administered questionnaire; all Hungarian LTCFs were eligible. The Statistical Package for Social Sciences (SPSS) version 20.0 was used for data analysis.

**Results:** The questionnaire was completed by 354 LTCFs, representing 24% of all Hungarian LTCFs. In total, the median consumption of ABHR and antimicrobial soap was 15.5 L (IQR, 0-800 L) and 60 L (IQR, 0-1,680 L) per LTCFs annually, and 2.2 ml (IQR, 0.4-9.1 ml) and 12.1 ml (IQR, 0.7-32.8 ml) per HCWs per day in 2013, respectively. The estimated number of hand hygiene actions was 0.6 hygienic handrub/HCW per day (IQR, 0-12.8/HCWs) and 2.4 hygienic handwashing/HCW per day (IQR, 0-21.9/HCWs; P<.001), respectively.

**Conclusion:** This study suggests that non-compliance with hand hygiene is a significant problem in Hungarian LTCFs. Based on our results, there is an urgent need for a nationwide multimodal hand hygiene promotion strategy including education and performance monitoring and feedback in all LTCFs. Furthermore, monitoring of ABHR consumption constitute an additional component of the existing National Nosocomial Surveillance system.

**Disclosure of interest:** None declared.

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**P295**

**Measuring alcohol-based hand rub volume used by healthcare workers in practice**

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1)

**Introduction:** Recent hand hygiene (HH) research has focused largely on adherence to defined HH indications specified in global and national guidelines. Research focused on quality of HH events has been limited. A critical variable impacting the quality of hand disinfection is the volume of alcohol-based hand rub (ABHR) applied during a single HH event (i.e.application volume or AV). It may be assumed that healthcare workers (HCWs) use AVs recommended by manufacturers; however, HCWs typically are able to control AV. Manufacturer recommendations for AV of ABHR vary based on local requirements with typical recommendations varying from 1 ml to 5 ml. To date, little data exists on actual ABHR AVs used in clinical practice.
Objectives: Determine the mean AVs of an ABHR used by HCWs during routine clinical practice.

Methods: Personal carriage bottles (125 mL) with lids engineered to count each ABHR use were used by 19 HCWs from five wards over three shifts in an acute care hospital. The bottles contained the WHO ethanol formulation. The mass of each bottle was measured before and after each shift and the number of use was recorded after each shift. The total volume of ABHR used by each HCW during a shift was calculated by dividing the total mass used by the density of the product (0.8607 g/mL). The mean AV was determined by dividing the total volume by the number of ABHR uses recorded. Data was analyzed by ANOVA with nested random effects.

Results: The mean AV of ABHR used by each HCW per shift ranged from 0.27 mL to 1.61 mL per use. The overall mean AV was 0.73 mL (±0.364 SD). The mean AVs were statistically significantly different among the five wards that participated (p = 0.0118). The number of HH events from personal carriage bottle per HCW over a shift ranged from 2 to 78 with a mean number of 22 (median 18).

Conclusion: The results of this study suggest that ABHR AVs used by HCWs are lower than manufacturer recommended volumes. Such practices may have a negative impact on ABHR effectiveness in clinical practice. More extensive studies are needed to understand whether the tendency to use AVs below recommended volumes is widespread, the factors influencing volume preference, and the impact of such practices on antimicrobial product effectiveness.

Disclosure of interest: None declared.

P297

Introduction: Hand hygiene (HH) is the single most important factor in the prevention of health care-acquired infections. Comprehensive monitoring of hand hygiene compliance is considered integral parts of a successful hospital infection control program. However, measuring adherence to hand hygiene guidelines is resource intensive and complicated by lack of standardized methodology.

Objectives: Our aim was to survey the methodologies used to measure hand hygiene guidelines across different Indian hospitals.

Methods: The survey was conducted in person among infection control professionals working in different Indian hospitals (one per institution) using questionnaire developed based on WHO hand hygiene guidelines during their participation in international infection control conference held in India during the month of March 2015.

