Volume 12, Supplement 1

ISSN 1996-9783

International Journal of Infection Control

Abstracts

Sixteenth Congress of the International Federation of Infection Control

16-19 March 2016
Vienna, Austria

SIXTEENTH CONGRESS OF THE INTERNATIONAL FEDERATION OF INFECTION CONTROL (IFIC)

ABSTRACTS

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Oral Presentations

O1 How to conduct an infection prevention and control risk assessment

Terrie Lee

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Every healthcare organization faces many risks for transmission of infection, and may experience difficulties in setting priorities. A risk assessment process can assist in setting those priorities, and in documenting results. This hands-on workshop will demonstrate the process of conducting a risk assessment, with a focus on strategies for success. A progress report will also be utilized for showing how to document and track accomplishments. Participants will have the opportunity to see practical applications of these concepts.

O2 Semmelweis: The man behind the myth

Manfred L. Rotter

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The Hungarian obstetrician Ignaz Phillip Semmelweis, born July 1st, 1818, worked as assistant of professor Johann Klein at the First Obstetric Clinic of the General Hospital in Vienna. He was severely troubled that at his clinic maternal mortality due to puerperal fever was much higher than at the Second Clinic. Consequently, he searched for the cause of this difference. He found that the only major difference was the medical personnel working there: since 1841 only medical students were trained at the First Department who, for educational reasons, had also to perform autopsies of female corpses, whereas at the Second Department only midwife-students, without contact to the pathology department, were instructed. After Semmelweis had realised that the pathology of his pathologist-friend Kolletschka who had died of septicemia resembled that of his infected women, he reasoned that he and his students were transferring "cadaverous particles" via their hands from dead corpses into the maternal passages causing septicemia. Consequently, he commanded that everyone entering the labour room had to disinfect his hands with a solution of hypochlorite (later chlorinated lime) to chemically destroy those "poisenous" particles. The effect was prompt and dramatic: within one month the death ratio dropped by 90% and remained at 1 to 2% just like at the Second Clinic. His work was hardly recognized by his colleagues and he died insane in Vienna on August 13, 1865. The perception of the "Savior of Mothers" does not stand for a myth, but for sound scientific thinking and acting.

How we manage the future O3

Christoph Kucklick

GEO Magazine, Hamburg, Germany

The digitalization leads to three revolutions which will fundamentally alter all aspects of our lives as well as the basic structure of society. The intelligence revolution will bring about the inclusion of intelligent, quasi-autonomous machines into society which will require new institutions and ethical designs. The difference revolution will increase the inequalities and processes of differentiation which will require new ways to integrate the divergence in society. And lastly the control revolution will lead to a shift in power away from traditional players to yet only half known

new forces. These changes will also affect the medical system and the way staff and patients relate to each other and to the new array of digital machines. Are the changes reason for concern? Absolutely, but they are also rife with chances. For that we will have to re-invent parts of our lives.

O4

Intelligent IT in adverse healthcare event prevention and control

Walter Koller[1], Klaus-Peter Adlassnig[2]

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Why intelligent IT in healthcare? In answering this question, the topic's complexity, responsibility, timeliness, research, and innovations will be touched. What are the fields of action? The examples will include drug-drug interactions, AMR and HAI surveillance, clinical decision support, clinical monitoring and alerts, and personalized medicine.

Who are the partners for workable solutions? Among them are clinical experts, knowledge engineers, IT specialists, researchers, and also administrators and health authorities.

What are the potential aims and outcomes? Beneficial outcomes reach from reduced adverse events, optimal diagnostics, therapies, and patient management to improved resource allocation and cost-benefit ratio.

Now, we come to "How intelligent IT works in healthcare?". We will differentiate between big "raw" data mining, clinical text mining (e.g., Dr. Watson), as well as structured knowledge design approaches (e.g., evidence-based rule and guideline systems, medical expert systems) and explain their backgrounds, methods, results, and perspectives.

A number of clinical examples are given: clinical alerts, reminders, and score calculations, HAI surveillance and monitoring, adverse drug event monitoring, and mobile app laboratory test interpretation.

O5

Same principles, different practices: diversity in antibiotic prescribing practices across different countries and continents

Stephan Harbarth

Geneva University Hospitals, Switzerland

The reasons for the uneven geographic distribution of antibiotic prescribing are not fully understood. For instance, there are striking differences in the volume and pattern of antibiotic consumption between Asia, North America and Europe. Disparities may be explained by several determinants:

1. surveillance methods;
2. infection control practices;
3. availability of diagnostic tests influencing antibiotic prescribing practices;
4. population characteristics and patient case-mix;
5. cultural factors (e.g. human behaviour and handling of uncertainty);
6. factors related to the healthcare systems and available resources; and
7. political commitment.

Clearly, effects exerted at the macrolevel by the healthcare system and the political environment contribute substantially to the observed diversity in antibiotic prescribing. In my talk, I will outline useful lessons that can be learned from the experience of different countries in Europe and the United States. I will cite different examples and present recent publications that demonstrate progress in antibiotic stewardship.

O6

Understanding infection control non-compliance: can behaviour theory help?

Michael Borg

Mater Dei Hospital, Msida, Malta

Despite the ever increasing scientific literature, most healthcare institutions continue to face major challenges in achieving effective compliance with infection prevention and control (IPC) policies. One of the main reasons for this conundrum lies in the fact

that IPC practices deal as much with human behaviour as they do with medical science. Indeed IPC has been described as a behavioural science applying biomedical principles.

This presentation will attempt to use behavioural theories, especially the Azjen's Theory of Planned Behaviour, to identify behavioural drivers that are likely to play a role in IPC non-compliance by healthcare workers. In particular, IPC literature will be used to explore how attitudes, normative beliefs and behavioural controls play a role in sub-optimal IPC practices and outcomes. By understanding the behavioural drivers of non-compliance, IPC professionals will be able to plan more effective interventions within their healthcare institutions.

O7 How can we get better compliance with infection control guidelines?

Andreas Voss

Canisius Wilhelmina Hospital, Nijmegen, The Netherlands

The first question would be: "Will we ever be able to achieve what we obviously were not able to achieve during the last 150 years?" My answer would be not, if we continue to do what we did in the past. Equally important is the second question: "What is the urgency and need of better compliance with infection control guidelines for the hospitals; and/or can or do we need to change anything about it?"

Some basic principles will be addressed to answer the above questions, such as:

- Influence on motivation
- Create a culture of patient safety
- Change our ways (less is more)
- Ensure support of hospital leadership

Clinical benefit and risks of ERCP

O8

Barbara Tribl

Department of Internal Medicine III, Division of Gastroenterology and Hematology, Medical University of Vienna, Austria

Endoscopic retrograde cholangiopancreatography (ERCP) is a technique that uses a combination of luminal endoscopy (by using a duodenoscope) and fluoroscopic imaging to diagnose and treat conditions associated with the pancreatobiliary system. Since introduction of ERCP in the late 1960s the technique turned from a diagnostic modality to an almost exclusively therapeutic procedure. ERCP has a higher rate of severe complications than most other endoscopic techniques. Therefore, having an appropriate indication is extremely important.

Indications in biliary diseases are the treatment of

1. biliary obstruction secondary to choledocholithiasis,
2. malignant and benign biliary duct strictures,
3. congenital bile duct abnormalities,
4. postoperative complications like biliary leaks,
5. patients with sphincter of Oddi dysfunction.

Indications in pancreatic disease are treatment of strictures, pseudocysts and pancreatic duct stones in recurrent, acute pancreatitis. Duodenoscopes are also used for treatment of adenomas and malignancies of the Papilla.

Post-ERCP morbidity is related to Post-ERCP-pancreatitis (3.5%), bleeding (1.3%), perforations (0.6%), and infections (1.4%). A large analysis showed a overall complication rate of 6.9%, of which 5.2% was graded as mild-to-moderate and 1.7% as severe. ERCP-specific mortality was 0.3%.The infectious risk of cholangitis occurs most likely in patients with biliary obstruction. Current guidelines recommend prophylactic antibiotic therapy in patients with biliary obstruction and cholangitis or with biliary obstruction that is unlikely to be drained during the ERCP. Antibiotic therapy is also recommended after any unsuccessful ERCP biliary drainage procedure. Recently, endoscope-associated infections have become a matter of debate.

2015 the American Gastroenterological Association published recommendations for risk-reduction.

O9 Epidemiology and infections associated with ERCP

Petra Gastmeier

Institute of Hygiene and Environmental Medicine, Charité-University Medicine, Berlin, Germany

In 2013, we detected the first outbreak with OXA-48 *Klebsiella pneumoniae* in our hospital (Kola *et al.* ARIC 2015). Because of the design problems of the duodenoscope and because we could not identify any deficits of reprocessing in our institution we performed a review of the current literature. Further outbreaks with gram negative multiresistant pathogens following ERCP were detected (Gastmeier/Vonberg Infection 2014). In 2014, we observed a further OXA-48 outbreak following ERCP in another Berlin hospital. We informed the German regulatory body (BfARM) about both events but they did not react.

Meanwhile, further outbreaks of multi drug-resistant pathogens (*Klebsiella, Escherichia coli, Pseudomonas aeruginosa*) associated with ERCP procedures have been reported - mainly from the US and the Netherlands. The source of infection may be related to difficulties in cleaning the elevator mechanism of the duodenoscopes. In August 2015, the US Food and Drug Administration sent out a communication with supplemental measures to enhance reprocessing of duodenoscopes. However, further steps seem to be necessary to reduce the risk of infection: Changes in the design of the duodenoscopes but also in the field of microbiological culturing and improved reprocessing measures such as ethylene oxide sterilization or repeated high-level disinfection. In addition, we hope that the regulatory bodies react more pro-actively in the future to force the companies to produce safe instruments.

O10 Caveats and common pitfalls during endoscopre reprocessing in clinical practice

Ojan Assadian

University of Huddersfield, United Kingdom

Medical instruments contaminated with microorganisms from a previous patient contribute to transmission of infection. Before the use on the next patient, contaminated devices must be adequately reprocessed and rendered innocuous. This does also pertain to endoscopes.

Therefore, reprocessing endoscopes is critically important as not doing so may put patients at risk of infections. However, reprocessing reusable medical instruments is not trivial. During many decades, a simple strategy was followed: manufacturers of medical instruments have optimized their product for the intended clinical application without paying considerations on its reprocessability. Medical practitioners purchased such instruments and reprocessed them “as good as possible” in good faith that the applied method will “do the job”. Latest with publication of the European Council’s Directive 93/42/EEC, which - among others - is also the basis for reprocessing of medical devices, this situation has changed. Annex I, clause 8.1 clearly stipulates that “ ... medical devices ... must be designed and manufactured in such a way that, when used under the conditions and for the purposes intended, they will not compromise the clinical condition or the safety of patients, or the safety and health of users or, where applicable, other persons, provided that any risks which may be associated with their intended use constitute acceptable risks ...”. The meaning of this is that endoscopes must be designed and operated in such order, that any risk is reduced to the minimum, including the risk of transmission of microorganisms. This presentation will address caveats during reprocessing of endoscopes.

O11 Invasive endoscopy – technical aspects of instruments, reprocessing equipment and sterile supply

Tillo Miorini

Institute for Appliead Hygiene, Graz, Austria

Invasive endoscopy still is a considerable reason for nosocomial infections. This fact is – to a certain extent - connected with a series of technical characteristics of the endoscopes and not least their corresponding reprocessing procedures.

First of all most of the (flexible) endoscopes on the market are equipped with - partly extremely - narrow channels (e.g. Albarran-channel of a duodenoscope), which moreover might be branched (e.g. air-water-channel). In addition it is not possible to check the cleanliness of these channels visually.

Due to these facts the cleaning and disinfection process of endoscopes belongs to the most challenging reprocessing procedures of medical devices. Whereas manual pre-treatment is essential, exclusive manual cleaning and disinfection nowadays is considered to be obsolete.

This means that we need effective cleaning and disinfection processes in washer-disinfectors (WDs), but:

- Do all endoscope - WDs which are on the market comply with the requirements of the standard EN ISO 15883?
- Are the chemical products and programmes used in these machines able to guarantee effective cleaning and disinfection of flexible endoscopes?

The expert group of the Austrian Society for Sterile Supply tried to answer these questions by carrying out studies and practical tests and after all these questions had to be answered with “no”. In addition, several critical incidents in connection with reprocessing of flexible endoscopes had been observed by accredited inspection bodies.

After implementation of guidelines for testing and validation of endoscope reprocessing processes, the processes could be optimized to a great extent according to these criteria throughout Austria´s hospitals.

Patient safety: building a culture O12

Suzanne Rhodenizer Rose

Infection Prevention and Control (IPAC) Canada

As professionals in infection prevention and control, we dedicate extraordinary amounts of time and energy into the development of evidence-informed guidelines and policies, the auditing of practices, and the collection and analysis of surveillance data. These are core functions in the field however the gaps between science and practice continue to plague us. The impact of patient safety culture on improved health outcomes cannot be underestimated. Within a healthcare context, safety culture can positively influence patient outcomes by motivating healthcare professionals to choose behaviours that enhance, rather than reduce, patient safety. The aim of this discussion is to facilitate an appreciation for how patient safety culture drives or sabotages the goals of an IPC program, to understand how culture impacts behaviour of healthcare staff, and to identify key steps to strengthen an organization’s patient safety culture.

Optimal programme planning through risk assessment O13

Terrie Lee

Charleston Area Medical Centre, Charleston, West Virginia, USA

An organizational risk assessment can assist an organization to set priorities, and to plan for optimal infection prevention and control activities. The risk assessment can also be used to establish engagement from clinical staff and support from key stakeholders. This in turn, leads to improved success of a program, with a focus on evaluation and reporting.

O14 Enabling core infection prevention and control skills for all healthcare workers

Ruth Carrico

University of Louisville, USA

Regardless of the setting in which care is delivered, there are basic and fundamental practices that serve to protect patients, healthcare workers and communities. National and international guidelines have been developed that focus on specific areas of infection and the interventions that the evidence has indicated to be useful in prevention. Because these guidelines tend to focus individually on one specific area of practice, it is difficult to identify those fundamental activities that are applicable and appropriate for prevention of many types of infections and in differing healthcare settings. This session will identify those practices that have been included in multiple guidelines and represent core practices for infection prevention and control in all settings where care is delivered.

O15 Leading strategically: creating boundary spanning networks

Mary Lou Manning

Thomas Jefferson University, Philadelphia, USA

Healthcare change is now continuous and requires the ongoing creation of direction, alignment, and commitment within and across organizational boundaries. Most change efforts, however, are approached as if the changes in question are one-time, independent, and can be planned and implemented from the top down, without buy-in from others, mutual adjustment, or cross-boundary collaboration. Twenty-first century challenges can't be solved with 20th century change methods. Nonetheless, many infection prevention leaders are still relying on top-down approaches in the face of changing organizational infection prevention problems. These problems are increasingly complex, interconnected, and not easily managed by people separated by levels and silos. This session will discuss how to accelerate change by activating hidden social networks in organizations, systems, and cultures and to enhance participants boundary spanning capabilities.

O16 Hospital organisation, management, and structure for prevention of healthcare-associated infection – what are the essentials?

Stephan Harbarth[1], Walter Zingg[1], Didier Pittet[1], Benedetta Allegranzi[2]

[1]Geneva University Hospitals, Switzerland
[2]World Health Organization, Geneva, Switzerland

The Prevention of Hospital Infections by Intervention and Training (PROHIBIT) was a project funded by the European Commission and based on a consortium of European institutions coordinated by the Infection Control Programme and WHO Collaborating Centre on Patient Safety at the University of Geneva, Switzerland. PROHIBIT was rolled out from 1 January 2010 to 30 June 2014. Its main objectives have been to understand the variations of HAI prevention in Europe and to test the success of a strategy to prevent CRBSI. PROHIBIT is an extremely comprehensive study which combines the strengths of qualitative research, survey methods, and observational and experimental intervention studies that provide evidence about changing infection control practices in Europe. Within these results, unique and very interesting data about hand hygiene promotion, monitoring and practices in European countries and healthcare settings are included. In my presentation I will present the main findings of a large systematic review that provides strong evidence about the essential elements targeting hospital organisation, management, and structure for prevention of healthcare-associated infection in different settings.

O17 Pro-con debate: Infection control can only improve with more and better evidence based medical studies

Yes: *Gary French*
Guy's & St Thomas' Hospital, London, United Kingdom
No: Michael A. Borg
Mater Dei Hospital, Msida, Malta

Are more and better evidence based studies and publications the missing key to improve infection prevention and control? If not, what is needed? The speakers will debate this question and provide their perspectives on what is needed for generalised IPC improvement.

O18 Involvement of frontline healthcare workers in Ebola preparation by EU member states

Noel Abela[1], Paul De Raeve[2]
[1]*International Federation of Nurses, Siggiewi, Malta*
[2]*European Federation of Nurses, Brussels, Belgium*

Background

Various reports suggested sub-optimal national preparations during the Ebola crisis, as illustrated by the case of the Spanish nurse who acquired Ebola during patient care.

Methods

An online questionnaire was designed by the European Federation of Nurses to survey European nurses about capacity building in the Ebola response and preparedness to infectious diseases of high consequence. It was disseminated to all EFN members and national nurses associations, targetting frontline HCWs, and strongly promoted through social media. The questions were formulated to retrieve information on risk assessment, training, awareness, protection and capacity building. The results were analysed using Survey Monkey, Excel and SPSS.

Results

A total of 1800 respondents from 23 European countries replied. Only 33% of respondents stated that they were knowledgeable of the Ebola protocol in their organisation whereas 61% thought that their opinions and views were not taken on board when developing these protocols and guidelines. 55.5% of respondents stated that they were never consulted on the choice of PPE's despite their front line involvement; 76% of respondents had never participated in regular training drills. Despite the buddy system for PPE doffing being strongly recommended by learned organisations such as WHO, 61% said that this was not introduced in their healthcare setting.

Conclusions

These preliminary results only represent the perceptions of responding HCWs. However they suggest a lack of involvement of frontline HCWs in the development of national Ebola policies which can translate into anxiety and stress which in turn would result in sub-optimal performance and self-protection.

O19 Evaluation of hospital nurses knowledge, attitude and practice (KAP) on peripheral intravenous catheter related phlebitis in the country of Georgia

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[2]*South Caucasus Field Epidemiology and Laboratory Training Program, Tbilisi, Georgia*
[3]*High-Technology Center, University Hospital, Tbilisi, Georgia*
[4]*Central Republic Hospital, Tbilisi, Georgia*

Background

Phlebitis is the inflammation of a vein, typically caused from the insertion of an intravenous catheter. Intravenous catheter related phlebitis (ICRP) was not studied in Georgia, therefore we evaluated knowledge, attitude and practice among hospital nurses and found recommendations for reducing the burden of ICRP.

Methods

KAP survey was conducted in the intensive care unit (ICU) and emergency department (ED) of two biggest hospitals (RE and IN) during April-May, 2014 in Tbilisi, Georgia. Out of 166 respondents 14 refused.

Nurses, who never trained on phlebitis management and prevention, interviewed with anonymized questionnaires. EpiInfoTM and StatCalc were used for data analyses and sample size calculation.

Results

None responded correctly to four key questions. 69,5% of nurses in RE were significantly (RR=2.4; 95% CI:1.6-3.6) more likely than nurses (28,5%) of IN to know usage of non-sterile glove to prevent phlebitis. 28% of nurses in ED were more likely (RR=3.1; 95% CI:1.5-6.5) than nurses (9%) of ICUs to know the link between length of catheter with the development of phlebitis. 20% of males were more likely (RR=2.9: 95% CI:1.4-7.5) to know the phlebitis time course and 80% nurses working less than 3 years were less likely (RR= 1.3; 95% CI:1.07-1.67) to have knowledge of phlebitis.

Conclusion

Given the findings, where the nurses in the ED and males showed more knowledge than in the ICU and females, we recommend implementing a mandatory learning module about ICRP prevention for hospitals and routine supervision targeting inexperienced nurses by more experienced nurses.

O20 A *Clostridium difficile* outbreak 4 months following transfer into a new hospital built with single bed rooms

Yveta Leharova, Ramona Rodrigues, Charles Frenette

Glen - Royal Victoria Hospital, Montreal, Canada

Background

In April 2015 the Royal Victoria moved to a new 500 single bed hospital. Four months following the move, the 36 single bed transplant unit, declared a *C. difficile* outbreak following the 3rd nosocomial case. The goal was to identify the source and control the outbreak.

Methods

Weekly multidisciplinary meetings were held to implement corrective measures. Audits for environmental/equipment cleaning and antibiotic usage were performed. A line list of all known *C. difficile* cases on the unit, during this time period, was used to analyses risk factors (e.g. antibiotic use, proton pump inhibitors, etc.). A cases was defined as admitted for > 72hrs, with diarrhoea and a positive PCR toxin stool sample. All available isolates were molecular subtyped.

Results

The outbreak was declared over after 3 weeks with no new nosocomial case. There were 8 cases in total. Length of stay ranged from 6-168 days. The average age was 67yrs. The majority were female, cancer/transplant patients on proton pump inhibitors and steroids. Antibiotic usages were all appropriate, except one. Environmental/instrument cleaning audits were poor to begin but improved during the course of the outbreak. All of the 8 nosocomial cases were molecular subtyped and only 2 matched, indicating this was not a true outbreak.

Conclusions

Molecular subtyping should be considered to determine a true outbreak of *C. difficile*. Screening for asymptomatic carriage of *C. difficile* and initiation of prophylactic antibiotics in high risk patients could circumvent illness in this high risk population.

