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ABSTRACTS

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Oral presentations

01 Establishing an infection control program with limited resources

Ossama Rasslan
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The overall goal of the Infection Control Program (ICP) is to improve quality of health care services through promotion of infection control practices.

To develop an ICP at the national level requires:

- Establishment of a national task force
- Development of national guidelines.
- Designation of IC staff at different levels of healthcare system
- Training of IC professionals.
- Establishment of centres of Excellency in different governorates
- Communication and Advocacy.

To successfully implement and maintain appropriate infection control program at the facility level requires:

- Proper organizational structure.
- Initial assessment of the current status of IC.
- Knowledge of proper infection control practices,
- Effective management skills,
- Contributions from all staff at the facility, and
- Designing a Plan to Improve I C Practices
- Implementing the Necessary Changes
- Monitoring and Evaluating I C Practices
- An organized supply of minimal essential materials and equipment.
- Close supervision.

All of these issues will discussed in details throughout the presentation.

02 Protecting the Healthcare Worker

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A goal of healthcare is provide a healthy work environment for our employees. Healthcare workers (HCWs) should have minimal risk of exposure to toxic chemicals, infectious diseases, hazardous waste materials and hazardous equipment. The focus of this presentation will be on HCW risks of exposure to infectious diseases and hazardous waste materials.

HCW risk of exposure to infectious diseases should be primarily managed through engineering controls or through methods that eliminate or minimize any exposure to the risks. Additional methods of control include immunizations, personal protective equipment, risk assessments, early identification of hazards, safer products, safe handling of wastes, and educational programs for the staff, patients, and family members.

Although bloodborne pathogens is the greatest infection control risk in healthcare, others infectious diseases can be transmitted through contact and airborne routes. Facilities need to ensure that these risks are decreasing, and the goal should be to eliminate the transmission of infectious diseases to employees.

Multiple employee health activities will decrease the risk of infectious disease transmission. These include surveillance of personnel prior to employment including a health history, physical examination, review and updating of immunizations, and evaluation of the need for specific task duty training.

Monitoring of employees following a known or potential exposure to an infectious disease will also protect the healthcare worker and others in their family and community.

Providing a safe workplace and standardized healthcare to HCWs is one method of ensuring improving care for both patients and staff.

03 Role of laboratory in enhancing the surveillance and control of acute respiratory diseases

Raymond H.K. Leung
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04 The new WHO infection control guidelines on pandemic- and epidemic-prone acute respiratory diseases

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In an era of emerging and re-emerging communicable disease health threats, the importance of infection prevention and control measures in health-care settings should not be underestimated. Transmission of pathogens that cause acute respiratory diseases (ARD) is no exception. The main mode of transmission of most ARDs are through droplets, contact (including hand contamination followed by self-inoculation) and infectious respiratory aerosols of various sizes for different pathogens. The new WHO Interim Infection Prevention and Control Guidelines For Epidemic- and Pandemic-Prone Acute Respiratory Diseases in Health Care provide recommendations for the non-pharmacological aspects of infection prevention and control for ARDs in health care. Several strategies should be combined and HCF leadership is key to provide support and to promote compliance with infection control recommendations. The key strategies for reducing the risk of pathogen exposure and transmission associated with health care include administrative controls, engineering and environmental controls, and use of personal protective equipment (PPE). Administrative (e.g. provision of adequate staff and supplies, education of health workers, patients and visitors), engineering and environmental controls (e.g. environmental ventilation) are fundamental components in the construction of an infection control structure to enable the safest possible health care. The use of PPE should be defined by policies and procedures specifically addressing infection control issues (e.g. isolation precautions). Its effectiveness is dependent on adequate and regular supplies, adequate staff training, proper hand hygiene, and in particular, appropriate human behaviour.