Results: Infection control professionals representing 26 Indian hospitals (different types) participated in the survey. In India HH was measured mainly due to quality imitative (11/26 42.30%) or part of accreditation (10/26 38.46%) requirement. The ICs monitor HH majority of the time (24/26 92.30%), they focus mainly on monitoring adherence to 5 HH moments (15/26 57.69%) and monitor during the day time (22/26 84.61%). Once in a month (12/26 46.15%) and direct observation 22/26 (84.61%) was the preferred mode of monitoring in India.

Conclusion: Majority of Indian hospitals monitor compliance to HH guidelines, however comprehensive monitoring of all aspects of HH was missing in many of the hospitals. Clearly, further research to develop efficient, reliable, and comprehensive methods for monitoring hand hygiene compliance is urgently required in India.

Disclosure of interest: None declared.

P298

Introduction: 24/7 electronic monitoring of hand hygiene (HH) product use enables the accurate assessment of HH compliance and behavioural patterns in a facility ward pre and post intervention. One such intervention being an increase in HH product accessibility.

Objectives: Assess the impact on HH behaviour of adding ABHR at point of patient care.

Methods: A group HH surveillance system was installed in a surgery ward such that all existing wall mounted Soap & ABHR dispensers were monitored. Dispensers were located at the entrance to patient rooms and over the sinks within. Data was not made visible to the ward staff to ensure that behaviours were unaffected.

Following a baseline period of 70 days, portable ‘point-of-care’ ABHR dispensers were added at the end of the patient beds and the impact on HH compliance and dispenser usage patterns was assessed over a further 70 day intervention period.

Results: During the baseline period the average daily calculated compliance was 23% (compared to an average of 65% in the presence of an observer).
During the intervention period the average daily calculated compliance was 26%.

Analysis of the 13% increase in HH compliance revealed a reduction of 2% in HH events taking place in the hallway compared with an in-patient room increase of 34%.

Conclusion: The work demonstrates that positive change in group behaviour can be affected by improved HH product access, with both an increase in overall HH compliance and a shift in the number of HH events taking place within the patient room, consistent with WHO 5 Moments teaching.

Disclosure of interest: None declared.

P299
Comparison of hand hygiene opportunities (HHOs) between a us study and in acute care facilities in three other countries

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Introduction: There is a lack of published data on HHOs/patient/day across countries. While HH compliance rates are often published based on observations by auditors, some recognised disadvantages are training required, valuable hours to collect representative samples and the Hawthorne effect. Emerging technologies have potential to improve data reliability, timeliness and density. A key challenge is to establish an accepted “denominator” (HHOs) in the compliance equation.

Objectives: Our aim was to establish the average HHOs/patient/day in a variety of acute care facilities in Australia, Netherlands and United Kingdom based on the WHO 5 Moments for HH recommendations.

Methods: Australia: 24-hr expert observations of HHOs were made in 2 wards for 7 days. HHOs/patient/day were averaged for both wards, tested for difference and aggregated. Aggregated average HHOs/patient/day were adjusted for care level using patient:nurse ratio and weighted for auditor bias.

Netherlands: Case patients were followed for 7 days to directly observe HHOs/patient/day. Data were tested for difference and averaged.

UK: Commonly performed care scenarios, “virtual patient/HCW observations”, were gathered from a range of wards in 3 hospitals and aggregated into typical care-days representative of patient type by care level to generate HHOs/patient/day. Selected expert observations were completed to validate results.

Average HHOs established from a USA study were then compared against the results from the 3 countries.

Results: In all 3 countries average HHOs/patient/day were in the range 50-85. Patient:nurse ratios in all 3 countries fell in the range 3.5. All results compared closely with the USA study findings.

Conclusion: Our work indicates that in acute care facilities in the 3 countries studied and USA, HHOs/patient/day is similar and driven by the prevalence of standard infection control ratio as a universal indicator of patient care level. This novel information provides valuable insight and allows emerging technologies that use HHOs as a denominator in a compliance equation to be considered for use in different developed countries where facilities and practices are similar.