O21 Comparison of surface marker, colony count and ATP as a measure of environmental cleaning compliance for intensive care discharge rooms

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[3]Infection Control Department, Central Institute-Sao Paulo University Hospital, Brazil

[4]St. Boniface Research Centre and University of Manitoba, Winnipeg, Canada

Background

The study objective was to determine the background level of CFU, ATP and marker removal in ICU discharge rooms in Canada and the Netherlands and determine

if an educational intervention (EI) could improve compliance.

Methods

This prospective ICU study assessed 5 high-touch sites (HTS) in 50 rooms in both countries. A novel reflective surface marker (RSM) was used (clean cutoff=total marker removal). Rodac plates containing DEN agar were used for viable count (clean cutoff<2.5 cfu/cm2). ATP (measured as relative light units–RLUs) was also used (clean cutoff<250 RLUs). EI consisted of reviewing the existing cleaning protocol and documenting competency for all cleaning staff.

Results

Phase 1 showed that % pass for RLU levels were significantly higher in Netherlands compared to Canada both pre and post cleaning (P<0.01). The post-cleaned CFU levels were not different between the countries. Post-cleaning the % RSM removal level was higher in Canada (84.5%) compared to Netherlands (60%). In Phase-2 the EI resulted in significantly improved RLU, RSM and visual inspection in both Canada and Netherlands. The post clean CFU levels were significant different (P<0.001). The dirtiest HTS ICU site was the bedrails in Canada and the computer keyboard in Netherlands.

Conclusion

There were significant differences in pre- and post-clean levels of CFU and ATP in different countries. During Phase-2 the ATP and RSM were significantly improved post EI in both countries. Possible explanations could be surface material differences and residual disinfectant effects.

O22 The perception of the role of an IPC link nurse in the UK and Belgium

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[2]Royal College of Nursing, London, United Kingdom

Despite international recommendations on the use of and integration of several infection prevention and control (IPC) link nurses (LN) in practice, there is still great diversity within and between European countries regarding their implementation and perception in practice. Whilst the value of LN is well recognized the lack of a clear definition of the role and absence of consensus on required education and training means that the true impact and value of these roles within contemporary healthcare is difficult to assess. To address these issues the workgroup infection control of the National Association of Catholic Flemish Nurses and Midwives (WIN) started in 2012 a joint venture with the Royal College of Nursing (RCN) regarding the sharing and aligning of information on IPC LN. This collaboration resulted in the project 'Build your own IPC LN' to further explore this issue.

The project's objectives are to use the experiences of those engaged in LN programs to identify current differences in the perception of the role of IPC LN to support the development of harmonised draft European professional competence profiles for this role. For this, an interactive workshop was organized.

The first part of this workshop was based on the work of Teare *et al.* (2001) with participants asked to design an IPC LN that reflected their individual current experience regarding how they see themselves and how others perceive them. This activity revealed certain factors that support or hinder the implementation and the success of the roll of IPC LN in practice.

The second part of the workshop focused on completion of a competence questionnaire to support the development of a competence profile for those in or managing this role. A competence profile can be useful to set up an effective training programme for IPC LN and to guarantee success in implementing them into practice.

In the period October 2014 - 2015 IPC LN, nurses, head nurses and infection control practitioners in the UK and Belgium were voluntarily invited to participate in a number of workshops. While currently all data (approximately 450 participants) is inserted in the database, they will be analyzed by mid-January 2016.

We like to present for the first time at the congress of the IFIC 2016 the results of the organized workshops and propose a first draft version of a joint professional competence profile for IPC LN.

O23 University-level strategies for educating current and future infection preventionists

Donna Haiduven

University of South Florida, College of Public Health, Tampa, Florida, USA

Background

Many original infection control practitioners are no longer in the field, creating a need for new infection preventionists (IPs). In addition, existing IPs may wish to engage in educational opportunities to assist with achieving certification and/or job advancement.

Purpose

To describe three university-level strategies used to educate current and future IPs.

Program description

The University of South Florida, College of Public Health has developed three strategies for educating IPs. The first is an undergraduate minor in infection control, initiated in 2013. The second is a graduate certificate in infection control, for either non-degree seeking or degree-seeking graduate students, available since 2001. The third is a master's in public health (MPH) with infection control concentration as of 2013. These programs are administered on-line with the exception of an MPH internship.

Results

To date, 52 undergraduate students have completed the undergraduate minor. The Infection Control Graduate Certificate Program has enrolled over 200 students, has the highest number of enrolled students in the college, the third highest in the university, as well as ranked the third highest in net growth for just 2014-2015. The newly-established MPH program has enrolled over 30 students to date. Numerous graduates have accomplished career advancement, obtained IP positions and/or achieved certification in infection control.

Conclusions

Three university-level strategies have been effective in educating current and future IPs as well as assisting graduates in obtaining IP positions. The composition and credit hours for these programs may be of interest to others wishing to educate IPs at the university-level.

Reducing surgical site infections in colorectal surgery over a three year period by introducing surveillance, clinical care pathways, and surgical site infection prevention guidelines O24

Janette Morlese

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Background

The Montreal General Hospital occupied 401 active patient beds in the 2010-2011 fiscal year. From June to December of 2010, 231 colorectal surgeries were performed. Among these surgeries 23 (10%) resulted in surgical site infections (SSI). Measures were then taken over the following three years to reduce the post-colorectal surgery infection rates.

Methods

We use the standard American National Health Surveillance Network (NHSN) criteria to define SSIs. SSI rates are stratified according to the NHSN risk index. SSIs are detected by reviewing microbiology results, antibiotics prescriptions of inpatients, chart review, inpatient rounds, and any cases of patients readmitted within 30 days of surgery, or up to 3 months if an implant/foreign body is present.

In each of the 3 years, each surgeon was provided with individual SSI reports that included SSI prevention guidelines. Further, all staff surgeons and residents were provided with presentations on SSIs, and recommendations with suggested action plans.

Results

There was a decrease in rates of infection for colorectal surgery since the index year (2010):

- In 2011-2012 there were 383 surgeries with 31 infections for rate of 8.1%,
- In 2012-2013 there were 316 surgeries with 20

infections for a rate of 6.3%,
- In 2013-2014 there were 295 colon surgeries with 20 infections for a rate of 6.8%.

Conclusion

There was success in decreasing SSI through the implementation of a bundled approach that included surveillance, clinical care pathways, and providing feedback to the surgeons through presentations, individual SSI reports, and the SSI prevention guidelines.

O25 Comparison of efficacy and cost of iodine impregnated drape vs. standard drape in cardiac surgery: study in 5100 patients

Jonida Bejko, Vincenzo Tarzia, Massimiliano Carrozzini, Michele Gallo, Giacomo Bortolussi, Marina Comisso, Luca Testolin, Cosimo Guglielmi, Marco De Franceschi, Roberto Bianco, Gino Gerosa, Tomaso Bottio

Department of Cardiothoracic and Vascular Surgery, University of Padova, Italy

Background

We sought to examine the efficacy in preventing surgical site infection (SSI) in cardiac surgery, using 2 different incise drapes (not iodine-impregnated and iodine-impregnated). A cost analysis was also considered.

Materials and methods

Between January 2008 and March 2015, 5100 consecutive cardiac surgery patients, who underwent surgery in our Institute, were prospectively collected. A total of 3320 patients received a standard not iodine-impregnated steri-drape (Group A) and 1780 patients received Ioban® 2 drape (Group B). We investigated, by a propensity matched analysis, whether the use of standard incise drape or iodine-impregnated drape would impact upon SSI rate.

Results

Totally 808 patients for each group were matched for the available risk factors. Overall incidence of SSI was significantly higher in Group A (6.5% versus 1.9%) (p=0.001). Superficial SSI incidence was significantly higher in Group A (5.1% vs 1.6%) (p=0.002). Deep SSI resulted higher in Group A (1.4%) than in Group B (0.4%), although not significantly (p=0.11). Consequently, the need for VAC therapy use resulted 4.3% in Group A versus 1.2% in Group B (p=0.001). Overall costs for Group A and B were €12.494.912 and €11.721.417, respectively. The Ioban® 2 offered totally €773.495 cost savings compared to standard steri-drape.

Conclusions

Ioban® 2 drape assured a significantly lower incidence of SSI. Additionally, Ioban® 2 drape proved to be cost-effective in cardiac surgery.

Antimicrobial activity of iodine present in a surgical incise drape O26

Tom Elliott

University Hospital Birmingham, United Kingdom

Introduction

The source of the microorganisms which cause surgical site infections include the commensal flora in the patient's skin. Unfortunately, currently available skin antiseptics do not entirely eliminate this source. This is partly due to microorganisms residing below the skin surface. Surgical incise drapes are being used in certain situations to minimize the subsequent contamination of the surgical site by these commensal microorganisms.

Aims

In this study, the antimicrobial efficacy of an iodine impregnated surgical site drape was evaluated against MRSA in a human donor skin model. This technique allows antimicrobial activity and penetration into the skin to be studied.

Methods

Donor skin was mounted onto the model, inoculated with MRSA and the iodine impregnated incise drape applied. The rate of kill of the MRSA and skin penetration of iodine was subsequently determined.

Results

Significant antimicrobial activity of the iodine was demonstrated after various scenarios which emulated the clinical situation. In addition iodine was shown to penetrate into the skin following application of the drape for specific times. The concentrations of iodine achieved in the skin were above the MIC and MBC for MRSA.

Conclusions

The results suggest that the iodine impregnated surgical incise drape in the clinical scenario may augment skin antisepsis and decrease microbial contamination of surgical sites, as well as actively inhibiting microbial growth peri-operatively. This may decrease the risk of surgical site infections.

O27 Wound edge protectors to prevent surgical site infections in abdominal surgery: the BaFo trial and meta-analysis

Jorg Kleeff

The Royal Liverpool and Broadgreen University Hospitals NHS Trust, Liverpool, United Kingdom

Surgical site infections remain the most frequent complication following open abdominal surgery and cause substantial morbidity, mortality, prolongation of hospital stay and health care costs. Wound edge protectors have been proposed as a simple, easy-to-use and cheap intervention to reduce surgical site infections, but high-level evidence to support this notion has been sparse. The multi-centre double-blinded randomized controlled BaFo trial including 608 patients undergoing laparotomy at 16 centres demonstrated a reduction of surgical site infections from 19.1% in the control group to 9.9% in the wound edge protector group (odds ratio=0.46, 95% confidence interval: 0.28-0.76; P=0.002). Further, an up-to date systematic review and meta-analysis of available data from all randomized-controlled trials published so far, provides evidence that the use of wound edge protectors significantly reduces surgical site infections in abdominal surgery. Given the estimated number of 230 million surgeries performed each year worldwide with over 7 million complications and an surgical site infection rate of 15%-25% following open abdominal surgery, these results could have a significant impact to reduce postoperative morbidity globally.

Prevention of infection in haemodialysis units O28

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This workshop will present the infection risks that patients in end stage renal failure are exposed to.

The problems related to haemodialysis vs peritoneal dialysis, will be interactively explored. This includes hazards associated with dialysis water systems and the haemodialysis fluids produced on-site.

Audience participation will be integral to the presentation of the case scenarios in two teaching hospitals, one in Malta and the other one in the UK, and the solutions implemented when confronted with higher than expected levels of H/D related infections. Guidelines for the prevention of these infections will be reviewed and discussed. The Kübler-Ross Change Curve will be used to understand the stages of personal transition and organisational change encountered when implementing change.

O29 Infection control/hospital hygiene capacity building in European countries with limited resources

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Capacity building in infection control (IC) and hospital hygiene (HH) represents a real challenge for European countries with limited resources (ECLR). A lot of factors should be taken in consideration, such as low number of new hospitals built during the past 10 years, no significant refurbishing of existing ones, insufficient human and financial resources to cover requirements for infection prevention (IP) and IC of hospital acquired infections (HAI), insufficient isolation wards. Healthcare staff members are not always regularly and efficiently trained on IC because there is no national standardized training plan and the healthcare system suffers due to significant staff migration towards richer countries, where higher incomes and better working conditions are offered. Antimicrobial agents are not always prescribed according to therapeutic protocols, because antibiotic policies are not always efficient in these countries. Laboratories are not always prepared for the identification of antimicrobial resistance phenotypes, for reporting HAI outbreaks in a timely manner or for the screening of multidrug-resistant (MDR) pathogens.

Questionnaires including the above mentioned issues were sent in some ECLR also aiming to rank the most critical aspects which can affect an effective IC of HAI.

In the field of IC/HH there is heterogeneity of resources in European countries but even with limited resources there are many lessons to be learned from the experience of higher resourced countries. This future perspective will contribute to the improvement of patient safety in ECLR.

Infection control/hospital hygiene training for European healthcare workers O30

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Patient safety and HAI prevention and control being a substantial theme shared in each clinical context, it should be an unavoidable part of the professional level of competency starting from the first approach to health care organizations (undergraduate level). It should be reinforced through lifelong education taking into account both scientific evidence and technical acquisitions. Healthcare professional education in patient safety and HAI prevention and control is highly recommended in all the official documents. Yet it appears to be one of the most neglected areas although scientific literature underlines that changes in behaviour and attitudes of professionals appear to be major drivers in significantly reducing the risks of errors particularly in this field. In order to overcome this gap between what should be and what is actually done an educational effort should be implemented to try and achieve an overall harmonization and standardization of professional behaviour in each and every brunch of healthcare organizations inside the EU countries. A framework of educational interventions will be presented starting from pre-graduation level to hospital hygienists/infection control professionals' highlighting levels of competency to be reached at each stage.

O31 Food-borne zoonoses: sobering reality and future challenge

Martin Wagner

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More than 1200 infectious agents are currently known and 61% of those are of zoonotic origin. Zoonosis is a disease that is transmitted to humans via exposure to living animals or consumption of contaminated food commodities. Examples for transmission via living animals are animal-borne influenza or rabies whereas food-borne zoonosis is virtually restricted to a handful of bacteria, viruses and parasites. With regard to food-borne zoonoses, the vast majority of cases occur due to infection with norovirus, *Salmonella* (currently app. 93.000 reported cases per year in EU-28) and *Campylobacter* (app. 220.000 reported cases per year). Infectious agents may attack human populations in dependency of the immune status of the host. The previously established term 'YOPI' (risk groups of young, old, pregnant, immunocompromised individuals) is a limited characterisation of vulnerable groups in current society. About 35% of the European population (503 million) is considered to be part of any the YOPI risk groups. In the EU annually 1.2 million cases of food-borne diseases are reported, which include 325,000 hospitalisation and 5,000 deaths. The total annual economic costs associated with food-borne illnesses is estimated to be €117 Billion. Food safety has been on the research agenda for many years but success was only achieved with regard to mitigation of food-borne salmonellosis, likely due to the introduction of a vaccine used on layer flocks. For most other food-borne pathogens, the sobering observation was made that case numbers rise or stay the same since decades.

Water borne infections in hospitals and their prevention - no water is worse than still water O32

Egil Lingaas

Oslo University Hospital, Norway

Over the last couple of decades, water has been increasingly recognised as a source of healthcare-associated infections. This is true not only for Legionella, but also for a number of other bacteria, especially non-fermenative Gram-negative species such as *Pseudomonas, Stenotrophomonas, Sphingomonas, Chryseomonas, Acinetobacter, Burkholderia* and *Achromobacter*. Water has also been demonstrated to be the source of infections with mycobacteria, protozoa and fungi. The origin of water borne infections are not only those that previously attracted the most attention, namely cooling towers and showers, but also water for consumption, treatment, haemodialysis and water for decontamination of medical devices, like in washer disinfectors for flexible endoscopes.

There are several reasons why this is a particular problem in hospitals. In recent years, hospitalised patients have become increasingly susceptible to infections with opportunistic bacteria due to underlying conditions, immunosuppressive treatment and extensive use of invasive devices. Secondly, hospital buildings often have large, complex water systems with areas of low water flow and water temperatures which predispose to biofilm formation. Thirdly, some water pipes are today made of materials that predispose for attachment and growth of water-associated microorganisms. Paradoxically, also, modern hand hygiene practice, with the use of alcohol based hand antisepsis instead of soap and water, reduces water consumption and therefore increases the risk of water stagnation, bacterial growth and biofilm formation. To reduce the risk of water borne infections, hospitals must therefore implement water safety plans. One of the most important parts of a water safety plan is to avoid stagnant water.

O33 What's new in antibiotic stewardship?

Uwe Frank

Heidelberg University Hospital, Germany

The rational use of antibiotics is an important strategy to preserving the efficacy in the treatment of infectious diseases. Overuse and misuse of antimicrobial agents has detrimental effects on patients, healthcare systems, and societies. Irrational antimicrobial use contributes to the rising cost of healthcare, the emergence of multidrug resistant organisms, and adverse drug reactions. Antimicrobial stewardship programs (ASP) provide standard, evidence-based approaches to encourage the rational use of antimicrobial agents. They optimize antibiotic treatment, make sure that patients receive antibiotics promptly but only when needed, ensure that patients will receive the right antibiotic at the right dose and for the right length of time, and improve prescribing of antibiotics in hospitals; in addition, they will potentially save money, and lives. The Centers for Disease Control and Prevention, Atlanta, USA, recommend that every hospital should by now adopt an antibiotic stewardship program.

O34 Wound antisepsis

Ojan Assadian

University of Huddersfield, United Kingdom

Although another group of antimicrobials, antiseptics, has maintained its position in surgery for surgical hand preparation and skin antisepsis, their general use in medicine has declined after the introduction of aseptic surgery and the wide availability of antibiotics. During the past years, mainly in Central Europe, the antiseptic concept was systematically explored in-vitro and in clinical practice. The aim was not to replace antibiotics by antiseptics, but to use antiseptics topically wherever possible in order to maintain effectiveness of antibiotics for systemic treatment by preventing the development of microbial resistance.

Indeed, there is a compelling argument to revisit the wider use of antiseptics in the light of increasing antimicrobial resistance and emergence related to antibiotic use. This concept has been recognized in chronic wound care with an increasing acceptance in other medical and surgical fields such as dermatology, gynaecology, traumatology, ophthalmology, and dentistry. Today, a wide number of antiseptics such as e.g. chlorhexidine, polihexanide, octenidine-dihydrochloride, povidone-iodine, silver, or triclosan are available, not only for prevention of infection, but also for treatment of existing infection. This presentation will give a summary on direct and indirect evidence-based proof of antiseptic effectiveness as an alternative concept for prevention and treatment of infection.

My favourite papers on… O35

The speakers will share their favourite papers on their respective topics.

Building patient safety throughout infection control: achievements and challenges O36

Pierre Parneix

Bordeaux University Hospital, France

Patient safety deserves dedicated team to promote and implement it in clinical wards. No one more than infection control practitioners have the ability, the knowledge and the experience to achieve that. For a long period of time the main challenge was to describe the frequency of healthcare-associated infections (HAI), to improve practices throughout guidelines and audits and to widely educate professionals. It led to a dramatic decrease in HAI frequency but at a certain point found limits. The hospitals became more accountable for the quality of care delivered. Initially banned from our languages the concept of a zero infection target emerged.

In France HAI declaration became mandatory in 2001, for the most serious ones, and induced a change in vision from the global epidemiology to the specific case analysis. Former Air France pilots and instructors proposed to decline their experience of safety in the health field. Radiation therapy was the first target but quickly the method was broadened to other fields like infection control and safe medication use. Root

cause analysis was the main tool proposed to find faster and more efficient solutions to at-risk practices or organisations.

In 2016 performing root cause analysis for HAI has been added in the French law. The no blame culture has to be generalised and a priori risk management methods, like risk visits, need to be widely implemented. So it is crucial to keep on learning from other industries at risk which are far much ahead in the safety field.

O37 From vision to reality: Vision Zero in the German Social Accident Insurance

Sabine Herbst

German Social Accident Insurance, Sankt Augustin, Germany

Prevention is one of the core tasks of the German Social Accident Insurance (DGUV) and its members alongside rehabilitation and compensation. It involves the implementation of a variety of measures aimed at preventing occupational accidents, occupational diseases and work-related health hazards in accordance with the statutory mandate to ensure prevention "using all appropriate means".

The long-term goal of the German Social Accident Insurance and its members is Vision Zero – a prevention strategy for a future without fatal or serious accidents and occupational diseases. Currently Vision Zero is not only discussed nationally and internationally, but it is part of the prevention strategies in many countries worldwide.

The strategy is based on the convictions that every accident is ultimately preventable if the right steps are taken previously. Therefore planning and implementing the right prevention measures as well as defining milestones are necessary. The need for prevention is both obvious and urgent. Workplace accidents and occupational diseases are preventable. Successful prevention not only avoids human suffering, it guarantees employees safety and health. And it also pays off economically.

The presentation will provide information about the meaning of Vision Zero and prevention measures of the DGUV to achieve this aim by implementing the Vision Zero approach into practice of occupational safety and health. Last but not least it will provide an outlook on possible actions to adopt Vision Zero to the healthcare system.

How to enhance nuclear safety in a sustainable way? O38

Frédéric Ménage

Institute for Radiological Protection and Nuclear Safety (IRSN), Fontenay-aux-Roses, France

Nuclear installations contain radioactive substances that may harm the workers, the people or the environment if released accidentally. That's why very stringent safety standards are applied to them. Nuclear safety is defined as the set of technical provisions and organizational measures - related to the design, construction, operation, shut-down and decommissioning of nuclear installations - which are adopted with a view to preventing accidents or limiting their effects.

In order to meet high safety standards, a special design method is used, called "defence in depth". It is a hierarchical deployment of different levels of equipment and procedures to prevent the escalation of anticipated operational occurrences and to maintain the effectiveness of the containment barriers.

In addition, a nuclear installation is a social and technical object and its design should be conducted in a way that will provide the operators with an efficient and user-friendly work environment.

A safe design is not sufficient, by itself, to ensure the expected safety level. The installation has to be operated in accordance with the intended design. Moreover, the safety level should improve periodically, based on experience feedback and state-of-the-art scientific knowledge.