05 The New Approaches in Isolation Precautions and Ventilation - Infection Control Management of Acute Respiratory Diseases in the Hospitals

Patricia T.Y. Ching
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Isolation precautions and room ventilation are important element in prevention of acute respiratory diseases (ARD) in the hospitals. Recent research after the SARS confirmed most ARD are transmitted via droplet and contact mode. Therefore for prevention of spread of ARD, droplet and contact precautions are reasonably adequate. Opportunistic airborne transmission may occur when performing aerosols producing procedures. Thus airborne precautions are required only at aerosol producing procedures. This is a rational approach especially in resource limited countries where N95 masks are reserved for airborne precautions. Isolation rooms with central air-condition system require special technology in the balance of dilution and removal of air to enhance ventilation inside such rooms. This is expensive and difficult to maintain. Recent research showed that natural ventilation is effective in providing good ventilation by opening windows and doors. This alone can achieve more than 12 air changes per hour (ACH). Using natural ventilation is a cost effective way for isolation of airborne infection especially in resource limited countries and in time of pandemic influenza.

**06****Perioperative antibiotic prophylaxis: an evergreen problem***Endre Ludwig*

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The aim of perioperative antibiotic prophylaxis is the prevention of surgical site infections (SSI), the reduction of the incidence of infectious complications. Prophylaxis is indicated in procedures with 1. high infection rates, 2 implantation of prosthetic materials, 3 postoperative infections with especially severe consequences.

The basic principle of perioperative prophylaxis is to assure a sufficiently high tissue concentration of an antibiotic with good activity against the most probable pathogens during the operation and for 3 hours after it.

Beyond the well established recommendations concerning the practice of prophylaxis (such as timing the administration, duration of prophylaxis, factors to be considered when selecting a drug, the most important indications, risk factors), there are still many problems to elucidate. Only some of them as it follows: indications in special interventions, the prevention of infections in immunocompromised patients, the optimal duration of prophylaxis in case of implantations, etc.

Among the problems, the adherence of surgeons to the accepted guidelines should also be mentioned: how to cope with the common misbelief of surgeons that the infections could be prevented by the extended administration of an antibiotic after the operation.

The choice of antibiotics should be based on their effectivity against the most probable pathogens. We have been facing a dramatically increasing rate of resistance both in staphylococci, enterococci, Gram-negative bacilli. The high rates of resistance make troublesome the choice of antibiotics not only in case of empiric therapy, but also in prophylaxis.

07**The role of microbiology in surgery***Marianne Konkoly Thege*

St. László Hospital, Department for Microbiology, Budapest, Hungary

The significance of microbiological investigations in surgical infections is controversial. Surgeons have a lot of "contra" arguments against taking samples for culture in order to treat the patient properly: the operation has a priority in the treatment of a surgical infection; the spectrum of possibly pathogens is well known; the empirical antibiotic therapy is usually effective; the infection rate is very low in case of the new, minimal invasive surgical interventions. Some of these statements are really true but nowadays they have to consider certain "pro" arguments of the microbiologists: the spectrum and characteristics of possibly pathogens are changing; the prevalence of antibiotic resistant pathogens are increasing; recognition of infection caused by difficult-to-treat, nosocomial pathogens such as methicillin resistant *Staphylococcus aureus*, multiresistant or panresistant Gram-negatives is possible only on the basis of microbiological investigations. Samples taken during the surgical intervention and blood cultures have the greatest value from a microbiological point of view. Adequate antibiotic therapy and infection control measures can be chosen according to relevant culture and sensitivity test results.

08**Surgical site infection surveillance in Europe***Jennie Wilson*

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Surgical site infection (SSI) accounts for approximately one quarter of healthcare associated infections (HCAI). They have been reported to considerably increase the costs of healthcare and cause significant morbidity. Many European countries have established systems of the surveillance of SSI based on those developed by the Centers for Disease Control in the USA. In some countries these have been in place for more than a decade, and in some surveillance of SSI has been mandated by the national government.

The Hospitals in Europe Link for Infection Control through Surveillance (HELICS) has provided a standardised approach to surveillance of HCAI and enables data from hospitals participating in national networks to also be contributed to HELICS. By 2005 HELICS had collected data on more 420 000 operations in 7 categories of procedure from 15 countries. The

HELICS dataset provides a unique opportunity to measure the occurrence of clinically defined HCAI across European countries, explore the variation in rates of SSI and improve understanding of factors that impact on inter-country comparisons. With a widespread trend for decrease in length of post-operative hospital stay standard methods for identifying and analysing SSI that develop post-discharge are particularly important. The contribution that surveillance of SSI makes to the prevention of HCAI has been demonstrated in a number of European countries where national surveillance systems have reported significant reductions in rates of SSI in participating hospitals. In addition, in with the increasing focus on patients as 'consumers', high quality data on rates of SSI are essential to inform both surgeon and patient about the risk of infection associated with different procedures.