Disclosure of interest: None declared.

P300
Comparing traditional audits with electronic measurements: bringing a new perspective to measurement of compliance with hand hygiene protocols

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Introduction: Manual auditing has long been considered as the gold standard for measuring concordance with hand hygiene protocol. Until recently, it could be argued that it was the only valid methodology available. This is despite the fact that self-auditing has long been deemed to be unreliable, and even “Secret Shopper” audits have been found to produce biased results due to variances in the methodology used and to the Hawthorne Effect[1].

In the UK NHS, compliance rates >90% are widely reported [2], leading Trust management to believe that hand hygiene is under control and no additional time or money will be spent improving practice. Electronic monitoring systems are available, which due to their different methodology, provide alternative yet complementary results.

Objectives: To compare results reported to Trust Management and audits to those obtained from ECM to understand how they interrelate and to gain new insights into hand hygiene compliance.

Methods: Trust results and “Secret Shopper” audit results were compared against the ECM data, and audits recorded using a smartphone-based system that feeds results directly to the ECM. This allows a comparison between the Wash-in, Wash-out methodology of the ECM and the 5-moments of the long-duration manual audits.

Results: Short-duration audits were slightly lower than the >90% reported to Trust Management. ECM results were found to be significantly lower, typically <20%.

Conclusion: By using a different methodology, ECM offers a different perspective on the issue of hand hygiene compliance. Whilst it will never replace manual auditing, it does provide an alternative view to the rose-tinted compliance figures that are often used and provides unique data that can be used in training / education, evaluation and feedback, and as reminders in the workplace, as part of the WHO Multimodal Hand Hygiene Improvement Strategy.

Disclosure of interest: None declared.

References

P301
Non-compliance of hand hygiene using covert and overt methodology among healthcare workers at a tertiary care hospital in Saudi Arabia

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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P301

Introduction: Hand hygiene (HH) is a core element in preventing healthcare-associated infections and the spread of antimicrobial resistance. Although the benefits of HH are non-controversial, the HH compliance is still suboptimal. The degree of HH compliance is thought to be affected by the awareness of healthcare workers (HCWs) of being monitored.

Objectives: To estimate the frequency of HH non-compliance using covert methodology and to compare such frequencies to corresponding traditional HH surveillance from the same locations and time periods.

Methods: A cross-sectional study design was conducted at King Abdullah Medical City, Riyadh, Saudi Arabia, between October 2012 and July 2013. Non-compliance was defined as missing both hand rubbing (with alcohol-based formulation) and hand washing (with soap and water) during one of the WHO five-moment HH indications (opportunities). Observations were conducted quietly without attempts to promote HH compliance or provide performance feedback to HCWs.

Results: A total of 6580 opportunities were observed among different professional categories in 28 hospital locations. The overall non-compliance from the current study was 54.1% compared with 12.9% in traditional HH surveillance (p<0.001). The same significant trend was replicated by professional category (53.1% vs. 10.2% in nurses, 53.8% vs. 19.6% in physicians, and 57.1% vs. 3.2% in other HCWs), service locations (54.3% vs. 8.6% in intensive care and step-down units, 51.8% vs. 14.1% in inpatient wards, and 58.2% vs. 16.0% in emergency locations), and HH indications (47.5% vs.10.5% in pre-contact with patients, 60.1% vs.10.5% in post-contact with patients, 57.3% vs.2.7% in post-exposure to body fluids, 68.5% vs.5.6% in before aseptic tasks, and 49.8% vs.17.5% in post-contact with patient surroundings).

Disclosure of interest: None declared.
Conclusion: Major differences in non-compliance were detected during covert and overt HH monitoring irrespective of hospital location, professional category, and indications. Overlapping methods of auditing and frequent change of data collectors may reduce the underestimation of non-compliance.

Disclosure of interest: None declared.