Being able to monitor experience feedback and to act upon it is a key to achieving safe operation throughout the lifetime of any nuclear installation. Every safety-significant incident is declared by the operators to the safety authority and the operator analyzes its root causes in order to identify any need for improvement. Another important aspect is the safety culture of the operators.

O39 The safety vision and strategy of the aviation industry

Martin Egerth

Lufthansa Flight Training GmbH, Germany

The last few years have been the safest in the history of civil aviation. Despite this fact, the industry cannot become complacent and assume this trend will continue. Unfortunately, we have seen that even with legal requirements for trainings and safety management systems in place, new and improved safety barriers, automation and fatigue risk management systems, incidents and accidents still occur.

At Lufthansa, safety is the top priority. To achieve a safety goal of 10^{-8}, one needs to understand safety, have a functioning safety/organizational culture and invest time (and money) in training. In addition, risk management, reporting systems as well as personnel selection and assessment play a pivotal role in achieving safety in the aviation industry.

How can we achieve safety and carry out safe flight operations? What challenges will confront the aviation industry in the future? This speech will demonstrate and discuss the current tools needed and the forward-thinking necessary to achieve safety in the aviation industry.

Infection prevention in surgery – a human factors approach O40

Neil Wigglesworth

Guy's & St Thomas' NHS Foundation Trust, London, United Kingdom

"Just 'trying harder' makes no one superhuman" (Don Berwick).

Healthcare is a complex socio-technical system, and safety, including preventing infections, is paramount. Human factors, also known as ergonomics has been described as being the science of "designing all aspects of a work system to support human performance and safety" (Russ *et al*. 2013) or more simply "Making it easy to do the right thing" (Martin Bromiley). In recent years there has been an increase in the reported application of human factors/ergonomics approaches (HFE) in healthcare, with a particular focus on surgery and the prevention of adverse events, including, but not limited to, infection. Reports of HFE approaches in infection prevention more widely are also increasing, although, arguably, the term 'Human Factors' is misused and abused in the healthcare literature (Russ *et al*. 2013). This presentation will include a brief introduction to the science of HFE and systems thinking and will focus on the opportunities and progress to date in applying HFE to the surgical pathway, with particular reference to the prevention of infection.

Russ AL, Fairbanks RJ, Karsh B-T, Militello LG, Saleem JL, Wears RL. The science of human factors: separating fact from fiction. *BMJ Qual Saf* 2013; 22: 802-803. doi: 10.1136/bmjqs-2012-001450.

O41 OneTogether: working together to prevent infections across the surgical pathway

Deborah Xuereb

Mater Dei Hospital, Msida, Malta

The OneTogether project is a partnership between leading UK-based professional organisations with an interest in the prevention of surgical site infections (SSI). It is a quality improvement collaborative between IPS, AFPP, CODP, RCN and 3M with the aim of promoting and supporting the adoption of best practice to prevent SSI across the surgical patient pathway. Following consultation with operating theatres and infection prevention practitioners a self assessment audit tool was developed focusing on seven areas of care that are fundamental to best practice in minimizing risk of SSI. These include skin preparation, prophylactic antibiotics, patient warming, maintaining asepsis, surgical environment, wound management and surveillance of SSIs. The tool is based on standards and best practice guidance and encourages infection prevention practitioners to liaise with operating theatre staff to identify limitations and gaps in infection prevention practices during the pre-operative phase, in operating theatres and during post-operative stage. The tool helps hospitals identify variations in knowledge and availability of policy on SSI prevention within their teams. The results from the assessment provide guidance into the level of compliance within each area assessed and can be used to help prioritise actions for improvement based on risk assessment, speed of actions or compliance scores. In this session we will identify how the tool can be utilised in practice to trigger improvements in practices.

'It's cold in here' - the case for patient warming O42

Heather Loveday

University of West London, United Kingdom

Hypothermia during surgery has been associated with surgical site infection and delayed wound healing and surgical care bundles include the maintenance of normothermia. A number of factors lead to patients becoming hypothermic during surgical procedures; these include the skin being exposed, the effect of anaesthetic drugs and the administration of cold intravenous and irrigation fluids. This presentation will discuss the findings from recent evidence syntheses and implementation studies in relation to patient warming in the perioperative period and the association with surgical site infection.

Healthcare-associated bacteria: transmission and spread O43

Hajo Grundmann

University Medical Centre Freiburg, Germany

Epidemics of healthcare associated bacteria are often characterised by the expansion of a relatively small number of successful clones. This seriously undermines the ability of hospital epidemiologists to disclose transmission pathways and gaps in infection control but offers the potential to understand the temporal-spatial spread over larger evolutionary as well as geographic distances. The lecture will focus on the advantages of synteny in *S. aureus* and its role as a model organism that improves our conceptional thinking about nosocomial transmission at large.

O44 Pro-con debate: What is the main impact of antibiotic stewardship programmes?

Saving money: Andreas Voss

Canisius Wilhelmina Hospital, Nijmegen, The Netherlands

Reducing resistance: Agnes Wechsler-Fördös

Department of Antibiotics and Infection Control, Rudolfstiftung Hospital, Vienna, Austria

Antibiotic stewardship is touted as one the essential interventions to reduce antimicrobial resistance in healthcare settings. However, is this supported by evidence based literature or is the main impact of these programmes primarily in reducing costs? The two speakers will debate these divergent views.

O45 A point prevalence study of healthcare associated urinary tract infections in Australian acute and aged care facilities

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[4]VICNISS Healthcare Associated Infection Surveillance Coordinating Centre, Victoria, Australia

Introduction

The urinary tract is the most common site of healthcare-associated infections reported by acute and aged care facilities. Most healthcare-associated urinary tract infections (HAUTIs) are potentially preventable through implementation of effective strategies. Point prevalence surveys are a useful surveillance method to inform prevention and control of HAUTIs This study reports the findings of phase II of this three phase project.

Aims

To pilot an online process for conducting point prevalence survey of HAUTIs and CAUTIs and to determine the point prevalence of HAUTIs and CAUTIs in acute and aged care facilities.

Methods

We estimated the point prevalence of HAUTIs and CAUTIs across eighty-four acute care and eighteen aged care facilities in Australia, using internationally recognised definitions. Patient records and laboratory results were surveyed using a web based questionnaire.

Results

A total of 1320 patients and 663 residents were surveyed. The median age was 74 years (interquartile range, 58-84 years) for acute care patients and 86 years (interquartile range, 79-90 years) for aged care residents. Overall HAUTI and CAUTI prevalence was 1.4% (CI: 0.8-2.2) and 0.2% (CI: 0-0.5) in acute care and 1.5% (CI: 0.8-2.6) and 0.3% (CI: 0-0.8) in aged care. There were 9.3% and 3.3% of patients and residents respectively with a urinary catheter in place on the survey day.

Conclusion

While the overall level of HAUTIs is low in both acute and aged care, given the burden and high risk of systemic sepsis from UTI, we should aim for zero HAUTI prevalence.

Antibiotic stewardship decision-supporting system - innovating the control and prevention of antibiotic resistant infections - a participative approach O46

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Healthcare associated infections (HAI) caused by antibiotic-resistant pathogens are linked with high-levels of morbidity and mortality. To prevent and control antibiotic-resistant HAI, strategies based on surveillance/monitoring systems are imperative, especially if they are well-matched with the local social-cultural background. To decrease antimicrobial-resistant HAI in hospitals a decision-supporting-system was designed to reduce antibiotic use/misuse and antibiotic-resistant HAI. Three Portuguese hospitals participate in the research, following the design science research methodology:

i. problem identification;
ii. solution definition by using an antibiotic stewardship decision-support information system;
iii. design, in collaboration with healthcare workers, a toolkit that help/assist physicians and infection control team to monitor/control antibiotic use and antibiotic-resistant HAI;
iv. implementation of the toolkit in the hospitals; and
v. evaluate the toolkit in the control and prevention of antibiotic-resistant HAI.

To feed the toolkit, patient, microbiology and pharmacy data are extracted from the current hospitals information systems by web services, in real-time. The information is then processed and aggregated in a unique database. A display module allows visualization through innovative graphics presentation: inform about the accuracy of antibiotic prescription, providing timely and appropriate information related with antibiotics use; monitoring the data about antibiotic use and resistant bacteria.

The evaluation of the toolkit, based on a focus group questioner about the toolkit functionalities, revealed that it was considered helpful in monitoring antibiotic use, helping antibiotic prescription, and can be used to improve infection control interventions. This toolkit is an important step forward for the reduction of antibiotic misuse and in the control/prevention of antibiotic-resistant HAI.

Ebola virus disease in healthcare settings in Nigeria 2014; implications for infection control

O47

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Introduction

During Ebola virus disease (EVD) outbreaks, up to 60% mortality is documented among health workers and hospitalized patients. In July 2014 an outbreak of EVD occurred in Nigeria following its importation by the index case, treated in a private health facility. We identified and characterized probable risk factors for disease transmission to guide infection prevention and control practices in this setting.

Methods

We defined a healthcare worker as any clinical staff who cared for the index case, and subsequently developed the disease. We reviewed clinical history and socio-demographic characteristics of affected health workers. We tested association between potential risk factors and developing EVD using bivariate analysis.

Results

A total of 11 healthcare workers were infected with six (54.5%) females, and four nurses (36.4%) resulting in five deaths (CFR 45.5%); three of those fatalities (60%) were females and three (60%) were doctors. Eight (72.8%) had direct physical contact and three (27.2%) contact with body fluids of index case. There was no significant relationship between age, sex, job cadre, type of contact and developing EVD ($p>0.05$). There was equal risk of infection in all health workers in contact with index case, with all developing EVD (Relative Risk = 1.4).

Conclusions

All healthcare workers are at risk of contracting infectious diseases during outbreaks. Clinicians should adopt and adhere to recommended standard precaution in managing all patients. Implementation of infection control policies and adherence to good

practices are integral to preventing and limiting disease transmission in healthcare settings.

O48 Bundle approach for HAI prevention standard implementation-focus on haemodialysis setting

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Introduction/aims

Through the process of national HAI prevention standard implementation Bulgarian Association BulNoso organized round table with the representatives of clinical associations. National consensus was signed for bundles approaches promotion, implementation, education. HD-CLABSIs are one of the most common causes of fatal HAI, with a mortality rate of 12%–25% has been served as a focus for improvement strategies in haemodialysis setting.

Interventions

A "bundle" of five steps to help prevent "CLABSI": proper hygiene and sterile contact barriers; properly cleaning the patient's skin; finding the best vein possible for the IV; checking every day for infection; removing or changing the line only when needed has been introduced in practice. The teams of 16 haemodialysis centres were included.

Results

The regular training of staff on infection control topics, access care, aseptic technique; education to all patients on infection prevention issues, vascular access care and hygiene, recognizing signs of infection has been organized. The patients screening for MRSA careers, decolonization and bundle implementation has been provided. The collected data on HD-CLABSI bundle element adherence and rates, an average 23.5% reduction of CLABSI was observed.

Conclusions

A bundle is a specific tool with clear parameters. The goal-oriented nature of the bundle appears to demand development of the teamwork with clinical specialists necessary to improve patients' reliability.

The clinical impact of ventilator-associated events: a prospective surveillance in a large hospital of China O49

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Introduction

CDC has developed the ventilator-associated events (VAE) surveillance. However, there were only a few studies about VAE, especially in China.

Objective

This study was performed to investigate VAE incidences and clinical impact in Chinese adult patients.

Design

21-month prospective single-centre surveillance on VAE between January 2014 and September 2015.

Setting

An adult comprehensive intensive care unite (CICU) of a large hospital in China.

Methods

Patients (≥18 years old) on mechanical ventilation(MV) >2 days were monitored for VAE. Patients with and without VAE were compared for clinical outcomes, the same as those with ventilator-associated condition (VAC) alone, infection-related ventilator-associated complication (IVAC) alone and possible ventilator-associated pneumonia (PVAP). Independent-sample T-test, Fisher's exact test and regression models were used in data analysis ($p<0.05$).

Results

Of 1,004 patients who received MV with 13,795 ventilator-days, 307 (30.6%) developed VAC, including 121 (12.1%) with IVAC and 47 (4.7%) with

PVAP. Patients with VAE had 14.2-day increased length of stay (LOS) in ICU, 15.7-day longer duration of MV and higher hospital mortality (27.0% vs 14.3%) than those without (P<0.05). VAE is the independent risk factor of the outcomes (β14.2, 95% CI 10.2-18.1 for LOS in ICU,β16.1, 95% CI 12.7-19.5 for duration of MV, OR 14.2, 95% CI 1.4-3.0 for mortality). There were no differences in the outcomes of the patients with different VAE.

Conclusions

In our CICU patients, VAE had a high incidence. VAE is associated with poorer clinical outcomes. However, future studies are needed to tell the differences in the outcomes of the patients with different VAE.

O50 On improving compliance with surgical antibiotic prophylaxis guidelines: frequently ignored simple actions

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Background

The literature reveals low compliance with surgical antibiotic prophylaxis (SAP) guidelines, but few studies explore SAP in neurosurgery. This study describes compliance with SAP guidelines in neurosurgery, and institutional characteristics related to greater compliance.

Methods

This retrospective study assessed neurosurgeries performed in 2010 at nine hospitals located in Sao Paulo City, Brazil. SAP guidelines compliance was based on six attributes and full compliance was reached when all attributes were compliant. A structured questionnaire was applied to describe hospital, and hospital infection control committee (HICC) characteristics. Logistic and linear regression were used to investigate association between SAP attributes compliance, patient, hospital, and HICC characteristics. Analyses were conducted at the 5% significance level.

Results

Full compliance was 10% among the 1,011 neurosurgeries evaluated. Compliance was better for drug dose (90.6%) and indication (90.0%) and worse for duration (26.1%).

SAP guidelines compliance was associated with HICC weekly hours for intensive care unit (ICU) beds (p 0.048), SAP guidelines dissemination (p 0.035), monitoring (p 0.024), and dissemination of SAP guideline compliance (p 0.015). Daytime surgeries had greater compliance regarding drug dose OR 3.38 (CI 1.72-6.65) and initial time OR 2.30 (CI 1.24 – 4.25). Spinal surgeries achieved greater compliance with initial time of SAP OR 1.83 (CI 1.12–3.01), and duration OR 1.59 (CI 1.7-2.16).

Conclusion

This study showed low compliance with SAP guidelines. Compliance was associated with HICC weekly hours/ICU beds, SAP guidelines dissemination, and monitoring and dissemination of SAP compliance rate. The findings highlight simple but crucial measures to improve SAP use.

O51 Participation in IFIC's Mentorship Programme between Malta and Albania: opportunities for improvement and sharing experiences

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Following a call for applications, a knowledge-sharing mentorship exchange programme in infection prevention and control (IPC) was approved and funded by IFIC between Mater Dei Hospital, Malta (MDH) and University Hospital Centre 'Mother Theresa' (QSUT), the largest tertiary acute hospital in Albania with a bed compliment of 1600 beds.

An initial baseline gap analysis was undertaken by MDH participants to review IPC infrastructure and practices was performed and target initiatives identified for the project, focused on training and improvement

in basic IPC structures and practices. Key stakeholders from hospital administration, IPC and microbiology of QSUT were invited to MDH to experience the IPC systems and strategies in this hospital. Lectures on antibiotic stewardship were delivered in a second visit to QSUT, when a point prevalence study of multi-drug resistant carriage was undertaken.

A total of six QSUT personnel each spent a week at MDH and received training and hands-on involvement in IPC and microbiology. Feedback and reports with specific recommendations for actions were disseminated following each visit. A final visit to QSUT was used to outline a future implementation strategy for the hospital, with an initial emphasis on improving hand hygiene and intravenous line care.

Despite significant infrastructural and personnel challenges, several successful changes were introduced as a direct result of the project. These included restructuring of IPC systems and introduction of alcohol hand rub, especially in QSUT's high-risk intensive care departments. Hand hygiene reminders for healthcare workers in the work place have also been implemented.

Acknowledgements

We would like to gratefully acknowledge the contribution of the staff of the MDH Infection Control Department and Microbiology Laboratory in providing training and assisting in hospital visits as well as the assistance of QSUT Infection Control during the converse visits.

O52 Process and quality control of water systems – what is needed?

Regina Sommer

Medical University of Vienna, Austria

Water from the drinking water system is needed for numerous applications in healthcare facilities. Whereas the water supplier is responsible for the water quality from the catchment of the water resource along the whole chain including possible treatment, storage and transport, the responsibility switches to the owner/operator of the building at the transfer point. Taking into account that impairments of the water quality inside buildings may occur despite impeccable quality at the point of entry, process and quality control of water systems have become an important duty of the owner/operator to prevent water associated infections and intoxications. Besides water for drinking, personal hygiene and cleaning, distributed in cold water and hot water installations, engineered water systems may cause a considerable human health risk for patients and personnel. Representative examples for such systems are therapy pools and patient-care bathtubs, treatment systems for haemodialysis water or the water for evaporating cooling towers. In the last years considerable progress has been made in terms of technology, operation, maintenance and control. Respective guidelines and standards have been established. In 2012 a new Austrian regulation on bathing water hygiene was enacted, which substantially expanded the hitherto existing scope. For the production of haemodialysis water the international standards ISO 13959 and ISO 23500 and technical guidelines for the water quality of evaporating cooling towers have been established (ÖNORM B 5020). All three have in common that special emphasis is laid on the control of the quality by means of a stage-by-stage check. Water hygiene represents a multidisciplinary challenge worth the effort to contribute to the prevention of water associated nosocomial infections.

O53 Prevention of waterborne infections – what can be done?

Markus Hell

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Healthcare water systems need active and continuous risk management. All healthcare facilities should have water safety plans as part of their infection control programme that define roles and responsibilities, design and maintenance, monitoring and action plans. Biofilm formation and water contamination should primarily be controlled and prevented through the following interventions:

Water should be kept at temperatures that limit growth of micro-organisms which means below 20ºC for cool water and above 50ºC for warm water at return. Dead ends favour water stagnation and should be prevented by a systematic walk-through of the water system, pipe by pipe. Point-of-use micro-filters against biofilm and chemical contamination can be mounted on single faucets for washbasins and showers. They need frequent changing and are costly, but are used in ideal facilities for immuno-compromised patients to prevent risk of legionella and pseudomonas infections. Water taps in clean areas should have long handles for turning with the elbow. In mixers, the hot and cold water should be kept separate as much as possible. Photocell faucets should be avoided, as they prevent flushing of the taps. Flexible shower hoses should not be longer than 1.5 meters, and be mounted so high that they can drain hanging between uses. The hose should be of light-proof material since light stimulates the formation of algae, which favour the growth of other micro-organisms. Chemical disinfection of water should be considered when physical and structural interventions are insufficient.

The described measurements should be considered as a holistic approach to minimize the risk of waterborne infections within healthcare facilities.

O54 Outbreak!

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Outbreaks in healthcare settings are regular occurrences, and demand swift action.

This workshop will address interactively how to investigate an outbreak, including when to declare one, and the steps required for its control.

Two outbreaks, one in a medical setting and the other one in a surgical ward, will be presented.

Audience participation will be key in discussing aspects of management, novel solutions, and difficulties related to assessment of healthcare personnel.

The burden of surgical site infections in developing countries O55

Benedetta Allegranzi

World Health Organization, Geneva, Switzerland

Background

Surgical site infection (SSI) is one of the most frequent complications of surgical procedures, but SSI surveillance according to standardized methods is difficult in developing countries due to lack of expertise, resources, and laboratory capacity. In 2010, WHO published a scientific publication and a report based on a systematic review on the burden of healthcare-associated infections (HAIs) in low-/middle-income countries (LMIC). SSI was identified as the most frequently studied and leading HAI in LMIC and SSI incidence was found to be up to 10 times higher than in high-income countries.

Methods

We performed an update of the previously published systematic literature review (1995-2008) by using the same methodology and focusing on SSI only. We searched Medline, Cochrane, Embase, and all WHO regional databases with no language restriction, from January 2009 to June 2015. We pooled SSI incidence data through meta-analysis using a random effect.

Results

Compared to the previous review which identified 57 articles focused on SSI in LMIC, the current update found 147 additional studies. The presentation will report median as well as pooled mean SSI incidence data, including stratifications according to the type of surgery, wound class, regional distribution and country economies. Available data about microbiological aetiology of SSI, independent risk factors for SSI, and costs reported by the selected studies will also be reported.

O56 Do we get surgical antibiotic prophylaxis right? A WHO global survey and evidence-based recommendations

Nizam Damani

World Health Organization, Geneva, Switzerland

Given the important profile of antimicrobial resistance within WHO, as highlighted in a recent EB Resolution, WHO conducted a global survey with aim to collect data on surgical antibiotic prophylaxis (SAP) prescribing in a wide range of healthcare facilities. The main objective was to establish the proportion of patients who continue surgical antibiotic prophylaxis after their operation in the absence of any infections, to ascertain the types and duration of antibiotic prophylaxis, and the reasons for SAP prolongation.

Although, several experimental and clinical studies demonstrated an effect of SAP on prevention of surgical site infections (SSI), but the optimal timing remains to be defined. Recently, several guidelines have been published by various organizations recommend administration of SAP within 60 minutes prior to surgical incision. However, these recommendations are not based upon systematic reviews of the literature and meta-analysis, and rigorous evaluation of the quality of the available evidence. As a part development of the WHO Guidelines for the Prevention of Surgical Site Infections, a systematic review of the literature and meta-analysis was carried to establish on optimal timing for preoperative SAP.

This presentation will discuss the outcome of the WHO global survey on the SAP and present findings of systematic review of the literature and meta-analysis on optimal timing of preoperative preoperative SAP.