09**Ventilation and its relationship to SSI***Peter Hoffman*

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A patient is uniquely susceptible to infection during a surgical procedure; any microbial contamination entering a surgical wound can cause infection. Airborne microbial contamination can enter a wound either by falling directly into the wound or by falling on to exposed "sterile" instruments that will later be used in the wound. (Keeping the instruments clean is at least as important as keeping the wound clean).

Ventilation in operating rooms (ORs) has two infection control functions: 1 - To remove contamination generated by the surgical team, mostly from dispersion of their contaminated skin particles.

2 - To prevent the entry of contaminated air from areas surrounding the OR

This is usually achieved by supplying high volumes of clean air to the most sensitive areas of the operating suite (the OR and the room where instruments are unpacked) and encouraging it to flow out of these rooms to surrounding areas. In doing this, it will dilute contamination generated in the OR and flush it out to less sensitive areas (achieving function 1) and this outward airflow will prevent the inward flow of contaminated air from surrounding areas (achieving function 2).

It is an unnecessarily complex and expensive to filter air to HEPA standards - a class F7 (EN 779) is adequate and much less expensive to install and maintain.

For surgical procedure particularly susceptible to airborne contamination (usually orthopaedic prosthetic surgery), an ultraclean ventilation system can be used. In these, an organised, usually downward, flow of air over the centre of the OR removes contamination generated in that area and prevents ingress from outside this area.

010**No VAP? No CR-BSI? 100,000 lives saved?: What are these people doing right?***Candace Friedman, Jennifer Arndt*

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Healthcare-associated infection (HAI) is a major patient safety issue affecting the quality of care of patients in both developed and developing countries. Strategies for preventing HAIs require a comprehensive evidence-based approach. These strategies include provision of data, information on appropriate practice and support to use this evidence to minimize infection risks.

Various groups, including the World Health Organization, are demanding more focus on safe practices and quality care. This focus involves leadership commitment, engagement of clinicians, increasing awareness, implementation of evidence-based guidelines and indicator measurement. Many organizations have initiated campaigns to decrease HAIs to zero preventable infections. Use of best practices and commitment of area-focused champions help this effort. Evidence-based patient care practices have been assembled into "bundles" to focus staff on the best processes to decrease infections. Data are gathered using standard definitions to monitor both process (e.g., catheter insertion technique) and outcome measures (i.e., HAIs). The data are provided to clinicians so the reduction effort can be evaluated. These strategies may not eliminate all infection risk, however the goal is to get as close to zero as possible.

This session will discuss the background of these campaigns and describe successful interventions and implementation strategies to reduce rates of HAIs.



O11 Assessment of learning about hand rubbing for medical students using both rand microbiological and colorimetric test

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Background: The prevention of nosocomial infections linked to hands cross-transmission is a priority. Thus hand washing is substituted by hand rubbing because a better compliance. For teaching, simple and a reproducible methods are needed, thus the microbiological reference method is not appropriate for evaluation because too long and expensive. The aim of this study is to use a quick microbiologic test and a colorimetric test for assessing the results of an educational sequence for medical students. **Method** 3 steps were applied to 92 medical students in 7 wards: 1- Application of two references measures (skin hydration and bacteriological sampling by fingers printing). 2- Rubbing before the teaching followed by the same measurements, and evaluation of the coverage of the hand by a fluorescent molecule added to the alcohol-based hand rub with wood light (Anios® box). 3- Training during 30 minutes before the same 3 measurements. **Results:** The mean results of initial measurements are 101.84CFU and 33.91% for skin hydration. After the step 2, the bacteria flora decreases to 100.64CFU, skin hydration increased to 38.2% ($p < 0.01$) and the fluorescence of the hand on palm 81.1% and back 53.8%. After teaching the results are better: flora 100.43CFU, skin hydration 43.2% and the stamped hand (palm 98.5%, back 89.4%). Whereas first plates show Enterobacteria 5.4%, MSSA 14.1%, MRSA 1.08% and other pathogenic bacteria 44.5%, following plates (2, 3 respectively) evidence less microorganisms Enterobacteria 1.2% and 0%, MSSA 1.2%, 1.2%, MRSA 0%, 0% and other pathogenic bacteria 16.3%, 4.4%. **Conclusion:** The fluorescence hand indicator is a good test for teaching evaluation for a great number of peoples.