P302 Should alcohol-based handrub volume be customized according to the size of healthcare workers’ hands?
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P302

Introduction: Hand hygiene promotion is the most important tool to prevent health-care associated infections. While hand hygiene compliance has been well studied and promoted for the last 20 years, less attention has been devoted to study the quality of hand hygiene action.

Objectives: We aimed to evaluate the amount of alcohol-based handrub (ABHR) needed to ensure appropriate hand antisepsis, depending on the healthcare workers (HCW) hand size.

Methods: This was an experimental study based on the microbiological laboratory, evaluating 15 healthy HCWs with different hand sizes performing hand hygiene following the World Health Organization (WHO) recommended sequence, with 6 different volumes of 2-propanol 60% hand rub. According to the European Norm 1500 (EN1500) standard, bacterial count was measured on the HCWs’ finger tips at baseline, after one friction without ABHR, then after each application of ABHR from 0.5mL to 3mL. The primary outcome was the log10 reduction measured after each ABHR application. Generalized linear mixed models were performed to analyze the results.

Results: Among the 15 participants, 10 were female (66.7%), 4 had small hands, with a mean (±SD) hand surface area (HSA) of 332.9 ± 22.2cm², 6 had medium size hands (mean HSA= 404.2 ± 97.6cm²) and 5 had large hands (mean HSA= 473.2 ± 40.4cm²). The log10 reduction was significantly decreased for each supplemental 0.5mL of ABHR (0.28 log10; 95%CI: 0.23 to 0.34, p<0.001) after adjustment on hand size and baseline log10 count. The log10 reduction was significantly lower for large hands compared to small hands (-1.19 log10; 95%CI: -1.61 to -0.76, p<0.001), and significantly lower for medium hands compared to small hands (-0.57 log10; 95%CI: -0.98 to -0.15, p=0.007). HCWs with large hands achieved a mean reduction of only 1.42 log10 ± 1.31, after rubbing their hands with 3mL of ABHR.

Conclusion: These results suggest the need of customizing the volume of ABHR used for hand hygiene, according to the size of the HCWs’ hands, for ensure appropriate hand antisepsis and patient safety.

Disclosure of interest: None declared.

P303 Relationship between hand size, volume of alcohol-based handrub and time needed to dry hands. An experimental laboratory-based study
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P303

Introduction: Quality of hand hygiene action is key to improve the effectiveness for health-care associated infection and antimicrobial resistance spread prevention. One of the parameters for quality is the volume of alcohol-based handrub (ABHR) used. The question around the possible need for customizing the volume of ABHR used to the hand size remains open.

Objectives: To assess the relationship between the volume of ABHR used and the time needed to dry hands depending on hand size.

Methods: Experimental study among a sample of healthy healthcare workers (HCW) trained to hand hygiene performance according to the WHO sequence. Six volumes of ABHR were tested (from 0.5mL to 3mL) and HCW were asked about their perception to obtain dry hands during the handrubbing sequence. Primary outcome was the acquisition of dry hands related to time of observation in seconds which was censored at 30 seconds. Due to clustered data, a shared frailty regression Cox model was performed.

Results: Fifteen HCW were included (10 women; 66.7%). Four had small hand size (median surface hand 338.1 cm²), 6 medium (403.4 cm²) and 5 large (479.0 cm²). We collected 90 measurements from 15 HCW. After 30 seconds, only 35/90 hands (39%) were perceived as dry. Overall, median time described by HCW to obtain dry hands was 18 seconds (interquartile range 15-24). Acquisition of dry hands was significantly decreased for each additional volume of 0.5mL. ABHR (hazard ratio, HR 0.14; 95%CI: 0.08-0.24, P<0.001) after adjustment on the hand size. Acquisition of dry hands was also significantly increased by hand size (P=0.03) with a higher HR for large compared to small hands (7.36; 95%CI: 1.64-33.06, P=0.009) and for medium compared to small hands (4.77; 95%CI: 1.10-20.56, P=0.036). There was no difference regarding the acquisition of dry hands between medium and large hands (P=0.486).