O57 Surgical Unit-based Safety Programme in Africa: a successful model for reducing SSI through infection prevention and control and culture change

Claire Kilpatrick[1], Benedetta Allegranzi[1], A. Aitken[2], S. Berenholtz[3]

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Five African hospitals were selected for a surgical unit-based safety program (SUSP) conducted between 2013 and 2015, as part of a World Health Organisation (WHO) collaboration with the Johns Hopkins Armstrong Institute for Patient Safety and Quality (JHAIPSQ). The JHAIPSQ SUSP implementation strategy and tools were adapted for the African settings while maintaining the core, tested US-based approach. WHO developed a new protocol and tools for surgical site infection (SSI) surveillance including data collection forms and a data entry and analysis package, a video, PowerPoint presentations and other documents to support SUSP training. New promotional posters and tailored surgical antibiotic prophylaxis protocols were also produced. A before-after, semi-experimental study design was then used as part of the roll out of SUSP in the African hospitals consisting of four phases: preparation, baseline evaluation, implementation, and follow-up evaluation. Several indicators were measured during the baseline, implementation and follow-up phases. The primary study outcome was SSI incidence; however, several process measures reflecting the implementation of a SSI prevention bundle were also recorded to assess actual implementation of the intervention and improvement of SSI prevention practices. These variables were included in the data collection forms and collected pre-, intra- and post-operatively for all enrolled patients in the study. The Hospital Survey of Patient Safety (HSOPS) was also conducted both at the baseline and follow-up phases. Support for implementation was provided by WHO and JHAIPSQ throughout. Finally, four hospitals completed the study. Preliminary results and recommendations will be presented.

O58 Surveillance of antibiotic resistance in Europe and beyond

Hajo Grundmann

University Medical Centre Freiburg, Germany

When measuring antibiotic resistance through surveillance, quantifiable operational units need to be defined. These depend on the needs of the stakeholders that shall be informed thorough theses efforts. This presentation will define stakeholders' demands to generate an inventory of surveillance objectives. For simplification, an original approach will be chosen to bundle sets of objectives that represent common demands and can be addressed by common subject areas.

Subject area I addresses clinical demands and focuses on patients;
subject area II addresses public health demands by focussing on meta-populations;
subject area III addresses infection control demands and focuses on pathogens.

A division into these areas leads to a separation of surveillance activities suggesting a modular approach which can provide complementary information. Moreover, the modules address the conundrum of ABR at the complementary levels of

i. patient,
ii. population,
iii. pathogen,

which – rather conventionally – follow the operational and professional fault lines of the main disciplines involved, namely clinical medicine, public health, and biology. Efforts to harmonise these operational units of surveillance will be discussed and exemplified by European collaborative network approaches.

HAI and AMR surveillance and control in Austria O59

Reinhilde Strauss

Ministry of Health, Vienna, Austria

Surveillance of HAI and AMR has a long tradition in Austria which is reflected in the participation in EU-projects such as EARSnet and HAInet since years. After an evaluation of the ECDC concerning existing structures and outcomes in AMR/HAI surveillance and control, the National Action Plan AMR was released. The NAP-AMR covers all fields of interventions both in human and animal health following the "one health" - concept as stated by WHO and EU and it is updated regularly.

Furthermore the topic has reached highest political level and thus the implementation of the NAP-AMR until the end of 2016 is part of the nationwide health reform. Two important activities are the realisation of nationwide single datasets for AMR and HAI that allow for benchmarking, quality improvement in the regions and international comparison. Concerning AMR a pilot project is currently under way and full implementation is foreseen with beginning 2017. Concerning HAI the conceptual phase is finished - after decision making on political level the implementation should start this year with a pilot phase and full implementation beginning 2017.

Healthcare waste management in the era of Ebola, MERS, SARS and other infectious disease - the EU perspective O60

Edward Krisiunas

Waste Not Want Not International, Burlington, Connecticut, USA

When the topic of waste management comes up in conversation today, unless you are in the industry or have embraced a green life style, one might receive an odd face or two or none at all. That sometimes changes when one discusses Health Care Waste (HCW) - that array of material generated in the

provision of healthcare. This presentation is not about managing electronic waste per the WEEE directive or recycling of office paper (although they are part of the healthcare waste stream). Rather the evolution of HCW management related to infectious material has traveled an interesting path, somewhat similar to Western Front from World War I from Nieuport to Basel. What began as simply collecting infectious waste that posed a risk of disease transmission such as sharps and gauze/drapes/tubes of blood in the '80s has evolved into a sophisticated collection/management system of multi-coloured bags and bins, that are treated and destroyed by an equally eclectic number of treatment technologies. While few reports in the literature have confirmed actual disease transmission to healthcare workers or the public from this waste in high income countries, the recent Ebola as well as SARS and MERS outbreaks forced facilities to review their waste handling practices. For years, the EU waste catalog has set the bar for classifying waste. However, lack of consistency remains. This presentation will review these issues as well as discuss a current undertaking to have a common theme related to HCW management training throughout the EU.

O61 Submitting your first successful paper - what journal editors look for

Kathryn Suh

The Ottawa Hospital, Canada

This session is targeted to new authors who have never submitted a manuscript to a medical journal. We will outline why you should consider publishing your research, how to select the journal that is most appropriate for your research, and the general process for preparing a manuscript, highlighting the features of a manuscript that will increase the chances of successful publication. We will discuss how journal reviewers and editors assess manuscripts and some of the factors they consider when they decide that a manuscript should be accepted, rejected, or revised. We will also address some of the potential pitfalls for authors to avoid. This session is intended to be interactive, with time for discussion.

Community-associated MRSA O62

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MRSA infections are usually hospital-acquired (HA-MRSA) and affect older patients with prolonged hospital stay and repeated antibiotic courses. HA-MRSA is usually introduced into hospitals by colonised patients who are then the source of cross-infection to others. HA-MRSA does not spread significantly in the community but patients may remain colonised after discharge and become the source of new infections on re-admission. The epidemiology and control of nosocomial HA-MRSA is now well understood and the incidence of this infection in hospitals is declining.

However, true community-associated MRSA (CA-MRSA) has recently emerged in people without previous healthcare contact. CA-MRSA strains are genetically distinct from HA-MRSA and have arisen by the insertion of small SCCmec cassettes into the chromosome of methicillin-sensitive *S. aureus*. They often produce the PVL virulence factor, but even without PVL they commonly cause skin abscesses and, rarely, necrotising pneumonia and death in previously healthy people.

Compared with HA-MRSA, CA-MRSA strains have the potential to produce more frequent infections in the community, more severe infections in hospitals, affect previously spared specialties such as paediatrics and obstetrics, and cause more frequent infections in healthy people, less compromised patients and in staff.

CA-MRSA is widespread in the USA, dominated by PVL+ve USA300 (ST8-IV); it is uncommon but increasing in Europe and other countries and is more genetically diverse. It seems inevitable that CA-MRSA will become increasingly common in both hospitals and the community and, because of its different epidemiology from HA-MRSA, will require new methods of control.

O63 Clostridium difficile

Markus Hell

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In the field of healthcare-associated infections, *Clostridium difficile* infection (CDI) has evolved to become the main contributor to healthcare-associated infectious diarrhea. Today, CDI is responsible for approximately 50-70% of gastrointestinal infections in hospitalized patients and reported incidence rates range from 1 to 30 cases per 1000 patient discharges. CDI is an infection of the large intestine caused by the bacterium *C. difficile*. An episode of CDI is defined as a clinical picture compatible with CDI (i.e., diarrhea, ileus or toxic megacolon) with microbiological evidence of *C. difficile* in stool, without reasonable evidence of another cause of diarrhea, or identification of pseudomembranous colitis during endoscopy, after colectomy or on autopsy. CDI can be severe and life-threatening: European surveillance data indicate that CDI rates among hospitalized patients have increased in many countries and that approximately one in ten CDI cases causes (or contributes to) ICU admission or death, or leads to colectomy. Ten to 25% of treated patients have a CDI recurrence within a month after initially successful therapy.

CDI can often be prevented. The local burden of CDI may reflect weaknesses in various aspects of diagnosis (e.g. disease awareness and adherence to recommended diagnostic practices), care (including antibiotic use, hand-washing, infection control, environmental decontamination, training and staffing) and surveillance.

CDI prevention is achieved by consistent and reliable implementation of infection prevention and control and antimicrobial stewardship measures.

Vancomycin resistant enterococci O64

Petra Gastmeier

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Vancomycin resistant enterococci (VRE) are associated with morbidity and mortality in patients with haematological malignancies, patients following abdominal surgery and intensive care patients. A recent systematic review described a 95% higher mortality following VRE bacteraemia compared with vancomycin susceptible enterococci as the causing pathogens (Prematunge *et al.,* ICHE 2015). However, prevalence of VRE bacteraemia in these patient groups varies widely between institutions and countries. In general, the VRE prevalence in Europe is much lower compared to US hospitals, but within Europe is also a wide variety. For example, in German ICUs the incidence of nosocomial infections with VRE is almost equal with the incidence of nosocomial MRSA infections.

Several studies suggest that antibiotic therapy over administration is the main driver of VRE colonization. Previous metronidazole treatment was shown to be strongly associated with domination of VRE in anaerobic flora and a subsequent nine-fold increase in the risk of VRE bacteremia (Taur *et al.,* CID 2012). Infection control measures for preventing VRE infections include hand hygiene, staff education, isolation of patients colonized with VRE and environmental cleaning. Active screening contributes to VRE prevention probably by heightening awareness of control measures, including isolation (Humphreys, J Hosp Infect 2014). General decolonisation in wards with high colonisation rates may also be useful (Climo *et al.*). However, the evidence for the mentioned measures is limited (De Angelis, JAC 2014).

O65 Infection control in the neonatal intensive care unit

Angelika Berger

Department of Paediatrics and Adolescent Medicine, Medical University of Vienna, Austria

Premature infants are particularly prone to severe nosocomial infections during their stay in the neonatal intensive care unit (NICU) due to several reasons, including high amounts of antibiotics used in NICUs, low grade of colonization at the time of admission, an immature immune system and risk factors related to intensive care such as intravenous lines, long term parenteral nutrition, mechanical ventilation and surgeries.

In the presentation, advances in neonatal intensive care over the last decade, particularly improvements in the outcome of extremely premature infants, as well as consequential challenges with regard to infection prevention will be discussed. The course and results of a multidisciplinary project to reduce nosocomial sepsis rates at the NICUs of the Division of Neonatology, Paediatric Intensive Care and Neuropaediatrics at the General Hospital of the Medical University of Vienna will be presented. Furthermore, literature on NICU outbreaks as well as outbreak management will be reviewed.

O66 Making a business case for infection control – chances and pitfalls

Agnes Wechsler-Fördös

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Nosocomial infections are a major threat to patient safety and cause high expenses. In recent years, these infections are even more worrisome due to the increase in multidrug resistant pathogens.

By law, every hospital in Austria was required to have an infection control physician since 1972. The only defined task at that time was that this person had to be contacted in case of building or reconstruction activities within the hospital.

From 1989-1995 a WHO-project "Health and Hospitals" was supported and financed by the city of Vienna and was carried out in Rudolfstiftung Hospital. One of the bottom-up subprojects was "Establishing a Professional Hygiene Organization." Thus the framework for infection control teams was developed and implemented in this model hospital. The knowledge gained in this project served as a basis for changes in legal requirements to establish interdisciplinary infection control teams in all hospitals with defined goals, tasks and responsibilities.

Nevertheless, expenses were a major topic as there was no incentive for hospital trusts to put money into these new organizations, especially since any return on investment would not be available very soon. Therefore it is advisable to start with interventions that show beneficial outcomes rapidly in order to get sustained support from both the hospital's chief executive and from healthcare workers as efficient infection control measures might interfere with everyday practices.

CRE/CPE/CRO – demystifying the microbiology and opportunities for genome sequencing O67

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Multidrug-resistant Gram-negative bacteria (MDR-GNB) come in many shapes and sizes. CRE, CPE, CRO, CPO, NDM, KPC, ESBL are just some of the dazzling array of acronyms you will come across when talking about MDR-GNB. It's not as straightforward as plain old MRSA! One of the most important threats within the MDR-GNB family are bacteria that are resistant to the carbapenems. Carbapenems are a class of beta-lactam antibiotic with a broad spectrum of activity against Gram-positive and Gram-negative bacteria. Whilst carbapenems are used for the treatment of Gram-positive infections, the emergence of Gram-negative bacteria with resistance to the carbapenem antibiotics is a health issue that has prompted unusually dramatic health warnings from the US CDC, Public Health England (PHE) and the European CDC (ECDC). Related to the issue of acronyms is how do we

distinguish between different strains of carbapenemase-producing Enterobacteriaceae (CPE)? Pulsed-field gel electrophoresis (PFGE) has been the mainstay of typing in the past, but provides rather limited epidemiological information. The advent of whole genome sequencing offers the capacity to provide unprecedented detail in understanding the epidemiology of this heterogeneous group of bacteria. This talk will aim to navigate through the MDR-GNB acronym minefield, focusing on the threat of carbapenem-resistant bacteria and exploring the new insight offered by whole genome sequencing. I will cover the emerging issue of antibiotic resistance in Gram-negative bacteria, explaining key differences between antibiotic resistant Enterobacteriaceae and non-fermenters, and examining the threat of CPE.

O68 MDR ESBL across Europe: can we turn back the tide?

Peter Wilson

University College London Hospitals, United Kingdom

The increase in multidrug resistant Enterobacteriaceae and *Pseudomonas aeruginosa* in many countries presents significant threats to successful treatment. These organisms are becoming prevalent in hospitals, long term care facilities and the community and are transferred among vulnerable patients by staff and contaminated equipment. Colonization of the gut including travellers provides a reservoir for transfer to others. Plasmid transfer in the gut results in a variety of strains carrying resistance mechanisms. Although food animals can provide another reservoir most spread occurs from human to human. The use of antibiotics, urinary catheters and gastrostomy are factors in colonization with resistant Enterobacteriaceae while Pseudomonas sp spreads via hand carriage from handwash sinks. Although many strains can be treated with alternative antibiotics or combinations, some are pan-resistant and prospects for new agents are poor. Infection control is the best defence and concerted national programs have shown success. Routine testing for resistance in the laboratory combined with screening for rectal carriage allows detection of outbreaks with minimum delay. Standard Infection Control Precautions particularly hand hygiene and environmental cleanliness reduce transmission. However, unlike MRSA, carriage is not cleared and long term physical segregation is difficult where prevalence is high. Achieving success will be a serious challenge.

The challenges of patient isolation - what can we do when there is no room at the inn? O69

Martin Kiernan

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Many hospitals were not designed to cope with the demands now placed on them in terms of managing patients with infection. There are increasing demands on already overburdened isolation facilities in many hospitals and the rise in multi-drug resistant gram-negatives (MDRGN) places further demands on these limited resources. This paper will review the evidence for isolation of patients, consider the effectiveness of this as a strategy and will make recommendations for risk assessment and prioritisation of room allocation given the difficulties that a constantly changing set of challenges presents. The problem of what to do when there are no isolation facilities will be examined. The question as to whether 'isolation' is possible in open ward areas will be considered and the evidence for advanced source control by way of patient bathing with Chlorhexidine as a strategy for when isolation of all that would ideally require it will also be discussed.

Adapting infection control practices to past, present and future challenges O70

Didier Pittet

Geneva University Hospitals, Switzerland

Healthcare-associated infection (HAI) is a major, global issue for patient safety and its prevention was chosen by WHO Patient Safety as the theme of its First Global Patient Safety Challenge "Clean Care is Safer Care" launched in October 2005. Infection rates differ dramatically between countries with the greatest burden in developing nations. Although some

differences can be explained by patient case-mix and diversity, others suggest a wide variability of policies and practices in HAI prevention, such as differences in adoption and application of guidelines and protocols, beliefs and attitudes among healthcare workers, staffing patterns, available resources, or barriers to implementing best practices.

The infection control team must identify infection prevention and control (ICP) practices which are unsafe and hazardous. Unsafe practices must be assessed for their severity, frequency, and likelihood of recurrence. Priority must be given to hazardous practices that have high adverse effects for patients. Once all information is available on the severity, frequency of occurrence, and cost of prevention, priorities for action and appropriate strategies can be developed. Effectiveness of these measures should be monitored by regular audits and/or outcome surveillance and the information must be fed back to front-line clinical staff, relevant managers, and key decision-makers.

Improvement in ICP practices requires questioning basic beliefs, continuous assessment of the stage of behavioural change, interventions with an appropriate process of change, and supporting individual and group creativity. Learning and behaviour change comes from training in a safe and controlled environment, similar to the training of pilots in simulators. But 'prevention of HAI: toward zero risk?' must take into account also benchmarking and public reporting in today's politicized healthcare climate. In several countries, public reporting of HAI is now mandatory. A net 'zero' may not be realistic, but it is suggested that most success in infection prevention comes from simply complying with practice recommendations, often available since many years. Hospitals must consider how they can implement practice change as failure to do may result in them being forced to do so by the public and by legislation in the future.

Poster Presentations

P1

Detection of antimicrobial resistance genes and virulence markers genotypes in Helicobacter pylori infected patients at Theodor Bilharz Research Institute

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Introduction/aims

More than 50% of the world's population harbor *Helicobacter pylori* in their upper gastrointestinal tract and over 80 % of them are asymptomatic. Prevalence of bacterial resistance varies in different geographic areas. The present study aimed to examine gastric biopsy specimens obtained from patients with dyspepsia for monitoring of resistant mutation genes in *H. pylori* strains to agents commonly used for treatment namely; metronidazole, amoxicillin, clarithromycin and tetracycline and to evaluate the virulence markers genotype profile among antimicrobial-resistant strains.

Methods

The study included 113 patients undergoing upper endoscopy with various dyspepsia symptoms at Theodor Bilharz Research Institute Hospital from March, 2012 to April, 2013. Four antral biopsy specimens were obtained from each patient for rapid urease test and DNA extraction for PCR assays. *H. pylori* antigen in stool specimens was tested by ELISA.

Results

H. pylori was detected in 60/113 (53.1%) using rapid urease test and/or stool antigen test and PCR assay on gastric biopsy specimens. Specific virulence genes; cagA, vacA and iceA1 were detected in 16 (26.6%), 37 (61.6%) and 23 (38.3%) of the 60 *H. pylori* strains. Gene mutations were detected among strains resistant to metronidazole (15, 25.0%), amoxicillin (11, 18.3%), clarithromycin (4, 6.7%) and tetracycline (one, 1.7%). Finally, there was no significant association between virulence genotypes and antimicrobial resistance.

Conclusions

The current study suggested an association between cagA genotype and peptic ulcer, and vacA and iceA1 for gastritis. There is no relation between virulence genotypes in *H. pylori* and antimicrobial resistance.

P2

Bactericidal action of a super-oxidized solution and gel versus iodine against a panel of multidrug resistant pathogens: comparative effectiveness

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Background

The use of topical disinfectants in modern wound care has helped in reducing surgical site infections. This study aims to compare the efficacy of two newly available oxidized water formulations with iodine.

Methods

We assessed the bactericidal effect of super-oxidized solution and gel against resistant bacterial

strains (methicillin resistant *Stapylococcus aureus*, vancomycin resistant *Enterococcus*, extended spectrum beta-lactamase producing and carbapenem-resistant enterobacteriaceae, multidrug resistant non fermentative rods and Candida spp.). Nutrient agars treated with Iodine, gel or solution were allowed to dry for 2 hours before inoculating the organisms in serial logarithmic dilutions and viable counts were determined by Miles and Misra method following overnight incubation at 37 °C. The experiment was performed twice in triplicate.

Results

With the super-oxidized products, significant Log reduction in viable bacterial and yeast counts (3.7–6.5, P values<0.01) was observed in all tested strains except in case of non-fermentative drug resistant Gram negative rods; for *Pseudomonas aeruginosa* bacteria log reduction was 2.6, P value=0.1 while there was no observable reduction in the counts of multidrug resistant *Acinetobacter baumannii*. Iodine showed more bactericidal activity on these species (Log reduction 2.7 and 2.9, P values<0001).

Conclusions

Although super-oxidized products are effective and practical topical antiseptic agents, their weak activity against non-fermentative rods esp. *Acinetobacter baumannii* makes them unsuitable for routine use in hospitals with ongoing outbreaks by the organisms. Other alternative agents need to be investigated for more effective topical antisepsis.

P3 Making national infection control (IC) guidelines for the healthcare sector

Helle Amtsbiller, Elsebeth Tvenstrup Jensen

The National Center for Infection Control (NCIC) at Statens Serum Institut (SSI), Copenhagen, Denmark

Introduction

In 2012, the task of making national infection control (IC) guidelines for the healthcare sector was assigned to The National Center for Infection Control (NCIC) at Statens Serum Institut (SSI). After a decade with guidelines written in an ISO standard-like format, this task implied a unified system of easily readable and freely available guidelines published on the SSI website.

Intervention

Professionals from IC units in the five Danish regions and other specialists were invited to participate in the topic-specific working groups.

These groups elaborated drafts, followed by a consultation process aimed at a broad spectrum of healthcare staff, professional societies, staff unions, authorities, and industry, before finalization of each guideline by NCIC. Recommendations were based on grading quality of evidence according to SIGN, using a combination of international guidelines, original articles, and consensus.

Results

By 2016, this work resulted in 14 finalized IC guidelines, all intended as the basis for local guidelines and implementation. Topics include flexible endoscopes, hand hygiene, building environment, disinfection, catheters, cleaning, surgery, textiles, and general practice.

NCIC noticed an increasing use by a broad range of healthcare, technical, and domestic staff. Besides, there is wide interest in the ongoing work with new guidelines and revision of existing ones.