O12 Change from surgical scrub to Alcohol rub in three Irish hospitals

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In August 2005 the operating theatres of the three Midland Regional Hospitals commenced using an Alcoholic rub instead of the standard peri-operative surgical scrub of either 4% w/v Chlorohexadine Gluconate or Povidone Iodine This practice is standard in some European countries for many years but is new in Ireland Skin is a major potential source of microbial contamination in the surgical environment. Skin can never be rendered sterile, but the number of micro-organisms can be reduced prior to surgery. Traditional methods of pre operative skin preparation for surgical teams consists of washing their hands and arms with either of the above agents from between 2-5 minutes average 3 minutes. Alcohols are considered to be among the safest antiseptics available and generally have no toxic effect on human skin. The antimicrobial activity of alcohol-based rubs is considered to be superior to all other currently available methods of pre-operative hand preparation. On the basis of literature reviews an alcohol rub was selected for use which contained isopropanol and n-propanol alcohol. It also contains mecetronium etilsulfate a substance with a mild antiperspirant, which suppresses the production of sweat under the glove. This product achieves the same antimicrobial reduction in 90 seconds as a three-minute application. We believe that the use of alcohol rubs for pre-operative skin preparation is in line with evidence based best practice and the way forward for patients and staff.

O13 Repeated prevalence surveys – a recommendable way of monitoring hospital acquired infections

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Introduction: All Danish hospitals are obliged to start the process of accreditation during 2009. On this background we have started semi-annually prevalence surveys of hospital acquired infections (HAI) in the

Region of Northern Jutland. **Material and methods:** Prevalence surveys took place in all somatic hospital wards in the Region of Northern Jutland, twice in 2006 and once in 2007. The four most important HAI were registered: urinary tract infection (UTI), pneumonia, postoperative deep infection and septicaemia. Moreover, use of permanent urinary tract catheters was registered. **Results:** The overall prevalence in the three surveys varied between 5.2 and 7.1%. The number of patients included in the surveys varied from 93.7% - 98.9% of available beds. In the first survey a significantly greater number of patients with urinary tract catheter had UTI, whereas the two latest surveys showed a trend, although not significant. The amount of deep postoperative infections increased significantly from the 1st to the 2nd survey, but not from the 2nd to the 3rd. **Discussion and conclusions:** In our hands repeated prevalence surveys seem to be a quick and ressource-economic way of monitoring HAI. The registration indicated a high degree of compliance among the personnel. The increase in the prevalence of deep postoperative infections may help us find indication for further investigation by a time-limited incidence survey. The possible increase in UTI among patients with urinary tract catheter may stimulate us to evaluate the indications for catheter use.

O14 Percutaneous exposure incidents among vietnamese hospital personnel and the impact of a prevention program