Conclusion: Perception of dry hands was significantly associated with the volume of ABHR used but also with the hand size. These results suggest the need for customizing hand hygiene duration with ABHR application according to HCW hand size but to keep also a sufficient volume of ABHR to ensure efficient antiseptic.

Disclosure of interest: None declared.

P305 Do international standards for hygienic handrubs reflect realistic usage?
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Antimicrobial Resistance and Infection Control 2015, 4(Suppl 1):P305

Introduction: Hygienic handrubs are widely used in healthcare to reduce the probability of pathogens being spread via the hands. International standards such as EN 1500[1] have been developed to ascertain the efficacy of handrubs claiming antimicrobial action. This standard compares a reference product (2 x 3ml applications of 60% v/v isopropanol IPA over 60 seconds) with a test product(s). However, as WHO guidelines[2] recommend that drying times are limited to 30 seconds, does the standard represent realistic usage?

Objectives: This study compares the volumes of alcohol-based hand rub (ABHR) applied with drying time, antimicrobial efficacy and user acceptability. The ABHR’s studied are 60% v/v IPA and the two WHO – recommended handrub formulations, i.e. 80% v/v ethanol and 75% v/v IPA, both of which contain 1.45% v/v glycerol.

Methods: Fifteen volunteers were recruited to test six volumes of the three ABHR’s, ranging from 0.5ml to 3ml. The drying time and user acceptability were recorded. Five volunteers were then selected to test the same volumes in the manner of an EN 1500 test. The log10 reduction factor (RF) in E. coli K12 was calculated, in addition to whether the volunteers’ hands were dry at the end of the procedure.

Results: Both RF and drying time significantly increase as the volume of ABHR increases (p<0.05; Friedman test). The user comments also displayed a significant relationship with volume (p<0.05, η² test), with the majority of comments negative at 3ml. In the EN 1500 – style test, only the two smallest volumes dried fully for all ABHR’s (p<0.05, η² test).

Conclusion: EN1500 was not originally designed as a means to define product dosage; however this is increasingly becoming normal practice. Our data reinforce the need for standards to more accurately reflect the volumes of handrubs that are used in practice. One possible solution involves two-tiered standards, that test both high volume / long drying times and low volume / short drying times, thus allowing formulations to be tested against a reference product under both ideal and realistic conditions.

Disclosure of interest: None declared.

References
1. EN 1500:2013 Chemical disinfectants and antiseptics - Hygienic handrub - Test method and requirements (phase 2/step 2).
Comparison of hand hygiene antimicrobial efficacy: Melaleuca alternifolia essential oil versus triclosan versus chlorhexidine

Introduction: The antimicrobial effects of essential oils have been reported in the scientific literature, especially regarding the essential oil of Melaleuca alternifolia, also known as tea tree essential oil (TTO). This essential oil has antiseptic properties and can represent a natural-product alternative for hand hygiene in healthcare settings which currently use mainly products based on triclosan and chlorhexidine.

Objectives: To evaluate the antimicrobial efficacy in hand hygiene performed using three distinct soaps containing 2.0% Melaleuca alternifolia essential oil; 0.5% triclosan; 2.0% chlorhexidine.

Methods: Was applied the methodology of the European Committee for Standardization, EN1499 version April 2013, indicated to evaluate the efficacy of antiseptics for hand hygiene. The hands of 15 healthy volunteers were artificially contaminated with Escherichia coli K12 and then the hands were washed with each of the products being assessed or the reference soap (soft soap). The number of microorganisms was counted before (pre-values) and after (post-values) each procedure and microbial logarithmic reduction was performed for each of the participants in each procedure. Data were analyzed using two non-parametric tests: Wilcoxon test and Friedman test. Level of significance p=0.01 one-sided.