Conclusion

A work process open to a broad range of users, a variety of IC topics, combined with materials that are easily readable and available and constitute a coherent system of guidelines seem to be a suitable foundation for the users' ownership and may improve implementation.

P4 Preventing infections among healthcare workers in Bangladesh by reducing sharp injuries through comprehensive educational and training module

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Introduction

Sharp injuries (SIs), one of the major occupational hazards among the healthcare workers (HCWs), are the leading cause of transmitting more than 20 blood borne pathogens including Hepatitis B, Hepatitis C and Human Immunodeficiency Virus. Exposure to these pathogens by accidental SIs usually occur due to unsafe use and disposal of sharps, which poses a serious threat to HCWs and their patients in extension.

Interventions

A quasi experimental study was conducted at two healthcare settings of Bangladesh from 2013-2014. The study included a baseline survey, pretest-post test with preformed questionnaire, followed by classroom and hands-on training, and post-training survey with a check-list through covert observation. Total 547 HCWs including nurses, laboratory technicians and cleaning staff were trained on prevention of SIs by convenient sampling method. Standard sharp injury reporting system was established and colour coded waste bins were introduced at both hospitals.

Results

Rate of compliance to standard methods of sharp use and disposal among nurses, laboratory technicians and cleaning staff increased remarkably from 0% to 82.65%, 42.35% and 70.59% respectively at the Institute of Child and Mother Health (ICMH) and 0% to 66.67%, 52.94% and 53.98% respectively at the General Hospital, Sirajgonj (GHS) ($p<0.0001$). total number of SI decreased from 200 to 3 at ICMH and 96 to 3 at GHS ($p<0.0001$).

Conclusion

Study results show that the intervention was successful in reducing SIs and decreasing occupational hazards among HCWs, which signifies the importance of effective infection control educational and training module.

Reprocessing of gloves: is it really economical? P5

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Introduction

Gloves are reprocessed and reused in healthcare facilities in resource limited settings to reduce the cost of availability of gloves. The study was undertaken with an objective to compute the cost of reprocessing of gloves so that an evidence based decision can be taken on the economics of reprocessing.

Methods and material

This retrospective record based cross-sectional study was undertaken in the central sterile supply department of a tertiary care teaching hospital in North India with more than 1700 beds. Costing heads considered were men, material and machine. Cost involved in reprocessing per pair of gloves was calculated by integrating all the cost inputs in various processes involved and dividing them with total number of gloves reprocessed in the study duration of one year.

Results and discussion

The study brings out that the total cost of a reprocessed pair of surgical gloves was USD 0.22 which was greater than the cost of a new pair of disposable surgical gloves (USD 0.15) as the cost of sterilization of one pair of gloves itself came out to be USD 0.17. Around 66.5% of the cost was attributable to manpower, while the cost of material constituted 26.4% of the total costs.

Conclusions

Reprocessing of gloves is not economical on tangible terms even in resource limited settings, and from the perspective of better infection control as well as healthcare worker safety, it further justifies the use of disposable gloves.

P6

Adherence to infection control and prevention standards in Shiraz hospitals, Iran, 2013

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Introduction/aim

Hospital infections are among one of the most important issues in patient management. Evaluate the adherence to infection control and prevention standards among governmental and non-governmental hospitals in Shiraz, Iran.

Methods

In this cross sectional study, 22 hospitals of the 33 hospitals in Shiraz, Iran including 13 governmental and 9 non-governmental facilities were surveyed. A 67-item self-administered questionnaire was used. Collected data were entered to SPSS Version 15.0 software. The level for statistical significance was set at 0.05.

Results

Adherence to infection control and prevention standards was 60.23% in governmental and 69.25% in non-governmental hospitals. Compliance by governmental hospital in the areas of program leadership & coordination, focus of the program , isolation procedures , barrier technique and hand hygiene, integration of the program with quality improvement and patient safety , education of staff about the program ranged from 63% to 88%. For non-governmental hospitals standard compliance for all areas ranged from 59% to 87%. Compliance rates between governmental and non-governmental hospitals in the areas of focus of the program and isolation procedures were statistically significantly different (p=0.03 and p=0.05 respectively).

Conclusions

To achieve more effective functional healthcare services, additional studies must be undertaken to assess the nature and extent of problem areas that exist in planning, implementing and monitoring of infection control and prevention standards.

P7

Nosocomial pneumonia: incidence and risk fatctors at Polyvalent Unit Care, Ibn El Jazzar Hospital, Kairouan, Tunisia (2015)

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Introduction

The ventilator-assissted pneumonia remains an important cause of morbidity, mortality and increased healthcare costs in patients who are mechanically ventilated. This increased incidence is influenced by the severity of patients and the frequently use of invasive mechanically ventilation. The aim of this study was to analyze the ventilator-assissted pneumonia (VAP) in our intensive care unit.

Material and methods

This is a longitudinal descriptive study of incidence including patients hospitalized in a period of one year: from 1/3/2014 to 28/2/2015. All patients with mechanical ventilation over 48 hours were included whether they were infected or not. Monitoring stops when the patient leaves or dies.

Results

The study included 257 patients, whose mean age was 39 +/-20 years (range: 2-93 years) and sex ratio was 2.48. Sixty nine pneumonia episodes were seen in sixty-for mechanically ventilated patients. The incidence density was 54.76 for 1000 days of mechanical ventilation. Nosocomial pneumonia was emerged after a period of 5+/-3 days from the admission and 4+/-3 days from the beginning of mechanical ventilation. The diagnosis is confirmed by the results of protected distal end tracheal aspirates cultures in 70, 42%. *Pseudomonas*

aeuroginosa, *Klebsiella pneumoniae* and *E. coli* were found in 66% of cases.

Conclusion

Our results were higher than other national or international study. The long-term solution to this problem is to set up a local prevention strategy as soon as possible.

P8

The role of educational intervention on healthcare workers' compliance to standard precautions and frequently touched surfaces cleaning at critical care units

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Aims:

To evaluate the role of educational intervention on healthcare workers' (HCW) compliance to standard precautions and frequently touched surfaces cleaning at critical care units.

Intervention:

The study included 49 HCWs at 2 intensive care units (ICUs) and one neonatology unit of Fayoum University Hospital. Evaluation of their knowledge, attitude and practice (KAP) towards standard precautions as well as obstacles affecting compliance to standard precautions before and after a 32-hour, purposed-designed infection control education program was performed using a structured self-administrated questionnaire and observational checklists. Assessment of environmental cleaning was investigated by observational checklist, ATP bioluminescence and bacteriological culture for 118 frequently touched surfaces.

Results:

Preintervention assessment revealed that 78.6% of HCWs were with good knowledge, 82.8% with good attitude and 80.8% had good practice. Obstacles identified by HCWs were as follow: making patient-care very technical (65.3%), deficiency of hand washing facilities (59.2%), skin irritation resulting from hand hygiene products (51%), unavailability of PPE (38.8%). High significant improvements of knowledge, attitude and self-reported practice were detected after one month of educational intervention (P= 0.000). During the pre-interventional period only 30.5% of surfaces were considered clean versus 97.45% post intervention (P<0.05). The highest median ATP bioluminescence values were obtained from telephone handset, light switches and blood pressure cuffs. S. aureus was the most common isolated organism followed by Enterococcus spp and E.coli (52, 38 and 19 surfaces respectively).

Conclusion:

Contentious training of HCWs on standard precautions should be considered a mandatory element in infection control programs.

P9

Measuring patient safety culture in a Tunisian tertiary care hospital

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Introduction/aims

In Tunisia, patient safety is now recognized as a top priority in healthcare system. Few attempts have been made to evaluate the extent to which safety is a strategic priority or that organizational culture supports patient safety. One of them, our study aimed to investigate patient safety attitudes amongst healthcare providers in Tunisian tertiary care hospitals.

Methods

This cross-sectional study was conducted during October, November and December 2013 in Sahloul University Hospital in Sousse: a 630-beds tertiary hospital in Eastern Tunisia. This survey included 344 cares providers. The french version of the hospital survey on patient safety culture questionnaire was used to identify dimensions of patient safety culture.

Results

Areas with potential for improvement were overall perception of security, teamwork within units,

organizational learning/continuous improvement, open communication and underreporting of events. Teamwork across hospital units had the lowest score. No significant differences between physicians and nurses were found for all composites in our study.

Conclusions

Patient safety culture remains underdeveloped in our hospital. Leaders must implement a development strategy by creating the culture and commitment needed to identify and solve underlying systemic causes related to patient safety.

P10 Incidence and risk factors of device-associated infection in Tunisian intensive care unit

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Introduction/aims

Intensive care unit -acquired infections (ICU-AIs) constitute an important worldwide health problem. Our aim was to determine 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 months' period in medical intensive care unit at University Hospital Center Farhat Hached (Sousse-Tunisia). Patients admitted to the unit were included in our 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<10-4) and mechanical ventilation (p=0.04).

Conclusions

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.

P11 Peri-operative antimicrobial prophylaxis' prevalence in three departments of a university hospital at the Tunisian centre-east: a WHO investigation

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Background

Antibioprophylaxis caused controversy throughout the world. Our study fits into the framework of a global survey, conducted by the WHO in a wide range of healthcare establishments, about prevalence and duration of antibioprophylaxis in surgery.

Aims

Determine antibioprophylaxis' prevalence after surgical intervention, describe prescribed antibioprophylaxies' types and assess reasons for prophylaxy's extension.

Methods

Descriptive exhaustive study among the hospitalized patients in ENT, general surgery and gynecology obstetrics at UHC Farhat Hached of Sousse, during the 3 consecutive working days preceding the day of the survey (April2015). The study has been carried out by doctors, WHO's standardised formulary has been used for the collection of data. Analysis was performed by SPSS software 17.0.

Results
77 Cases have been identified: 66 women (77.9%) and 22 men (22.1%) (average age: 44.32 ± 15.63 years). Antibioprophylaxis' prevalence was 70.1% (n=54). The most prescribed antibiotic was cefazolin (70.4%). It was about cesarean section in 40.7% of cases and abdominal surgery in 31.5% of cases. According to the classification of Altmeier, surgery was clean in 77.8% of cases and it was clean-contaminated in 11.1% of cases. An antibioprophylaxis' extension was noted in 6 cases (11.1%).

Conclusion
Despite some positive elements in antibioprophylaxis schema such as use of narrow-spectrum cephalosporin (first-generation) antibiotics and not frequent extension of antibioprophylaxis, this study has revealed some malfunctions, as frequent prescription of antibioprophylaxis in clean surgery. A study involving other services on a more extending duration and sample size would be better in assessing antibioprophylaxis schema in order to make required adjust.

P12 Adverse events' risk factors: a case control study at Tunisian university hospital

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Background
Adverse events' frequency and potential severity threaten patients' safety. However, risk factors associated with harms and severe adverse events (SAE) remain poorly evaluated and merit to be further studied.

Aims
Identify SAE's risk factors occurring during hospitalization at UHC F. Hached of Sousse, Tunisia.

Methods
A case-control study was conducted including all patients who were hospitalized in our hospital within a one-month period in all clinical units. All suspect cases were validated by an independent medical expert. Controls were matched by service and hospitalization's duration preceding SAE's appearance in the matched case. Risk factors were collected and analyzed by conditional stepwise logistic regression.

Results
Overall, 152 SAE were identified among 1347 hospitalizations (incidence rate: 11.3%). In the case-control study, 304 controls were matched to cases, totalizing 456 patients. Univariate analysis showed that history of hospitalization in the six last past months, difficulty to communicate, patient status, hospitalization conditions, exposure to specific care procedures, medical devices and healthy products were significantly more frequent in cases than in controls. Multivariate conditional stepwise logistic regression analysis showed that only evening or night admission (OR=1.7[1.4-2.6]), hospitalization in the six last months (OR=1.8[1.3-3.0]), communication difficulty (OR=2.2[1.5-4.6]), longer surgical operation (OR=5.6[2.2-12.9]), biopsy (OR =2.9[1.3-6.6]) and blood transfusion (OR=3.4[1.5-6.9]) were considered as risk factors of SAE.

Conclusion
Heavy invasive cares, in particular circumstances of hospitalization, as well as a high number of medicines are risk factors which are potentially preventable. These factors should be taken into account to improve healthcare associated risks' prevention and management at hospital.

Hospital acquired infection's epidemiology and risk factors at a Tunisian university hospital: results of a case-control study P13

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Backgrounds
Hospital-acquired infection (HAI) continues to be a major public health concern, particularly in developing countries. Our objective is to estimate the incidence of HAI in the Teaching Hospital F. Hached, Sousse, Tunisia as well as to identify its predisposing factors.

Methods

A case-control study was conducted including all patients who were hospitalized since 48 in 16 clinical units. Controls were matched by the service and the duration of hospitalization preceding the appearance of HAI in the matched case. Risk factors were collected and analyzed by conditional stepwise logistic regression.

Results

Overall, 73 HAI were identified during the study period among 1428 hospitalizations (incidence rate: 5.1%). In the case-control study, 219 controls were matched to cases, totalizing 292 patients. Multivariate conditional stepwise logistic regression analysis showed that only evening or night admission (OR=5.23 [2.39–11.43]), longer surgical operation (OR=3.05 [1.04–8.91]) and exposure to peripheral intravascular catheter and to mechanical ventilation (respectively OR=2.88 [1.11–8.21], OR=1.68 [1.03–2.34]) were considered as risk factors of HAI.

Conclusion

Heavy invasive cares, in particular circumstances of hospitalization are risk factors which are potentially preventable. These factors should be taken into account to improve the prevention and management of healthcare associated risks in hospital.

P14 Improving quality of care delivery by introducing in-house-prepared supply kits in a paediatric haematology-oncology center in Rabat, Morocco

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Introduction/aims

Procedures that break skin, such as venipuncture, lumbar punctures, and bone marrow aspirates are practices requiring adherence to infection prevention (IP) standards. Although commercially-prepared supply kits are a common resource in healthcare, due to lack of availability, they are infrequently used in the haematology-oncology center in Rabat. We facilitated healthcare workers' (HCWs) ability to adhere to IP standards by preparing in-house supply kits in order to improve quality of care delivery.

Intervention

We introduced kits onto the bone marrow transplant unit for frequently performed procedures. Each kit contains individually wrapped items (e.g. syringes, gauze, and blood culture bottles) required for each procedure, and is labeled and stored in an assigned cabinet. HCWs were informed of the kits' availability, composition and location. We then conducted a voluntary, anonymous, 16-item attitude survey.

Results

16 HCWs (100%) responded to the survey. Before using the kits, 63% estimate needing ≥ 10 minutes to collect procedural items, whereas now, 75% estimate needing ≤ 1 minute, agreeing that kits save time. 94% feel that kits have made their jobs easier, 81% believe kits play a role in adhering with IP standards and possibly reducing healthcare-associated infections (HAIs), and 88% believe that kits have improved delivery of care on the unit. Furthermore, 81% feel that the kits have added value to their work as caregivers.

Conclusion

Positive feedback from staff indicates that incorporating in-house-prepared supply kits can be accepted as part of patient care. Impact on HAIs and cost-effectiveness of kits should be explored further.

P15 Checkmate CAUTI rate

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Introduction

Catheter associated urinary tract infections (CAUTI) are the commonest among the hospital acquired infections (HAI). Catheterized patients are encountered across all sections of a hospital. The organisms causing CAUTI are often multi drug resistant, being colonizers of the catheter. Proper surveillance, early detection and active interventions are important to avoid the accompanying difficulty in treating these infections.

Aims

Ours is a 350 bedded tertiary care hospital. In 2014, our CAUTI rates were 13-14 %. Our aim was to undertake measures to reduce this rate to keep it within a benchmark of 4.

Interventions

a) Involve the clinical consultants.

b) Involve them in the making of a protocol for the process of urinary catheterization and get them to demonstrate it as per the protocol. Healthcare workers (HCW) are more inclined to following instructions when they see the involvement of their consultants.

c) Infection control officer and infection control nurse were involved in training of HCWs and surveillance.

I. Infection control measures were stressed upon – like aseptic precautions while insertion, hand hygiene, daily review for early removal.

II. Documentation of peri- urethral care-perineal wipes and regular cleaning of external meatus.

III. Individual containers to be used when emptying catheter bags.

c) Process audits of catheterization and checklists of catheter care were undertaken.

Results

CAUTI rates declined over a period of time such that they were within the benchmark.

Conclusions

Formulating an action plan and implementing it gives positive results.

P16 E-readiness and successful e-learning hand hygiene course completion among healthcare providers in a pediatric oncology center in Guatemala City

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Introduction/aims

E-learning, or online learning, is the next frontier in health education and central to the WHO eHealth strategy. We developed a 4-week e-learning hand hygiene (HH) course based on the WHO My 5 Moments for Hand Hygiene and invited healthcare workers (HCWs) at a pediatric oncology center in Guatemala City to participate. We aimed to identify e-readiness factors (predictors of learner success during e-learning) that influenced HH course completion and evaluate participant satisfaction.

Methods

We used a validated e-readiness tool to assess factors of successful course completion. Pearson chi-square test of independence was used to retrospectively compare e-readiness factors and course completion status (completed, non-completed and never-started).

Results

We surveyed 194 HCWs for e-readiness. 116 HCWs self-enrolled in the HH course, and 75% of them completed it. Most e-readiness factors were statistically significant between groups, including: having a computer with internet (p=0.001), having an email account (p=0.001), having basic computer skills (p=0.001), and internet skills (p=0.001).

Moreover, students were significantly more likely to complete the course if they self-reported comfort with using a computer several times a week (p=0.001) and communicating through online technologies (p=0.001). Previous online course experience was not a significant factor (p=0.819). 55 HCWs responded to the satisfaction survey; 89% agreed that e-learning was as effective as the traditional teaching method.

Conclusion

Technology access and online skills influenced course completion. Evaluating e-readiness in low-to-middle income countries should be an essential step before implementing e-learning interventions, to ensure appropriate computer skills and technology resource availability.

P17 Improving nurses' work effectiveness and hand-hygiene compliance: use of LEAN methodologies to address bottlenecks in the process of care

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Introduction

Hand hygiene (HH) is one of the most effective measures for preventing healthcare acquired infections (HAI). However, stirring healthcare workers to comply with HH remains a challenge. We hypothesize that the perception of lack of time and forgetfulness often mentioned as barriers stems from the pressure of too much tasks in a short period of time. Therefore, it is rational to search for efficiency and minimize waste. This study aims at exploring the use of lean methodologies to improve nurses' work processes in an ICU ward.

Methods

An observational study of an 8-hour work shift to identify nurses' activities and processes of care was executed. Next, a value stream map (VSM) was designed and the analysis performed with the nurses. After this, weekly lean workshops were held with the objective of improving workflow efficiency.

Results

From a pilot study, we found that nurse took 12% of her working time (52 minutes) to perform full compliance with HH procedure. In the observation, only 0.8% of the time (2 minutes) were recorded with HH, a mean of 9 seconds per HH moment. From the VSM, three processes were identified as the most relevant HH compliance drivers: the reorganization of essential supplies, the optimal provision of medicines and monitoring equipment's automatic data collection.

Conclusion

The use of LEAN methods enabled nurses in detecting and addressing improvement opportunities with significant benefits. Moreover, nurses' participation in the process enriched the experience, helping to design a customized intervention and heightened their sense of teamwork.

How hand hygiene best practices impact on workload? Finding more time to improve hand hygiene compliance P18

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Introduction

Healthcare-associated infections (HAI) are a major problem in modern healthcare. These infections are recognized as being spread mostly due to poor compliance with hand hygiene (HH). Among the barriers to HH compliance, heavy workloads and lack of time are many times referred. The aim of this study was to describe nurses' workload, recording the amount of time professionals spent engaged in different activities.

Methods

To characterize professionals' workload, an observational time-and-motion study of 8-hour work shift was performed in a sample of nursing wards. 12 nurses were observed. This observational study was completed by a survey applied to professionals working on the observed wards, focusing on opportunities and barriers to HH.

Results

Nurses spent an average of 25.27% (67 minutes) in direct patient care. Registering and searching for information took 22.8% of the time. 7.72% of time was categorized as waste. The overall HH compliance rate for nurses was 69.6% (95% CI: 66.3-72.9%). the mean time spent in HH using alcohol based solutions was 9 seconds (95% CI: 9-10 seconds; range 4-25 seconds). In the survey, nurses report "high workload shifts" (72.2%), "forgetfulness" (59.3%) and "lack of time" (48.1%) as the mains reasons for not complying with HH.

Conclusion

Nurses workload and HH compliance rate in this sample compares with findings of other settings. More efficient time use must be encouraged. Quality methods such as LEAN system may be a way of improving processes of care, thus liberating time to adequately perform HH.

Emerging pathogen: *Actinobaculum* spp. in the diagnosis of urinary tract infections

P19

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Introduction

Recurrent urinary tract infections can be caused by slow growing bacteria. These are often overlooked in the routine urinary laboratory because urine samples are only incubated for 24 hours. *Actinobaculum schaalii* is becoming an emerging pathogen that is responsible for urinary tract infections, mainly among elderly patients. Recent technology could be a promising tool for the identification of this pathogen.

Aim

Determination of the prevalence of *Actinobaculum schaalii* in urine samples after changing the culture method, followed by a resistance testing to obtain information on antibiotics available for successful therapy.

Material and methods

For a period of seven weeks urine samples were handled according to the routine urinary diagnosis procedure, but were also further incubated for 48 hours in a 5% CO_2-enriched atmosphere. A Gram stain is made to see if Gram-positive rods are present in microscopy. Matrix-assisted laser desorption/ionization time of flight and 16S rDNA gene sequencing are then used to analyse the samples. All *Actinobaculum schaalii* isolates are tested for antibiotic resistance by epsilometer test minimal inhibitory concentration determination on 5%-blodd Schaedler agar to determine susceptibility patterns.