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The establishment of a reporting system and management of percutaneous occupational exposures management in a Vietnamese tertiary hospital has been achieved in encouraging the healthcare personnel (HP) to report their occupational exposures and practicing safety practice. Despite the increasing number of HIV admitted to the hospital, the comprehensive occupational exposure prevention program, involving supplying sufficient protective barrier equipment and needle disposal units and continuing educational programs for all hospital staff on the use of these equipment has been successful in preventing HIV occupational exposures. Dedicating resources to occupational exposure prevention and HP safety should be a priority for clinical care and treatment programs in Vietnam. **Introduction:** Healthcare personnel have a risk of exposure to the bloodborne pathogen1. However, the incidence of occupational percutaneous exposures to HP is unknown in Vietnam. The organisation of reporting system of percutaneous occupational exposures in HP is still a new concept in the country. Follow-up these exposures and setting up the appropriate management and prevention programs thus are necessary. Cho Ray hospital is a 1705-bed tertiary care referral university centre for Southern Vietnam with the hospital's bed occupancy rate in 2006 was 144%. Approximately 300 emergency patients are admitted and 3000 out-patients are consulted per day. The number of HIV-infected patients admitted to Cho Ray hospital has increased rapidly, by six-fold in 2006 compared to 1997 and parallels the expansion of the HIV epidemic in southern Vietnam. However, there were no established protocols for occupational exposures. Since Infection Control Department of Cho Ray hospital established in 2000, all of HIV exposed HPs have been reported, treated, and followed up completely. **Challenges:** In the spread of HIV infection nowadays, number of HIV patient admitted to hospital is increasing. The patients with HIV who admitted to the hospital mostly enter with traffic accidents or other diseases, but no clinical signs which suspected HIV infection and were found HIV infection accidentally by scanning tests. Almost of them required urgent manipulations and needed invasive procedures such as intubation, infusion, and operation.2 These factors contributed to increase of the risks of transmission of HIV as well hepatitis viruses to HPs. Despite these high risks, infection control is not well practiced among HPs. There is a wide gap between knowledge and behaviour in infection control practicing among the HPs. Application of universal precautions has been limited.3 The working condition is unsafe because the hospital suffer from overcrowding and lack of facilities. **Actions:** Since 6/2001, a prevention program has been conducted, including training, setting up the system of report and supplying appropriate personal protective equipment (PPE) for HP. The training program including ongoing training courses (formal and informal) for all staff, publication of a guideline to prevent exposure to HIV, HBV and HCV for HP, and distributing pamphlets to educate staff about the prevention of exposure to blood borne pathogens. Provision of sharps disposal containers that meet optimal performance criteria and sufficient PPE are also available continuously on units and in departments. HBV vaccination



programme was also implemented in 2004. Reporting system for occupational exposures was set up and the treatment procedures after exposures also established. (Figure 1) All HIV exposed patients were given post exposure prevention within 2 hours after exposure with 2 drug basic regimen and followed-up in the 6 month period per standard guideline.⁴ Non HIV exposed HPs were tested for HBV and vaccinated if they had no antibody. Results: From 2/2000 to 12/2006, the total number of occupational exposed HP was 195 cases, of which 156 cases (80%) were percutaneous exposures including needlestick (96%) or other sharps-related injuries (4%). Source patients with positive HIV status was reported in 30 cases (19.2%), with negative or unknown HIV status was in 126 cases (80.8%). Nurses were the most commonly affected members 60 (38.5%), followed by cleaners 35 (22.4%) and surgeon 25(16%). (Table 1) Most exposed HP work at surgery department (39%) and emergency department (10.9%).(Table 2) Injuries occurred during waste collecting (22.4%), suturing (20.5%), recapping or removing needles (18%) and giving transfusion (8.3%).(Table 3) The most common injuries were from hollow-bore needles (57.1%), especially needles for blood taking. (Table 4) The most common reason for accidents was unsafe practice (61.5%), non-comply with standard precaution (26.9%) and insufficient of PPE (11.5%). In 30 cases of HP who exposed to HIV positive patient, 65.4% of HP do not know patient status before accident. There is no case of sero-conversion with HIV, but two cases have sero-conversion with HBV, and one with HCV. Since starting the HBV vaccination program, no case of sero conversion with HBV detected. After the prevention program, the incidence of exposed HP to HIV reduced significantly although the admissions of patients with HIV increase. Incidence was 0.7/month in 2000 then 1.3/month during the first 6 months of 2001, reduced to 0.08/month in 2002, 0.17/month in 2004 and 0.25/month in 2006 (P=0.007). Notably, the incidence of exposed HP reduced markedly after each episode of prevention (Figure 2) In addition, the programme supplied HPs with a better understanding of HIV transmission and provided further psychological support in private consultation, which helped to reduce psychological stress following HIV exposures. As a consequence, the number of HP reporting of needlestick HIV patients increased. Conclusion: HP have a high risk of percutaneous exposures. Improving safe working environment should focus in Vietnam including application of safe practice, especially safe injection technique and of appropriate PPE use. Prevention program including training, management, supplying sufficient PPE and reporting has been shown to be effective in preventing occupational exposures, and need to be maintained continuously. The majority of our HIV percutaneous exposures occurred during surgical and emergency procedures and waste collection. Surveillance data should be used to guide ongoing targeted training programs for high-risk procedures and settings.