Results: When the Wilcoxon test was applied, the three test products showed to be superior to soft soap (chlorhexidine, p=0.003, triclosan and TTO p<0.001), whereas the soaps containing triclosan or TTO were superior in efficacy to soap containing chlorhexidine. When Friedman’s test was applied, products that showed superior efficacy when compared to the soft soap were those containing 0.5% triclosan (p<0.001) and 2.0% TTO (p<0.001) and when efficacy was compared between the products, the three were equivalent, with no superiority between them.

Conclusion: When the Wilcoxon test is used, the three soaps can be considered antimicrobial, with the soaps containing 2.0% TTO and 0.5% triclosan being superior to the soap with 2.0% CHX. If Friedman’s test is used, only the 0.5% triclosan soap and the soap containing 2.0% TTO can be considered antimicrobial and both showed similar antimicrobial efficacy.

Disclosure of interest: None declared.

Suitability of enterococcus faecalis as a test organism to evaluate in vivo efficacy of alcohol-based handrubs

Introduction: The World Health Organization has called for development of improved methods to evaluate efficacy of hand hygiene products that more closely reflect practical use patterns and have success criteria tied to clinical benefit. The test organisms should represent pathogens with environmental stability known for their potential to be spread by contaminated hands.

Objectives: Determine the suitability of a non-pathogenic Enterococcus faecalis strain as an alternative to Escherichia coli for in vivo efficacy evaluation of alcohol-based handrubs (ABHR).

Methods: Overall methodology based on European Norm 1500:2013. Test organisms were E. faecalis (ATCC 47077) or E. coli K12 (NCTC 10538). Hand contamination was performed by either the immersion method from EN 1500 or spreading 0.5 mL of a high titer suspension over all surfaces of both hands (based on ASTM E2755). Subjects performed a reference procedure according to EN 1500. Testing was conducted at two laboratories using E. faecalis and one facility using E. coli.

Results: Mean log pre-values (PV) for E. faecalis contamination by immersion were 6.56±0.27 and 6.29±0.60 and mean log reduction factors (RF) were 5.68±0.92 and 4.63±0.26, at the respective labs. Mean log PV for E. coli contamination by immersion was 5.38±0.55 and mean log RF was 4.61±0.74. Mean log PVs for E. faecalis contamination by high titer were 5.78±0.40 and 6.82±0.09 and mean log RFs were 5.03±0.91 and 5.16±0.56, at the respective labs. Mean log PV for E. coli contamination by high titer was 4.76±0.52 and mean log RF was 3.86±0.95. E. faecalis yielded PVs that exceeded E. coli PVs by ~1-2 log units using either mode of contamination suggesting greater survival during hand drying.

Conclusion: E. faecalis demonstrates strong potential as a test organism that represents a pathogen with high environmental stability known to be spread by contaminated hands in healthcare settings. Additionally, the low-volume contamination procedure is simpler to execute and more closely mimics the condition of hands when ABHR use is indicated in clinical settings (e.g. minimally soiled and fully dry). Further studies are needed to finalize the method and better understand the sensitivity of E. faecalis to alcohols to ensure it differentiates product performance similar to E. coli.