Results

A total of 925 urinary samples were investigated, in which, after changing the culture method six strains of *Actinobaculum schaalii* could be found. These were tested for different antibiotics. According to EUCAST breakpoints, all isolates are susceptible to penicillin, ampicillin, amoxicillin/clavulanic acid, mecillinam, cefuroxime, cefriaxone, gentamicin,

vancomycin, linezolid, tetracycline, moxifloxacin and piperacillin/tazobactam. Only 33% are susceptible to clindamycin and levofloxacin, whereas 83% are susceptible to cotrimoxazole. All isolates are resistant to metronidazole, trimethoprim and ciprofloxacin.

Summary

Actinobaculum schaalii can become important as a pathogen causing chronic urinary tract infections. Culturing urine samples under CO_2 and an incubation period of 48 hours can lead to the detection of *Actinobaculum schaalii*. This should be considered in routine laboratories after referalls due to chronic urinary tract infections.

P20 Lessons learned from training healthcare workers to care for Ebola patients in West Africa

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Introduction/aims

The Ebola epidemic of 2014-2015 necessitated training of healthcare workers to care for Ebola patients in West Africa. The purpose of this paper is to describe the lessons learned from training healthcare workers from the perspective of one of the instructors of the CDC training course entitled "Preparing Healthcare Workers to Work in Ebola Treatment Units (ETUs) in Africa."

Interventions

This 3-day experiential training course was developed based on information from Medecins Sans Frontieres (Doctors without Borders) and the World Health Organization. It was primarily designed to provide training for persons intending to deploy urgently in response to the Ebola epidemic. The training utilized didactic, interactive, simulation, and practical experiences.

Results

Over 700 healthcare workers deploying to West Africa completed this training program. Course instructors were challenged with conducting this training following carefully developed scripts, under strict time constraints, while maintaining a positive and non-rushed teaching environment for the students. Debriefing sessions for students and instructors were essential for continuous reevaluation the successful implementation of this training program. A no-fault non-judgmental atmosphere was crucial for student success.

Conclusions

Additional lessons learned from this course included the importance of consistency and teamwork on the part of the instructors, the focus on personal safety for the healthcare workers and teaching to the principles, not the protocol. Perspectives from one instructor regarding important tenets of this course may be beneficial to others preparing for similar trainings in the future.

P21 Single bedroom as infection control measure to prevent infections in Dutch nursing home residents

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Introduction/aims

Frail elderly residents of nursing homes have a higher risk for an infection. Systematic surveillance on prevalence of HAI in this population is scarce but essential to target and evaluate interventions. The aim of this study was to determine the prevalence of healthcare-associated infections (HAIs) in Dutch nursing homes to identify the burden of and risk factors for infection.

Methods

In biannual cross-sectional prevalence surveys, for all residents in participating nursing homes baseline characteristics and the presence of gastroenteritis, lower respiratory tract infection (LTI), urinary tract infection (UTI), bacterial conjunctivitis, bloodstream infection, and antibiotic use were registered between 2010 and 2015. Infections were determined based on clinical definitions.

Results

In total 20,374 residents were included and 630 HAIs were registered (3.1%, 95%CI: 2.9-3.3). Most HAIs occurred among residents of rehabilitation units (4.2%, 95%CI: 3.3-5.2). The most common infections were the UTIs (2.0%, 95%CI: 1.8-2.2) and LTIs (0.7%, 95%CI: 0.6-0.8). Among residents from a single bedroom, the overall HAI prevalence was significantly lower (2.8%, 95%CI: 2.6-3.1, $p<0.01$) compared to residents having a multiple bedroom (3.5%, 95%CI: 3.1-4.0).

Conclusion

Repeated prevalence surveys support evaluation of local infection control policies, interventions and guides national policy making. There is an increasing trend for use of more single rooms in Dutch nursing homes. This trend benefits also infection control measures and has possibly effect on lower transmission of HAIs. Further in-depth analysis is needed to investigate this effect for the different types of infection in the course of time.

P22 Antibody titer of measles, rubella, mumps and chicken pox among medical workers in a university hospital in Japan

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Introduction

The vaccination policy has been frequently changed in Japan the last two decades. Outbreaks due to viral infection, such as measles, rubella, mumps and chicken pox have been reported in Japan. We investigated 1,739 cases of medical workers in a university hospital in Japan.

Methods

We investigated 1,739 cases of medical workers in our hospital on measles, rubella, mumps and chicken pox antibodies titer by EIA method.

Results

The criteria of the titer of indication to be vaccinated followed by Japanese Society for Infection Prevention and Control, showed 692 cases for measles, 214 cases for rubella, 563 cases for mumps and 43 cases for chicken pox were required additional vaccination respectively. We vaccinated low titer workers on 90.8% of measles, 90.2% of rubella, 88.2% of mumps and 88.4% of chicken pox.

Conclusion

Those four viral infections are thought to be causes of outbreak in hospital among not only medical workers but in patients. It would be important to monitor the titer of those antibodies and vaccinate workers at low titer to prevent outbreak in the hospital.

Study of antibiotics self-medication at primary health care centers in Iran, Shiraz, 2012 P23

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Introduction/aim

Today, self-medication of therapeutic agents is a global concern particularly in developing countries. We conducted this research to estimate the prevalence of irrational use of antibiotic in Shiraz community with especial interest in its determinant factors.

Methods

This cross-sectional study was conducted in Shiraz, 2012. Approximately 625 out of all patients referred to all healthcare centers in Shiraz were selected to fill out the questionnaire.

Results

The frequency of self-medication in this study was 37.2% and the request to prescribe antibiotics by the patients was 50.5%. There was a significant association between gender and self-medication. The most frequent cause for self-medication were common cold.

Conclusion

The results of this survey showed the high frequency of self-medication. Socio-cultural determinants are etiologic factors for self-medication. Policy makers should provide community-wide educational programs to make people aware about the adverse effects of self-medication.

P24 Our experience using a quality improvement coordinator as a method to improve hand hygiene practices at two pediatric cancer units in Morocco

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Introduction/aims

Hand hygiene (HH) is an essential component of infection prevention and control (IPC) practices, especially in low-income healthcare facilities. Needs assessments at two pediatric cancer units (PCUs) in Morocco, partner sites of St Jude Children's Research Hospital, revealed poor HH programs that lacked IPC surveillance and personnel training. We aimed to improve local IPC, including HH practices.

Interventions

In January 2012, we piloted an on-site quality improvement coordinator (QICo). We built a job description, obtained buy-in of PCU directors, hired a retired nurse living in Casablanca, trained her in IPC competencies, and mentored her on job performance. Her responsibilities included conducting weekly site visits, implementing surveillance tools from the WHO Multimodal HH Improvement Strategy, training healthcare workers (HCWs) and caregivers, and attending meetings with PCU directors.

Results

The QICo conducted HH infrastructure and supply surveys, HH practice adherence assessments, and the WHO HH Self-Assessment Framework. With the QICo's efforts, both PCUs have progressed from basic to intermediate HH levels. This year, the QICo provided 35 trainings on proper HH and IPC to 138 HCWs and 131 family members. Additionally, the PCU directors see her as an essential member of the IPC team and vital to continued improvement in IPC practices.

Conclusion

The QICo is a novel concept for building the quality of healthcare delivery in PCUs in low-resource countries as they seek to improve IPC practices. Using a local coordinator provides a culturally sensitive, on-site approach. Further research on QICo integration and sustainability is needed.

Evaluation of grade 5 infectious diseases and clinical microbiology training program in Gulhane Military Medical Academy P25

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Background and aims

Student feedback is one of the research methods that is commonly used for evaluation of learning-teaching process today. As part of Gulhane Military Medical Academy (GMMA) education program, infectious diseases and clinical microbiology training program is presented in grade 5 as theoretical lessons and practice training. The aim of this study is evaluation of the infectious diseases and clinical microbiology training program in GMMA by the students.

Methods

This is a cross-sectional study. The study group comprised of phase 5 students who participated in infectious diseases and clinical microbiology training program in 2014-2015 training-education year in GMMA (n=89). Eighty two students filled the questionnaire form completely (access rate 92%) and their forms were included in the analysis. Study group was informed about the purpose of the study. After obtaining their consent, a questionnaire consisting of 20 statements was applied to the participants. Data was gathered during May 2015. The questionnaires were applied under observation. Average application time for the questionnaire was 5 minutes. In order to enhance reliability of feedbacks, students were not asked to state their names, with an intention for them to state their own opinions more freely. All of the statements present in the questionnaire were asked using a Likert scale of 5 points. The following choices were scored as stated below:

'I do not agree at all' 1 point;
'I do not agree' 2 points;
'I am not certain' 3 points;
'I agree' 4 points, and
'I totally agree' 5 points.

Study data was evaluated using SPSS 15.0 statistical package software.

Results

Agreement rates for the statements 'training staff provided information about the training at the beginning of the program', 'the purpose and learning targets were shared' and 'training schedule was followed during the program, lessons were on time' were 86.6%, 76.8% and 84.1%, respectively. 89% of the students stated number and content of the theoretical lessons were adequate, 90.5% stated they benefited from theoretical lessons. Agreement rate for the statement 'I was given the opportunity to conduct medical interview and physical examination on my own' was 90.2%. Agreement rates for the statements 'I benefited from point of care clinical practice education', 'I was given the opportunity to actively participate in outpatient procedures during training program' and 'all students were given the opportunity to do practice' were 65.8%, 52.4% and 50%, respectively; and agreement rates for these statements were lower compared to other statements. Agreement rates for the statements 'assistant education tools are effectively used during lessons' and 'we were notified about education reference books at the beginning of the program' were 70.7% and 65.9%, respectively. 71.9% of the students think the exam at the end of the training program objectively measured what they learned during the program. Agreement rate for the statement 'general evaluation of the training program is made together with academic members at the end of the program' was 53.6%, and it was low. Agreement rate for the statements 'academic members can be consulted both for program-related and off-topic subjects' were 80.5%. 80.5% of the students think priority is given to student education in clinic, 90.2% think program duration is adequate and 89% think physical conditions are adequate. 80.5% of the students think they reached the predefined education targets, 85.3% are content with the training they received during the program and the mean contentment score was 4.20.8.

Conclusions

Students were generally satisfied about infectious diseases and clinical microbiology training program. Beside, student satisfaction will increase if they more actively participate in clinical and outpatient procedures.

Turkey infectious diseases and clinical microbiology training and qualification board's proficiency examination: analysis of 5-year experience

P26

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Background and aims

One of the functions of the qualifications board established in major and minor specialization in medicine is documentation of volunteer physicians' adequacy and the other one is to provide a recertification decennially. Infectious Diseases and Clinical Microbiology Specialty Society of Turkey (EKMUD) and in a coordinated but autonomous

working as Turkey Infectious Diseases and Clinical Microbiology, Training and Qualification Board (EMEK), has started to implement the online proficiency exams as a first in this area since December 2010. The aim of this manuscript is to summarize the 5-year exam experience.

Methods

EMEK' qualification examinations performed in the last 5 years were analyzed retrospectively.

Results

EMEK' proficiency examination is a two step test, including 1st stage online, 2nd stage practical examinations. Totally, 6 online and 5 practical exams have been made since December 2010. 1st stage of EMEK' proficiency examination is carried out asking 100 multiple-choice questions via internet. Online exam is mandatory, and candidate given at least 60 correct answers are considered successful. Infectious diseases and clinical microbiology expert or specialist assistants who are in the final year of training can participate the first stage of exam. 2nd stage of EMEK' proficiency examination takes place as an objective structured clinical examination (OSCE), and infectious diseases and clinical microbiology experts who is successful in first stage of exam can participate this stage. Second stage of exam consists of 4 sections; clinical evaluation with the case discussion (constitute 30% of exam score), clinical skills and assessment (constitute 30% of exam score), laboratory skills assessment (constitute 30% of exam score) and article evaluation (constitute 10% of exam score). At the second stage of exam, candidate who gets at least 60% score are considered successful, and they are entitled to receive a qualification certificate. A hundred thirty five people for online exam, 34 people for practical exam have hitherto been participated; thirty four infectious diseases and clinical microbiology specialist have received qualification certification.

Conclusions

EMEK' proficiency examination has been conducted without interruption for five years. Test preparation, implementation and evaluation processes are carried out with great dedication of the commission in the written rules. Partipication has been low on proficiency exam due to lack no legal obligation yet. Especially, experts who want to become scholars take the exam, also theoretical part of the exam is electronically made, all of them seems to be encouraging in terms of participation to the exam.

Occurrence of *Clostridium difficile* PCR-ribotype 027 associated disease in Serbia

P27

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Aims

The incidence of *Clostridium difficile* infections (CDI) in Serbia is constantly rising in the previous 5 years. We aimed to study *C. difficile* PCR-ribotypes isolated from patients hospitalized at two healthcare institutions: Clinical Center of Serbia (CCS) and Specialized Hospital for Cerebrovascular Diseases Sveti Sava (SS), both of them from Belgrade.

Methods

Database of microbiology laboratory, serving CCS and SS, was queried from January 2009 to December 2013 for all patients who underwent immunochromatographic toxin A and/or toxin B stool testing and/or *C. difficile* cytotoxigenic stool culture for suspected infection caused by this bacterium. Ninety-seven *C. difficile* isolates, collected from 2011, were then selected for PCR-ribotyping.

Results

From 2007 CDI became a reportable disease in Serbia. Number of cases as well as mortality increased from 0.75 and 0.02/100.000 respectively in 2007 to 26.6 and 0.87/100.000 respectively in year 2013. Outbreaks have been reported ranging from 1-5 per year, reaching a peak in 2013 when 21 outbreaks were detected.

Among 6164 stool samples sent to bacteriology laboratory for culture and toxin detection of *C. difficile* during a study period, 28.2% were positive, displaying linear trend of growth. PCR-ribotyping revealed 87.6% isolates of PCR-ribotype 027, while the remaining 12 belonged to PCR-ribotypes: 014/020 (n=3), 015, SLO191 (two isolates each); 017, 018, 070, 001/072, and SLO108 (one isolate each).

Conclusions

This study indicates that CDI are a serious problem in Serbia and that *C. difficile* PCR-ribotype 027 is present in hospital settings in Belgrade at least since 2011.

P28 Specific precautions for transmission of microorganisms: development and educational script validation for adult patients

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Introduction

Patients under specific precautions (contact, airborne, droplet) may be more likely to adverse events in hospital environment. Development of educational strategies to increase patient engagement in their care may reduce potential hazards.

Objective

To develop and to validate an educational guide on specific precautions for adult patients.

Methods

A methodological study design, carried out in three stages, having as theoretical framework the concept of „vulnerability". The study was conducted in two Brazilian hospitals; participants were adults under specific precautions.

Phase 1: a questionnaire was used to capture the perceptions of patients.
Phase 2: drawing up an educational guide based on the results of the previous phase.
Phase 3: submission of the guide to experts for content validation with acceptable concordance rate of 75%.

Experts invited have knowledge in the area of prevention of infectious diseases.

Results

39 patients were enrolled when on average seven days under specific precautions, mainly contact precautions. Less than half knew about the need of special care; among these, fewer than half knew about the transmission of the pathogen which they were carriers. The educational guide was developed to enlarge knowledge on the aspects usually neglected by professionals and to stimulate patient-centered care. All elements in the guide achieved a content validity index ≥75%.

Conclusion

The orientation guide based on „vulnerability" concept has the potential to support educational activities for adult patients under specific precautions. This guide can be applied routinely by healthcare professionals in order to minimize the unwanted effects of specific precautions.

Successful control of a carbapenem-resistant *Acinetobacter baumannii* outbreak in a neonatal intensive care unit P29

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Background

Acinetobacter baumannii, classically described as nosocomial pathogens in adults, is also responsible for infections in neonatal intensive care unit (NICU). We describe an outbreak of carbapenem-resistant *Acinetobacter baumannii* (CRAB) in a NICU, our investigation to determine the source and mode of transmission, and interventions to control it.

Methods

An outbreak investigation was undertaken at a 18-bed NICU in a tertiary care hospital between March 2014 and September 2014. The outbreak investigation included case identification, review of medical records, environmental cultures, patient surveillance cultures, healthcare workers' hand cultures, and molecular typing including pulsed-field gel electrophoresis (PFGE). Infection control measures were implemented.

Results

Sixteen infants admitted to NICU had cultures that grew CRAB during the study period. CRAB isolates were collected: 1 swab from healthcare workers, 12 from environmental specimens. PFGE showed outbreak isolates indicated genetically related single clone. The outbreak strain was isolated from hands of healthcare worker, cassettes of portable X-ray machine, and surface of care cart and laptop computer, which was identical to strains isolated from specimens from adult patient ICU. An intervention program (cohorting, education, reinforcing hand hygiene, environmental cleaning, and barrier isolation) was implemented to control the outbreak, and the outbreak ended after a series of multifaceted interventions.

Conclusion

We conclude that a rapid and thorough investigation of the environment during an outbreak of CRAB is essential to finding the source of the infection, and that cassettes of portable X-ray machine may be a source of such outbreaks.

P30 The quandary of self injection devices disposal in limited resource setting

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The advancements in medicine and technology have created more cost effective options to treat infectious diseases in limited resource settings. One current challenge that is emerging is the management of the disposal of self injection devices for a new range of products such as Sayana Press (Pfizer). This drug is delivered by a safe injection device called Uniject. This device was first meant to minimize the reuse of injectable syringes. The Uniject device has been used very effectively in vaccination campaigns. However moving into the arena of self injection with an autodisable component poses new challenges as systems are not in place to address how to dispose of these devices in the home. While the risk to the self injector is another needle stick, it still remains a hazard should family members come in contact with the device. A search of the literature has relieved little guidance for limited resource settings including devices such as insulin syringes. Options are to return the device to the point of purchase or distribution; provide to a local healthcare worker who has access to a sharps container or safety box; disposal in a pit latrine; or burning with local rubbish. Each option has its own pros and cons.

Hospital staff's perceptions and practices regarding infection control: a qualitative study from Vietnam P31

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Healthcare-associated infections result in prolonged hospital stay, long-term disability, high financial burden on the health systems, high costs for patients and their families, excess deaths and increased resistance of bacteria to antibiotics. The aim of this study was to explore hospital staff's perceptions and practices with respect to infection control in a rural and an urban hospital in Hanoi. A qualitative approach, using individual interviews and focus groups discussions for the data collection and content analysis for the analysis, was applied. Six individual interviews were conducted with the leaders of the hospitals, who have an overview of hospital activities (three in each hospital). Six focus group discussions were conducted according to occupation: one group of doctors, one group of nurses and one group of cleaning staff in each hospital. The main theme identified was "Making data available for health workers can improve their awareness of hospital infection control, motivate them to practice their existing knowledge and make use of

the facilities they already have". Three sub-themes were identified:

Sub-theme 1: "Hospital staff was knowledgeable of healthcare-associated infections, but they were not aware of the total situation";

Sub-theme 2: "Awareness of the importance of hand hygiene in preventing healthcare-associated infections, but hospital staff acknowledged poor hand hygiene practices in their hospitals";

Sub-theme 3: "Hospital staff perceived the importance of healthcare waste management, but they were not aware of healthcare waste treatment in their hospitals".

P32 Conclusive results of a multi-center hand hygiene technique assessment study

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As a preparation for the UNESCO World Semmelweis Year, a multi-institution hand hygiene study was conducted involving four hospitals in Hungary and Austria (Albert Szent-Györgyi Health Center, University of Szeged; Miskolc Semmelweis Hospital and University Hospital, Bethesda Children's Hospital of the Hungarian Reformed Church and AKH Vienna General Hospital) over the course of 12 months. In total, 217 healthcare workers from 10 departments were involved, primarily from surgical suits and pediatric ICUs. The volunteers were asked to routinely measure their hand hygiene technique with an innovative hand hygiene unit, Hand-in-Scan, until they learned to achieve and maintain complete coverage. The Hand-in-Scan device provided immediate digital feedback regarding the missed areas (larger than 0.6 cm2), and also stored the results digitally. The retrospective analysis of 687 observations revealed that the average number of missed areas across all institutions was 1.5 +- 0.49 (mean +- STD) the first time employing the training system, and by the fourth measurement, the number of missed areas dropped to 0.55 +- 0.14. Importantly, the number of people making mistakes at all was reduced significantly, by 60%. Consecutively, it has been demonstrated that repetitive practice with immediate objective feedback improves the effectiveness of hand hygiene, and supports the local infection control efforts.

P33 Incidence of MRSA surgical site infections in a Romanian university hospital

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Staphylococcus aureus is one of the leading causes of surgical site infection (SSI). Eastern and South-Eastern Europe are part among the areas where the prevalence of methicillin-resistant *S. aureus* (MRSA) strains remains high.

Therefore, we aimed to assess SSI ratio in open general surgery and to discuss the results from January 2015 through December 2015.

Re-operated and laparoscopic cases were excluded. The diagnosis of SSI was performed according to the CDC criteria for SSI. Our study group included 516 patients of whom 139 (26.93%) were diagnosed with SSI. In 17 (20.98%) patients, SSI had polimicrobial aetiology, while the rest of cases (79.01%) were monomicrobial. The most common causative agents of SSI were *Staphylococcus aureus* (39.50%), followed by *Pseudomonas aeruginosa* (24.69%), *Klebsiella*

pneumoniae (8.64%) and coagulase-negative *Staphylococcus* spp. (8.64%).

Of the 32 *Staphylococcus aureus* studied strains, 23 were MRSA.

SSI have been shown to increase mortality, readmission rate, length of stay, and costs for patients who incur them. Although there is some controversy about the effectiveness of screening and eradication programs, the literature suggests that patients should be screened and MRSA-positive patients treated before surgical admission, in order to reduce the risk of SSI.