Disclosure of interest: None declared.
<table>
<thead>
<tr>
<th>Oral Presentations</th>
<th>Final Identifier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wednesday 17 June 2015</strong></td>
<td></td>
</tr>
<tr>
<td>Antimicrobial stewardship</td>
<td>O1 - O3</td>
</tr>
<tr>
<td>Susceptible and resistant <em>Staphylococcus aureus</em></td>
<td>O4 - O9</td>
</tr>
<tr>
<td>Ebola virus disease</td>
<td>O10 - O16</td>
</tr>
<tr>
<td>Implementation academy (slide session)</td>
<td>O17 - O21</td>
</tr>
<tr>
<td>Catheter-related infections</td>
<td>O22 - O26</td>
</tr>
<tr>
<td><strong>Thursday 18 June 2015</strong></td>
<td></td>
</tr>
<tr>
<td>Surgical site infection</td>
<td>O27 - O32</td>
</tr>
<tr>
<td><em>Clostridium difficile</em> infections</td>
<td>O33 - O39</td>
</tr>
<tr>
<td>Multidrug resistance in Gram-negative organisms</td>
<td>O40 - O44</td>
</tr>
<tr>
<td><strong>Friday 19 June 2015</strong></td>
<td></td>
</tr>
<tr>
<td>Hand Hygiene</td>
<td>O45 - O51</td>
</tr>
<tr>
<td>Outbreaks</td>
<td>O52 - O54</td>
</tr>
<tr>
<td>Costs of HCAI</td>
<td>O55 - O56</td>
</tr>
<tr>
<td>MERS-CoV and influenza</td>
<td>O57 - O61</td>
</tr>
<tr>
<td><strong>Innovation Academy - Wednesday 17 June 2015</strong></td>
<td></td>
</tr>
<tr>
<td>Innovation Academy - The pitch</td>
<td>I1 - I12</td>
</tr>
<tr>
<td><strong>Poster Presentations</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Wednesday 17 June 2015</strong></td>
<td></td>
</tr>
<tr>
<td>Ebola virus disease</td>
<td>P1 - P12</td>
</tr>
<tr>
<td>Nosocomial influenza</td>
<td>P13 - P20</td>
</tr>
<tr>
<td><em>Clostridium difficile</em> infections</td>
<td>P21 - P27</td>
</tr>
<tr>
<td>Environmental cleaning, disinfection &amp; air/water control</td>
<td>P28 - P53</td>
</tr>
<tr>
<td>Endoscope reprocessing</td>
<td>P54 - P57</td>
</tr>
<tr>
<td>Special issues in infection control</td>
<td>P58 - P62</td>
</tr>
<tr>
<td>Infection control in haemodialysis</td>
<td>P63 - P67</td>
</tr>
<tr>
<td>Surgical site infection</td>
<td>P68 - P87</td>
</tr>
<tr>
<td>Education</td>
<td>P88 - P91</td>
</tr>
<tr>
<td>Occupational health</td>
<td>P92 - P98</td>
</tr>
<tr>
<td>Public health issues</td>
<td>P99 - P116</td>
</tr>
<tr>
<td>Multidrug resistance in Gram-negative organisms</td>
<td>P117 - P142</td>
</tr>
<tr>
<td>Hand hygiene 1</td>
<td>P143 - P165</td>
</tr>
<tr>
<td><strong>Thursday 18 June 2015</strong></td>
<td></td>
</tr>
<tr>
<td>Antimicrobial Resistance</td>
<td>P166 - P170</td>
</tr>
<tr>
<td>Antimicrobial stewardship</td>
<td>P171 - P187</td>
</tr>
<tr>
<td>Susceptible and resistant <em>Staphylococcus aureus</em></td>
<td>P188 - P197</td>
</tr>
<tr>
<td>Vancomycin-resistant enterococci</td>
<td>P198 - P202</td>
</tr>
<tr>
<td>Healthcare-associated catheter infections</td>
<td>P203 - P215</td>
</tr>
<tr>
<td>Healthcare-associated urinary tract infections</td>
<td>P216 - P223</td>
</tr>
<tr>
<td>Outbreaks</td>
<td>P224 - P235</td>
</tr>
<tr>
<td>Infection control in intensive care</td>
<td>P236 - P248</td>
</tr>
<tr>
<td>Infection control in low &amp; middle income counties</td>
<td>P249 - P259</td>
</tr>
<tr>
<td>Paediatric infection control</td>
<td>P260 - P265</td>
</tr>
<tr>
<td>Innovative approaches to infection control</td>
<td>P266 - P274</td>
</tr>
<tr>
<td>Surveillance in health care settings</td>
<td>P275 - P279</td>
</tr>
<tr>
<td>Hand hygiene 2</td>
<td>P280 - P308</td>
</tr>
</tbody>
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