P34 Multidrug resistant pathogens isolated from ventilator associated pneumonia in the intensive care unit

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Background

Ventilator associated pneumonia (VAP) represents a common cause of death among patients with assisted mechanical ventilation in the intensive care unit (ICU). It causes higher treatment costs and also a longer hospital stay.

Purpose

The aim of our study was to determine the prevalence of multidrug resistant (MDR) bacterial strains isolated from patients with VAP, hospitalized in the ICU.

Methods

For seven months (December 2014-June 2015) bronchial aspirates were collected from VAP cases in ICU patients, at Timisoara Emergency Clinical County Hospital (Romania). Identification of germs and susceptibility tests were performed by the Vitek 2 system (BioMerieux). We considered as MDR, any strain resistant to more than three classes of antimicrobial agents.

Results

From 140 collected bronchial aspirates we isolated 165 bacterial strains, of which 76 (46.06%) were MDR. The most frequently isolated microorganisms were: *Klebsiella pneumoniae* (46 strains), *Pseudomonas aeruginosa* (34 strains), *Staphylococcus aureus* (32 strains), *Proteus mirabilis* (14 strains), *Acinetobacter baumannii* (12 strains) and *Escherichia coli* (10 strains). A large proportion (88.48%) of the studied strains was resistant to beta-lactam antibiotics and of these strains, 35.61% were extended spectrum beta-lactamase (ESBL) producing Enterobacteriaceae and 16.43% were methicillin-resistant *Staphylococcus aureus* (MRSA). The frequency of resistance was 33.93% to aminoglycosides and 55.15% to fluoroquinolones. We have not isolated any resistant strain to glycopeptides or colistin.

Conclusions

Increased prevalence of MDR pathogens represents a difficult challenge for the medical staff. Identifying strategies (bundles) for reducing risk factors for VAP with MDR strains is imperative.

P35 Materiovigilance at a Tunisian university hospital: medical staff's knowledge, attitudes and practices

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Introduction/aims

In the framework of better risk management at hospital environment and in perspective to improve quality and safety care, University Hospital Center Farhat Hached, Sousse, Tunisia has developed a medical device's vigilance system (MDVS) in order to monitor incidents or risks of incidents that may arise through using medical devices allowed-on in market.

Aims
Determinate medical staff 's knowledge, attitudes and practices at University Hospital Center Farhat Hached, Sousse, Tunisia regarding MDVS establishment.

Intervention
We conducted a descriptive study, type KAP (knowledge, attitudes, and practices), in March 2015, among all medical staff exercising at our hospital who are in direct contact with medical devices. Measuring instrument used is a self-administered questionnaire, pre-established and pretested. Seizure and data analysis was made by SPSS software 20.0.

Result
More than half of participating physicians do not know about nor institution's local correspondent (69,5% (IC95% [60-79%])), neither existence of a standardized form for reporting (56,8% (IC95% [47,4-66,3%])). Regarding attitudes, majority of investigated (89.5% (IC95% [83,2-94,7%])) notify interest of creating MDVS. All of them showed interest to receive more information about MDVS but only 57.9% (IC95% [47,4-67,4]) mentioned a desire of training following.

Conclusion
Our study highlights lack of information and training in a field yet sensitive and needing to be heavily regulated. Materiovigilance is a medical feature needing to be integrated into healthcare professional's continuous and basic formation. We also insist on strengthening awareness and communication around medical device's vigilance system. Success of system's functionality must be supported by laws promulgation relating generally to medical devices and particularly to regulatory agencies' organization.

Professionals' perceptions regarding implementation of cross infections reporting system

P36

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Introduction/aims
Cross infection have been recognized as a critical problem affecting the quality of healthcare and a principal source of adverse health outcomes. Epidemiological surveillance is an essential part of their prevention. In this study, our aim was to describe professionals' perceptions regarding the implementation of a cross infections reporting system.

Interventions
A cross-sectional descriptive study conducted, in 2012, using a self-administered questionnaire to a representative sample of 380 health personal, in 16 hospital's services, in our University Hospital (99 doctors, 281 paramedical staff).

Results
The participation rate was about 76%. Only 37% of respondents perceived cross infections rate in our hospital as high or very high. Lack of cross infections reporting system in health units was reported by 71.8% of respondents, while the majority of them (85%) believe that cross infection surveillance is very or slightly important. 89.2% of respondents perceived the interest of establishing a cross infections reporting system. Finally, cross infection that should be subject of report are those with multiple antibacterial drug resistance (23,9%) and those occurring in the context of epidemic (19,2%).

Conclusions
In the field of cross infection, it should be noted that the quality of information to report is a challenge in order to facilitate plan's implementation, to evaluate different activities and to prevent adverse events.

P37 Patients' safety culture among healthcare professionals in Tunisian university hospital

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Introduction/aims

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. Our aim was to measure level of patients safety's culture among healthcare professionals in order to improve strategies of healthcare quality and safety in our hospital.

Interventions

In 2013, we conducted 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 care 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".

Conclusions

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.

P38 Catheter-related bloodstream infections (CRBSI): when one factor alters the product

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Introduction

In July 2012 our institution incorporated a nurse specialized in infection control and initiated an infection control program including active surveillance of risk factors at the intensive care unit (ICU). Ours being a neurointensivist institution, femoral insertion is the most frequently used site for central venous catheters (CVC) since 1994; location was firstly chosen to avoid thoracic veins and later on it was done routinely. No impact on CRBSI rates has been seen since then and thus no recommendations for changes have been made. Insertion is done by physicians and catheter care by nurses, following the standards in practice for catheters inserted elsewhere.

Objective

To describe our experience on the impact of active surveillance in identifying the drivers of an increase in CRBSI

Materials and methods

Prospective, descriptive and comparative analysis of patients hospitalized at the ICU and requiring CVC since July 2012 through July 2015. Active surveillance followed the criteria for prolonged bacteremia by the Argentine National Surveillance Program of Hospital Infections (VIHDA).

Results

A total of 13,682 days/patient were included in the study period; 953 catheters were inserted (6,911 days/catheter), of which 373 were femoral, 270 subclavian and 310 yugular insertion. Catheter duration ranged between 2 and 32 days, mean 10 days. CRBSI rate in the period July 2012-June 2014 was 1‰, the last episode occurred in Feb 2014. On June 2009 two CRBSI were registered, followed by three other episodes in July. The only change observed in the period was the shift from flexible plastic packed parenteral solutions

to those packed in rigid plastic. The change was due to a shortage in supply. When informed about these findings, the committee recommended to purchase flexible plastic as soon as available. As from product availability, no further episodes were registered until February 2015, when flexible plastic packages were again not available. The cumulative CRBSI rate was not zero due to the small numbers of days/catheter. Only one of the CRBSI occurred at a femoral insertion; most CRBSIs were yugular.

Discussion

International guidelines recommend avoiding femoral insertion to prevent CRBSI. Our institution does not follow these guidelines; however, the site of insertion has not been the factor responsible of an increase in the CRBSI rate, probably related to failing to use integral closed circuits.

Conclusion

Active surveillance and an effective program are key to timely detect and modify the factors leading to an increase in CRBSI. Although our institution does not follow the guidelines regarding site of catheter insertion, we have been able to sow rate 0. Even not being an objective of this study, we can also state that femoral insertion is a safe alternative for central venous catheters, when following appropriate aseptic measures at insertion and adequate nursing care.

P39 An innovative approach to improve nurses' hand hygiene compliance: combining indoor location with gamification

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Introduction

Hospital acquired infections are one of the biggest problems healthcare field is facing. They can be prevented by performing hand hygiene (HH), but healthcare workers' (HCWs) compliance with it is still far from desired. The reasons are forgetfulness, lack of time and motivation. Direct observation is an effective but costly and time-consuming approach to assess HCWs' performance.

Objectives

Create awareness regarding current nurses' HH compliance, trying to change their individual behavior and optimize their performance. To achieve this, an automated monitoring system (AMS) was combined with a gamification solution to provide feedback accurately in a fun and engaging way.

Methods

A design science research approach was used to iteratively design, test and evaluate a solution. An AMS that collects data regarding HCW's HH compliance and a gamification application that provides them with feedback using game elements, both during and after the shift, were designed with the help of a focus group. A nurse's HH compliance was monitored and feedback was provided during a workday. The accuracy of the system and the impact of its usage were analyzed.

Results

Although the system isn't fully accurate, the focus group, especially the participant nurse, enjoyed the concept and approved the measure as a good and unique opportunity to receive feedback and improve their performance.

Conclusion

The full impact of gamification on HH compliance is still under evaluation. So far the results show that the system is promising in improving nurses' awareness. A longer test with more nurses is already in place.

P40 Competencies for infection control for generalist nurses in Brazil: Delphi method

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Introduction/aims

The absence of a policy in Brazil to guide the competencies for infection control for the generalist nurse, hinders the curriculum development process of these competencies in undergraduate nursing programs. This study aims to develop a guideline the competencies to infection control that the generalist nurse should develop during the undergraduate nursing program.

Methods

Participants are 40 Brazilian professionals, 33 nurses and 8 doctors with expertise in infection control area. To collect data are using the Delphi method. For the analysis of qualitative data was used the technique of content analysis for quantitative data is used descriptive and dispersion statistics. The study was approved by the Ethics Committee under No 818.839 and complied the ethical principles established in Resolution CNS 466/12.

Results

In the first round of research was generated an initial list of 143 competencies to infection control for the generalist nurse, after analyzing these competencies were grouped and classified between general or generic, arriving at a list of 10 core competencies and 14 generic competencies. In the second round, which is developing, this list of competencies will be evaluated and to create the final list of competencies for infection control for the generalist nurse.

Conclusions

It is hoped that this research will contribute to modify the teaching of undergraduate nursing courses in Brazil, making it a directive to which the generalist nurse competencies need to master at the end of their training to provide safe care in primary, secondary and tertiary healthcare institutions.

P41 Clinical audit of phlebotomy in a Tunisian hospital

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Introduction

Phlebotomy is taking a venous blood sample for a medical biology analysis. If the taking of a sample is poorly executed, the results for this sample may be inaccurate and mislead the clinician, or the inconvenience of the patient having to undergo a new levy. The three main problems associated with errors in the collection are: hemolysis, contamination and mislabelling. We conduct clinical audit to evaluate compliance of activities in relation to the recommendations. Our objective was to determine the compliance rate of the different steps of the phlebotomy procedure and propose corrective actions.

Material and methods

It is an observational study which follows a forward-looking approach based on direct observation of blood collection procedures in 2015.

Results

330 acts of phlebotomy were audited in 11 services. The overall compliance rate phlebotomy was 57.7%. The overall compliance rate 'patient prescribing and preparation' was 94.4%; 'equipment preparation' was 85.3%. There was a lack of tourniquets, holders and hydro-alcoholic solutions. The overall compliance rate 'collection procedure' was 45.1%, the overall compliance rate for hand hygiene is low (28%), wearing gloves (20%) and the use of antiseptics (44.4%). The overall compliance rate 'sample identification' was 61.3% (tube labeling (45.7%) and compliance of the laboratory worksheet (76.9%)). the overall compliance rate 'transport' was 49.4%. There was a lack of bag or holders for transport.

Conclusion

The results obtained allowed to propose an improvement plan to improve this practice. In fact, the ultimate goal of professional practice evaluation is to improve the quality of care.

P42 Evolving trends of nosocomial infection prevalence at Ibn El Jazzar Hospital, Kairouan – six years of survey

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Introduction

The epidemiologic survey is the basic tool to prevent nosocomial infection; prevalence survey is simple and costing an inventory of nosocomial infection risk, to educate a large number of professionals, to identify priority points and evaluate the overall impact of a prevention strategy.

Since 2010 we have established a surveillance system based on achieving annual prevalence survey.

Material and methods

This is a descriptive study of prevalence with achieving annual survey of prevalence of nosocomial infection from 2010 (6 surveys were conducted), the passage was made in a day for the service and in three days the entire building. Infections were sought from clinical and microbiological information available in the inpatient services, medical records, referent, as required microbiology laboratory.

Results

Descriptive analysis of data collected during the six years showed a significant reduction in the prevalence of the monitoring period ($p < 0.02$). The evolution of the prevalence of NI was noted as follows: 11.9% in 2010; 5.7% in 2011; 7.8% in 2012; 3.7% in 2013, 3.07% in 2014 and 3.19% in 2015. An increase in the prevalence rate was recorded in 2012 (7.8%) compared to 2011 (5.7). This increase can be explained by a stock shortage of hygienic soap concurring with the period of the 2012 survey.

Conclusion

These results could testify to the effectiveness of preventive measures put in place since 2010. The decrease in the prevalence of healthcare associated infections in our region should motivate teams to continue their efforts in hygiene and improving the quality of care.

P43 In vitro antimicrobial synergy studies of carbapenem-resistant *Acinetobacter baumannii* isolated from intensive care units of a tertiary care hospital

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The increasing prevalence of multidrug-resistant and pan drug-resistant *Acinetobacter baumannii* as a cause of nosocomial infections has led to the need for the reassessment of novel combinations of antibiotics as our only current viable option for handling such infections until a new therapeutic option becomes available. Two of the most commonly used methods for testing antimicrobial synergy are the time-kill assay method and the e-test method, and these were the methods used in this study. Antibiotic combinations tested in this study were azithromycin and polymyxin, tobramycin and polymyxin, polymyxin and rifampicin, and tobramycin and rifampicin. The azithromycin and polymyxin combination showed synergy, while the rifampicin and polymyxin combination showed antagonism. The synergy was achieved at lower MIC values than using each of the single agents alone against the same isolates. Synergy testing results varied according to the method used, and it is difficult to establish which method is more accurate. The use of these lower MIC values as a guide to determine effective therapeutic doses used in combination therapy can help to decrease the emergence of resistance and can also minimize the side effects associated with using a single agent at a higher dose. Further research is still required to predict in vivo efficacy of such combinations.

P44 Detection of mupirocin resistance in meticillin-resistant *Staphylococcus aureus* isolates in an Egyptian hospital

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Objective

Topical mupirocin has the power to eradicate nasal carriage of meticillin-resistant *Staphylococcus aureus* (MRSA). However, mupirocin resistance has been increasingly reported. The aim of the study was to determine the prevalence of mupirocin resistance in MRSA isolates from clinical and nasal samples by conventional and molecular methods and to test their susceptibility to other antibiotics.

Materials and methods

A total of 60 MRSA non-duplicate isolates were included in this study, 14 from surgical wounds, 16 from urinary tract infections and 30 nasal swabs, obtained from healthcare workers of Suez Canal University Hospital, Ismailia, Egypt. E- test method and polymerase chain reaction (PCR) targeting MupA gene were performed and antibiogram was done.

Results

Using E-test, 6 isolates out of 60 MRSA (10%) exhibited high level resistance to mupirocin and only one isolate (1.6%) exhibited low level mupirocin resistance. Four isolates out of six MRSA that exhibited high level mupirocin resistance carried mupA gene. All seven isolates (11.6%) that showed mupirocin resistance were from nasal carriers. Compared to mupirocin-susceptible strains of MRSA, strains with mupirocin resistance strains were more likely to be resistant to tetracycline, chloramphenicol, gentamycin, ciprofloxacin, and trimethoprim-sulfamethoxazole.

Conclusion

The prevalence of high-level mupirocin resistance (10%) and low-level resistance (1.6%) in MRSA is a cause for concern. Hence, it is recommended that routine testing of MRSA for mupirocin resistance be conducted even in facilities where mupirocin is not prophylactically administered. This will facilitate the early detection of resistance and assist in the control and spread of mupirocin-resistant MRSA.

P45 Laboratory safety "from infrastructure to general infection control practices"

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Introduction

Laboratory workers are at high risk of accidental injury or infection exposure. For workers in laboratories, guidelines for various levels of risk (biosafety levels) have been developed. These guidelines are specific and describe the appropriate equipment, facilities and procedures to be used by staff. Also, general infection prevention guidelines and recommendations should be applied.

The most important element of containment is adherence to standard microbiological practices and techniques. Persons working with potentially infected materials must be aware of potential hazards, and must be trained and proficient in the practices required for handling such material safely.

Aim of the work

General orientation to help laboratory workers' protection and also to protect persons outside the laboratory from infectious agents that may be accidentally released from the laboratory.

Methods

We discussed general safety measures in the laboratories, specific biosafety precautions and infrastructure recommendations with common problems faced and suggested solutions.

Results

The better the knowledge of the laboratory personnel about safety precautions and their importance, the better the adherence and thus safer environment.

Conclusion

Infection control personnel should work upon teaching the laboratory personnel about hazards and environmental and infection control measures to protect them. Each laboratory should adopt a biosafety manual that identifies the hazards that may be encountered and specify practices and procedures designed to minimize or eliminate exposures to these hazards.

P46 Nosocomial HBV infection

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Case Study

A 80 year old lady with diagnosis Ca vesicae urinariae T3.N1, macrohaemoturia was hospitalized in the department of urology at East Hospital in Riga, Latvia on 10.02.2015. On 02.2015 she underwent surgery. Three weeks later she was discharged from the hospital in a good condition. From 28.02 till 04.03. the patient was rehospitalized for plasma transfusion.
In June 2015 developed symptoms of hepatitis and in Latvian Centre of Infectiousus Diseases hepatitis B was diagnosed. No HBV risk factors after leaving the hospital were registered - no injections, manicure, sexual contacts.

A 65 year old man with diagnosis Urolithiasis, calculus ureteris sin. et calculus coraloideus renis dxt. was hospitalized in the department of urology at East Hospital in Riga, Latvia on 10.02.2015 The surgery was performed on the same day and the patient was discharged.

In July 2015 this patient also was diagnosed with HBV infection.

All contact persons were checked for HBV infection , it was not diagnosed.

There is a central sterilisation in a hospital, all used instruments and materials occured to be sterile.
So, the source of infection was not detected.

A toolkit for CPE control, experiences in Manchester, UK P47

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Introduction/aim

Antimicrobial resistance is one of the defining public health problems of our age. The rapid spread of Carbapenemase-producing Enterobacteriaceae (CPE) is a major challenge for public health and healthcare systems. Within the UK, Manchester has the highest prevalence of CPE. University Hospital of South Manchester (UHSM) is a large acute hospital with both general and highly specialist services.

Interventions

In 2013, Public Health England published the 'CPE Acute Trust Toolkit', a recommended package of interventions to help hospitals detect, manage and control CPE. This includes: risk assessing every admission, screening those at risk, implementing strict infection control, screening hospital contacts, educating patients, communicating clearly to other healthcare providers, improving environmental cleaning and decontamination, and training of healthcare staff.

Results

In early 2015, UHSM began implementing a locally adapted CPE Toolkit, which included: risk-based admission screening, regular outbreak meetings, the introduction of a hydrogen peroxide vapour room disinfection system, improved surveillance and communication, and other bespoke and innovative infection control measures. These interventions have

been associated with a significant reduction in CPE detection, against a background of increased screening activity. There were 41 cases of CPE reported in Quarter 2 (Jul-Sep) of this financial year (2015) compared to 94 for the same period last year, which is a reduction of 56%.

Conclusions

Introduction of a locally adapted CPE policy, based on PHE guidance, has been associated with a clear reduction in CPE, though maintaining control remains a significant challenge.

P48 Investigation of colonisation by extended spectrum beta-lactamase producing Enterobacteriaceae in mothers after premature birth

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The occurence of extended beta-lactamase (ESBL) producing Enterobacteriaceae are increasing. These pathogens, if they are present in the colon of premature infants or pregnant women, can cause asymptomatic carriage. There might be great differences in the colonisation rate in various countries. Relevant data on the colonisation rate in Hungary are not available. In the neonatal intensive centre of our hospital, the occurence of these bacteria has been recorded since 2005. 98.5% of the cases have been colonisation. From 1st October 2013 to 31st October 2015, we screened mothers on the day of their premature birth for this pathogen to determine the imported colonisation rate among them. 19 of 751 anorectal swabs or stool samples were found to be positive, which means a colonisation rate of 2.5%. Positive mothers were given personal hand hygienic education. Then they actively participated in the care of their babies and breast-fed them, if their infants' condition allowed this. From the premature infants, ear swab and stomach washing were taken and sent for culture on the day of their admission. In the course of their hospital stay, anorectal swabs were taken and screened for ESBL colonisation in every two weeks +/-2 days. None of the premature infants of the 19 ESBL-positive mothers became positive in the studied period.

Knowledge of the colonisation rates in every country could influence the necessity of screening test before hospital admission. The implemented hospital hygienic measures based on these data could prevent the spread of this pathogen.

P49 Experience of a Vietnam hospital with a new medical waste treatment technology

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Cai Lai Hospital, Tien Giang Province, Vietnam was selected among a group of Vietnamese hospitals to benefit from a World Bank funded project to improve medical waste treatment and waste water management infrastructure. The hospital received a new non-burn technology to process infectious medical waste in may of 2014. Waste management practices in Vietnam have suffered from a lack of funding to procure and maintain environmentally friendly equipment. The system came with an automatic dumping process as well as a shredder for processing waste post-treatment. The hospitals has benefited from the project in that a building was built to support the infrastructure for collection and treatment of infectious waste as well as serving as a treatment center for other hospitals.

We report the following on the outcome the investment:

- excessive time cycle – cycles last 4 hours which requires additional man hours/staff to wait for completion of the cycle;
- equipment has been difficult to clean after waste has been processed;
- autoclave bags are expensive and an alternative is needed;
- steam/water connections are not secure and water leaks creating slip hazards;
- and the odor from the processing of waste is unpleasant at times.

The hospital has reached out to the vendor of the technology regarding these issues. As more installations are planned for Vietnam, as well as in other countries, hospitals should communicate with government officials and vendors in advance of procuring the equipment to address potential issue before installation to ensure a smooth transition towards full operation.

P50 Seasonal variation of carbapenem resistant *Acinetobacter baumannii* surgical ICU in Clinical Centre Skopje

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Introduction

There are data, presenting seasonal variation of *Acinetobacter* infections in ICU with increase of infection rates during the late summer (July-October) and in early winter months.

Aim

Tracking seasonal index of *Acinetobacter baumannii* isolated from surgical ICU in period 2010-2015, and comparison with seasonal index of carbapenem-resistant strains for a period 2013-2015.

Material and methods

Computer database was used as basic tool for follow on *Acinetobacter* isolates originated from endotraheal tubes in surgical ICU. Seasonal index was estimated for period 2010-2015, as a tool to follow seasonal variations of *Acinetobacter* isolation. Carbapenemase-resistance was detected by disc diffusion and automized VITEK antibiotic susceptibility testing.

Results

Sesonal variation index has shown three peaks: March, June/July and December. Carbapenemase resistant clone of *Acinetobacter* took major role in this seasonal distribution since 2013, because this clone riched very high rate of 84,3% (N=159). Seasonal index of carbapenemase-resistant *Acinetobacter* (2013-2015) has peaks in March and July and declination in December.

Conclusion

Seasonal variation for *Acinetobacter* spp. has three peaks with double higher rates of isolation. Carabapenem-resistant strains have the same seasonal appearance for the early spring and early summer months, but difference appears in December with highest rates for total *Acinetobacter* isolates but very low rates for carbapenem-resistant isolates.

P51 Surveillance of surgical site infections according to ECDC recommendations in Polish surgical wards – a pilot study

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Introduction/aims

Hospital acquired infections (HAIs) registration is one of the essential elements of the infection control programs. The aim of this work was to analyze epidemiology and microbiology of surgical site infections (SSI) in Polish hospitals and to compare them with data from other European countries.

Methods

This work presents the results of SSI registration on the basis of ECDC HAI-Net SSI recommendations. Data were gathered between 1.01.2013 and 30.06.2015 among 16 121 surgical procedures of different kind.

Continuous, active surveillance method was used for SSI identification.

Results

Total number of 274 cases of SSI were detected with significant differentiation of cumulative incidence (CI) of SSI depending on type of surgical procedure. For example, CI of SSI after: CHOL operations reached 3.05%, COLO operations – 12.9%, CSEC – 0.38%, HPRO – 1.09%, KPRO – 0.98%, LAM – 1.46%.

According to ECDC reports, corresponding rates reported in 2010-2011 in European countries (average values) were: for CHOL – 1.5%, COLO – 6.2%, CSEC – 0.8%, HPRO – 0.5%, KPRO – 0.3%, LAM – 0.7%. Significant differences in microbiological factors isolated in SSI, especially after such procedures as cesarean section and hip replacement were additionally observed.

Conclusion

Presented results point at significant differences in epidemiological situation between Polish and European surgical wards reporting data under ECDC HAI-Net SSI project.

Based on the results of some previous studies it is known that the practical implementation of SSI prevention procedures in Polish hospitals needs significant improvements.

P52 Polish epidemiological nurses job satisfaction in the context of cooperation with hospital staff and personal career goals

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Introduction/aims

The control of healthcare-associated infections should be one of the priorities for the hospitals' management. Infection control is based on infection control teams, especially on epidemiological nurses (EN).

The aim of this study was to evaluate job satisfaction of Polish EN in context of cooperation with the medical staff, hospitals' management and their personal career goals.

Methods

The study was performed using a questionnaire survey among Polish EN in 2015.

Results

208 EN (about 20% of all Polish EN), replied to the questionnaire.

The average age of respondents was 48.5 years, the average length of work as a nurse - 24 years, and as the EN - 10 years.

Most respondents pointed to serious problems in co-operating with physicians: about 80% pointed to problems in collaboration with physicians of medical and surgical wards and 70% with the doctors in ICUs. Slightly fewer, 60%-70%, pointed to problems in cooperation with the nurses of different kind of wards . In addition, 80% indicated the difficulties in cooperation with the managers and microbiology laboratories.

There were no significant differences in the responses according to EN level of education, hospital type and size, country region or seniority.

33.2% of respondents were considering changing jobs, and 53.3% declared that they would not recommend the EN position to a nurse starting professional career.

Conclusions

The results showed that IC is undervalued by the hospital staff. This results in a lack of job satisfaction among the majority of Polish EN.

Knowledge among nurses regarding Foley's catheterization in Karachi Pakistan P53

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Background

Indwelling urinary catheters increase a patient's risk of complications during hospitalization. Nurses can play an important role in use of aseptic techniques in indwelling urinary catheters. However, it is essential that nurses understand about care and sampling of their patients have urinary catheters in place if they are to serve as person to reduce CAUTIs.

Aims and objective

To assess level of knowledge among nurses about Foley's cathetriztion, sampling and care.

Methodology

A cross-sectional survey was conducted in level of care government and private hospitals in Rawalpindi. 66 nurses were sampled conveniently. Participants were interviewed with the help of structured questionnaire. The questionnaire was designed to collect information on level of knowledge of nurses regarding Foley's catheter insertion, care and sampling. The data was entered and analyzed in excel. Descriptive statistics was calculated and presented in form of frequencies. Responses were scored as correct with 1 and wrong with 0. Those who scored 5 were aid to have adequate knowledge.

Results

We analyzed the data of 66 participants, majority of nurses 54 (81.8%) assume Foley's catheter insertion as sterile procedure, while 12 (18.1%) think it to be non-sterilized. 56 (84.8%) know that sterile gloves must be used for the procedure while others (15.1%) believe that any gloves can be used. However, only 28 (42.4%) nurses are using satirized gloves while 24 (32.6%) use both sterile and latex, examination (10 (15.1%)) or latex gloves (4(6%)).11(16.6%) nurses reported that they use unsterile gloves as they are economical, 15 (22.7%) said it depends on availability while few consider use of unsterile gloves as hospital policy or does not feel the need to use sterile gloves. 37 (56%) nurses reported to take urine sample by detaching catheter from urine bag while 19 (28.7%) take it from urine bag and only 10 (15.1%) take from port of catheter via syringe. 21 (31.8%) nurses reported that they wash their hands before procedure while 45 (68.1%) do not. 64 (96.9%) nurses wash hands after procedure and 2 (3%) wash only if powder seen on hands. 44 (66.6%) nurses use Pyodine for cleaning perineal area before catheterization, 17 (25.7%) use savlon for the purpose while 5 (7.5%) use soap and water or only water for cleaning perineal area. 24 (36.3%) nurses label catheter after insertion while 42 (63.6%) do not.

Only few nurses (16(24.2%)) perform post insertion catheter care and 49 (74.2%) nurses do not.

19 (29.2%) nurses attended CME on catheterization in last 30 days and 46 (70.7%) did not. Only 10 (15.1%) had adequate knowledge. These were those who attended the CME in last 30 days.

Conclusion

Majority of these nurses had inadequate knowledge and so were not practicing as per infection control policies and standards. Nurses must be given adequate and continuous education regarding catheterization and its care as per standards. Their practices must also be monitored by the heads of the institution to ensure quality care and to prevent possible infections.

Prosthetic joint infection in a tertiary care teaching hospital

P54

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Introduction/aims

Prosthetic joint infections are a serious problem both in low and high income countries. Their prevention measures should be targeted by knowing the risk factors. Our study aimed to determine the incidence and current risk factors of prosthetic joint infections in our organization.

Hypothesis

To knowledge the incidence rate and risk factors of prosthetic joint infection allow us to reduce infection risk after joint replacement.

Methods

We reviewed prospectively collected data from our database on 340 patients undergoing primary and revision hip or knee and hip arthroplasty between january 2007 and december 2010.

Results

Twelve patients with infections were identified (3.5%). Infection rates were 6.5% and 1.5% after hip and knee arthroplasty respectively. The most common organism identified was Staphylococcus aureus (6 cases). Logistic regression analysis identified three variables independently associated with prosthetic joint infection: rheumatoid arthritis (relative risk [RR] = 44.90; 95% confidence interval (95% CI): [5.54–333.0]; p <0.001) remote infections (RR = 33.17; 95% CI: [2.57–528.7]; P = 0.007) and revision (RR = 11.57; 95% CI: [1.84–71.6]; p = 0.009).

Conclusions

Our rate seems to be higher than those reported in the literature. To reduce this rate we must take actions targeting identified risk factors.

P55

Mortality among patients with nosocomial infections in tertiary intensive care units of Sahloul Hospital, Sousse, Tunisia

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Introduction/aims

Nosocomial infections are a public health issue. They are associated to high mortality in intensive care units. This study aimed to determine nosocomial infection-associated mortality in Tunisian intensive care units and identify its risk factors.

Methods

A prospective cohort study was carried out in intensive care units of a Tunisian university hospital. The ICUs-wide active surveillance of nosocomial infections has been performed between 01 July 2010 and 30 June 2011. Data collection was based on Rea-Raisin protocol 2009 of "Institut National de Veille Sanitaire" (InVS, Saint Maurice - France). We used Kaplan Meier survival analysis and Cox proportional hazard regression to identify independent risk factors of nosocomial infection-associated mortality.

Results

67 patients presented nosocomial infection in the end of surveillance. The mean age of patients was 44.71 ± 21.2 years. Among them, 67.2% were male and 32.8% female. Nosocomial bacteremia was the most frequent infection (68.6%). Nosocomial infection-associated mortality rate was 35.8% (24/67). Bacteremia (hazard ratio (HR) = 3.03, 95% confidential interval (95% CI): [1.23-7.45], p =0.016) and trauma (HR= 3.6, 95% CI: [1.16-11.2], p = 0.026) were identified by Cox regression as independent risk factors for NI-associated mortality.

Conclusions

Our rate was relatively high. We need to improve the care of trauma patients and intensify the fight against nosocomial infections especially bacteremia.

P56

Timing of urinary catheter removal after uncomplicated total abdominal hysterectomy: a prospective randomized trial

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Objective

To assess whether immediate (0h), intermediate (after 6h) or delayed (after 24h) removal of an indwelling urinary catheter after uncomplicated abdominal hysterectomy can affect the rate of re-catheterization due to urinary retention, rate of urinary tract infection, ambulation time and length of hospital stay.

Study design

Prospective randomized controlled trial conducted at Suez Canal University Hospital, Egypt. Two hundred and twenty-one women underwent total abdominal hysterectomy for benign gynecological diseases and were randomly allocated into three groups. Women in group A (73 patients) had their urinary catheter removed immediately after surgery. Group B (81 patients) had the catheter removed 6h post-operatively while in group C (67 patients) the catheter was removed after 24h. The main outcome measures

were the frequency of urinary retention, urinary tract infections, ambulation time and length of hospital stay.

Results

There was a significantly higher number of urinary retention episodes requiring re-catheterization in the immediate removal group compared to the intermediate and delayed removal groups (16.4% versus 2.5% and 0% respectively). Delayed urinary catheter removal was associated with a higher incidence of urinary tract infections (15%), delayed ambulation time (10.3h) and longer hospital stay (5.6 days) compared to the early (1.4%, 4.1h and 3.2 days respectively) and intermediate (3.7%, 6.8h and 3.4 days respectively) removal groups.

Conclusions

Removal of the urinary catheter 6h postoperatively appears to be more advantageous than early or late removal in cases of uncomplicated total abdominal hysterectomy.

P57 Prevalence and predisposing factors of meticillin-resistant *Staphylococcus aureus* carriage in long-term care facilities – systematic literature review

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Background

Meticillin-resistant *Staphylococcus aureus* (MRSA) is one of the most common cause of healthcare associated infections. The probability of carrying MRSA is higher among residents of long-term care facilities (LTCFs) due to their vulnerability. This study gives an overview of prevalence and predisposing factors of MRSA carriage in LTCFs in order to provide a base for clearly defined control strategies.

Methods

A detailed literature search was conducted using PubMed, ScienceDirect and Cochrane Library CENTRAL databases for papers published in English language between 01 January 2006 and 31 September 2015. We used specific search term combinations. Studies on the prevalence of MRSA colonisation were included.

Results

In total, 28 studies were included in this review. Prevalence of MRSA carriage averaged 17,7%, however, rates varied over a wide range, from 4,7% to 58,6%. The most common predisposing factors were previous antimicrobial therapy, chronic wounds (e.g., pressure ulcer), high grade resident care (e.g., immobility, incontinence), MRSA history, and preceding hospital admission.

Conclusion

MRSA is widespread in LTCFs all over the world. This review highlights the importance of suggested infection prevention and control measures for LTCFs: antibiotic stewardship, screening, decolonization, standard and transmission-based precautions, and hand hygiene. However, LTCFs should primarily focus on improving staff adherence to basic hygienic practices (e.g., hand hygiene).

Infection control in Hungarian long-term care facilities P58

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Background

Multidrug resistant microorganisms, infections and antimicrobial use are common among residents of long-term care facilities. However, long-term care facilities (LTCFs) do not attend to infection prevention and control. This study was conducted to assess the status of infection control practices in Hungarian long-term care facilities.

Methods

An online questionnaire on the demographic, infection control personnel, practices and priorities was designed and sent to all registered LTCFs in Hungary. Epidata (Version 3.1) were used for data entry and analyze.

Results

A total of 270 (18%) LTCFs responded. The mean bed number was 116 (range: 8-991). 3.7% of all available rooms were single rooms (i.e., possible for isolation). 58.4% of LTCFs had a qualified nurse. Only 10% of LTCFs had assigned an infection control practitioner. A majority of infection control practitioners (48.2%) had a nursing degree. The most frequent task performed by the infection control practitioners is the registration of infected residents (46.7%). Only 2 LTCFs (3.3%) reported to have an infection control committee. Infection control has a priority only in 50% of LTCFs. Isolation (45.2%), influenza (36.2%) and *Clostridium difficile* (17.4%) are the most important problem in these settings.

Conclusion

Resources for infection prevention and control in LTCFs were not enough in Hungary, therefore there is an urgent need the implementation of infection prevention trainings, guidelines and programmes. Furthermore, information on the cost of infections is needed to assist efforts at prioritizing the national health policies.

Keywords: infection, infection prevention and control, infection control practitioner, long-term care facilities, Hungary.

P59 Investigating glove use compliance in the institutes of Albert Szent-Györgyi Health Centre of University of Szeged

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Introduction

The importance of hand hygiene is highly emphasized at our institutes of Albert Szent-Györgyi Health Centre, thus the utilization of glove compliance has to be improved as well. The aim of our study was to investigate the healthcare workers' knowledge and attitude on the use of gloves.

Methods

Questionnaire survey was performed among healthcare staff of the department of internal medicine (DIM), department of surgery (DS), emergency department (ED) and the intensive care unit (ICU) regarding their knowledge of glove utilization and attitude.

Results

From a total of 138 questionnaire, 128 questionnaire were proved valuable regarding knowledge and 131 regarding the attitude. The given answers to three questions in the knowledge test on glove use were deemed inadequate on general; namely the importance of hand rubbing with alcohol based hand rub after and before using gloves, the prohibition of glove reuse and use of gloves in situations when not indicated. The attitude part of the questionnaire highlighted two main problematic factors i.e. wearing gloves disturbs precise manual movements and the distribution of the gloves is uneven among the departments.

Conclusion

In conclusion, we reorganized our training program according to the results and new posters were made to aid decision making on when to wear gloves personalised for ED-ICU and DIM-SD staff.

P60 Control measures of an outbreak with carbapenem-resistant *Klebsiella pneumoniae* in a Danish department of thoracic, cardiac, and vascular surgery

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Introduction

The prevalence of carbapenem-resistant enterobacteriaceae (CRE) in Denmark is low and generally only found in patients with a recent travel history. In July 2015, a carbapenem-resistant *Klebsiella pneumoniae* was detected in swabs from sternal

wounds in two patients hospitalised after having heart surgery performed at the department of thoracic, cardiac and vascular surgery at Odense University Hospital.

Interventions

An outbreak group with members from the infection control unit, the management of the surgical department, the department of cleaning and patient services, and the hospital management was established. Screening of all patients in the ward identified the bacterium in a rectal swab from a patient who had undergone lung surgery. No source of infection or route of transmission was revealed; none of the three cases had a history of recent travel, and they had not shared rooms.

All patients in the ward were moved to a vacant department, and the ward was thoroughly cleaned followed by disinfection by use of Glosair® in selected rooms and areas. A subsequent audit revealed failures in compliance with standard precautions of infection control which could lead to cross contamination, and actions were taken to optimise these areas.

Results

No further cases of CRE were identified after the interventions. By prompt and efficient actions, an outbreak of CRE was stopped and steps to prevent future outbreaks were taken.

Conclusions

Optimising compliance with standard precautions of infection control in the hospital setting is of crucial importance to prevent future outbreaks of resistant microorganisms.

P61

Examining the motivational determinants of self-determination theory in relation to primary care nurses beliefs, attitude and practice on hand hygiene

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Infectious diseases caused by microorganism accounts for a significant percentage of all deaths worldwide. Evidence have indicated the effectiveness of hand hygiene in reducing healthcare-associated infections but compliance among healthcare workers are lacking and innovations are required.

The self-determination theory (SDT) has been found to be effective in supporting behaviour change when the satisfaction of an individual for autonomy and competence are positively linked with effective functioning and behavioural outcomes. This study aims to examine the correlation between the motivational determinants in SDT and nurses beliefs, attitude and practice on hand hygiene. The use of constructs in SDT on autonomous motivation and competence that are central to facilitate effective behavioural outcomes appears promising to influence hand hygiene.

A pilot study on a convenience sampling of 30 nurses was carried out using questionnaires consisting of demographic profiles, self-regulation questionnaires (SRQ) rated on a seven point scale and beliefs, attitude and practice rated on a five point scale.

Cronbach α coefficient for SRQ ranged from 0.60-0.89 and hand hygiene beliefs, attitude and practice scale ranged from 0.60-0.93. Pearson Correlation Coefficient analysis on the relationship between beliefs was significantly related to autonomy support ($r=0.40$, $p<0.02$). Both identified and intrinsic regulation were significantly related to competence and autonomy ($r=0.59$, $p<0.01$, $r=0.54$, $p<0.02$, $r=0.64$, $p<0.01$, $r=0.62$, $p<0.01$).

Results indicate that when primary care nurses are provided with autonomy support, positive beliefs on hand hygiene can be inculcated. The use of autonomy supportive approach appears promising in promoting more autonomous motivation to influence hand hygiene compliance.

P62 Prevalence of carriage of multidrug-resistant organisms in a tertiary university hospital in Albania

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Background

The prevalence of multidrug-resistant organism (MDR) carriage in patients hospitalised in Albania is largely unknown.

Aim

To carry out a 1-day point-prevalence-survey (PPS) screening for nasal meticillin-resistant *Staphylococcus aureus* (MRSA) and rectal MDR Gram Negative carriage at a 1600 bed tertiary care hospital in Tirana, Albania.

Methods

The PPS was carried out on patients housed in the high-dependency wards (110 beds) in the hospital. A total of 106 nasal and 104 rectal swabs were collected.

Results

Fifteen of 106 patients (14.2% [95% Confidence Interval (95CI): 7.6%-20.8%]) were MRSA positive. The isolates exhibited high proportions of resistance to aminoglycosides and fluoroquinolones but no resistance to glycopeptides, nitrofurantoin and the relatively newer agents, tigecycline and linezolid was noted.

The prevalence of MDR Enterobacteriaceae (51 isolates; 43 patients) was 40.6% (95%CI 31.1% – 50.0%). Only two carbapenem resistance strains were identified; however significant resistance levels were identified to most other antibiotics except for amikacin and fosfomycin. The more commonly isolated MDR Enterobacteriaceae were *Escherichia coli* (28 isolates from 24 patients) and *Klebsiella pneumoniae* (14 isolates/patients). A lower number of MDR Non-Fermenting Gram Negative bacilli were isolated {22 isolates: *Acinetobacter baumannii* (9); *Pseudomonas aeruginosa* (8) and *Stenotrophomonas maltophilia* (5)}.

Conclusion

Our results suggest that MDR is a significant challenge in Albania, especially MRSA and ESBL Enterobacteriaceae and highlight the need for a sustained surveillance and improved infection prevention.

P63 Control the growth of azole resistant *Candida* species and biofilm formation by the essential oil of Salvia mirzayanii

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Introduction

Candidiasis is a frequent infection ranging from mild dermatosis to life threatening fungemia. The *Candida* species are considered as the fourth cause of nosocomial infections. The emergence of resistance among *Candida* species to antifungal drugs has accelerated dramatically. These resistant strains especially among non-albicans species enhance the failure in treatment, and might associate with prolonged hospital stays and complications. An alternative approach to overcome such resistance might be the use of natural products and phyto-chemicals in the medicine. The goal of this study was to investigate the chemical composition and in vitro antifungal and antibiofilm activities of essential oil of *Salvia mirzayanii* against azole resistant *Candida* species.

Methods

The EO of air-dried sample were obtained by hydrodistillation method and analyzed by gas chromatography/mass spectrometry (GC/MS). The antifungal activities of the EO against 31 azole sensitive and 9 azole resistant *Candida* species were investigated by flow cytometry and broth-microdilution methods. The biofilm formation inhibition of *Candida* species was measured by using a XTT reduction assay.

Results

1,8-Cineole (41.2%) was the major compound of the EO followed by Linalool acetate (11%) and α-Terpinyl

acetate (6%). The EO exhibited strong antifungal activities against the examined yeasts at concentration ranging from 0.03-2 µL/mL. In addition, the EO inhibited the biofilm formation of six *Candida* species at concentration up to 1 µL/mL.

Conclusion

Considering wide range of antifungal activities of the examined EO, it might has potential to be used in the control and management of fungal infections caused by Candida species.

Sixteenth Congress of the International Federation of Infection Control

16-19 March 2016
Vienna, Austria