O15 Developing a Rational Approach to SSI Prevention in a Tertiary Care Hospital in Cairo

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Surgical site infections (SSI) account for a large proportion of hospital acquired infections. They are associated with high morbidity and mortality that poses a large burden upon inpatient's health care budget. Prevention is desirable and it constitutes of a combination of preoperative patient and operation room environment preparation, appropriate surgical techniques, perioperative antibioprohylaxis and postoperative wound care. Surveillance of SSI was conducted, in a tertiary care hospital in Cairo, as a part of the infection control program. This study represents SSI over 2006 in general and specialised surgeries. Cases were identified according to data analyzed from the infection notification forms and the microbiology reports of positive cultures. The isolated microorganisms as well as their sensitivity/resistance pattern were illustrated. Results showed infection rates in Clean surgeries: 1.05%, Clean-contaminated: 0.8%, Contaminated:4.7% and Dirty: 8%, in general type of surgery-wound class. Other measures for SSI prevention were highlighted as patient preoperative preparation, biological assessment of operation room environment and antibioprohylaxis which is implemented and properly followed since July 2005 to date. Cycling of the antibiotic policy was done three times and updated according to new requirements. Measuring SSI rates is a major challenge in hospitals where limited experience with measurement of outcomes exists. However it is one of the quality performance indicators in health care settings

O16 Risk factors for nosocomial infection in an adult intensive care unit: a prospective study

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Objectives: To determine the incidence and the associated risk factors of nosocomial infection (NI) in non-outbreak conditions in an Adult Intensive Care Unit (AICU). Setting: A 16 bed AICU in a 1,500-bed tertiary teaching hospital. Methods: All patients who stayed more than 48 hours in AICU during a 15-month period were entered into the study. Information on different risk factors was gathered prospectively using a daily questionnaire. The Centre for Disease Control definitions were used to identify the first episode of NI (cases), which were then compared with those patients who did not develop infection (controls). Odds ratios and their 95% confidence intervals were calculated using logistic regression. Results: 430 patients were followed for 3947 patient-days with a median length of stay of six days. Overall 90 episodes of NI were identified in 74 patients. The incidence rate for the first episode of nosocomial infection was 23 (95% CI 18-29) per 1000 patient-days at risk (74 episodes within 3181 patient-days of follow-up). Artificial ventilation (OR=3.16, 95%CI: 1.65-6.05), central venous catheter (CVC) insertion (OR=3.13, 95%CI: 1.35-7.23), the presence of an arterial line throughout the stay (OR=3.04, 95%CI: 1.12-8.27), bronchoscopic procedures (OR=2.06, 95%CI: 1.03-4.13), more than one week stay in AICU compared with less than five days (OR=4.15 95%CI: 1.90-9.09), and the use of ciprofloxacin (OR=2.55, 95%CI: 1.04-6.26) were significantly associated with the development of nosocomial infection. Conclusion: AICU stay more than one week, ventilation, CVC, arterial line, bronchoscopy, and ciprofloxacin use, predispose AICU patients to NI in non-outbreak situations.

O17 Education in infection prevention: How to start from the beginning?

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Health care associated infections (HCAI) prevention is recognized as a specialist field in many countries. Still the education for infection control professionals (ICP) is not universally available. During 2003 we have performed a survey in 10 South East European countries to see, among other structures, the education infrastructure. We have found that basic education for ICP is present in only 4 countries, while continuing education was present in 6 countries but 8 countries have planned to improve education in the next 5 years. As in Croatia we did not have basic education, we have performed a survey of ICP practice. On the basis of the results we have planned basic education for infection control nurses. The general aim: learn basic concepts of HCAI prevention and control and understand the impact infection prevention has on quality improvement in health care. Specific goals were to achieve competencies in many particular aspect of HCAI prevention and control. The Course has 300 hours during six months (a week per month of direct teaching and three weeks of work in own hospital, doing "homeworks"). So far we had 2 such courses, with 21-24 participants in both Courses, several nurses from Bosnia&Herzegovina and from Macedonia were participating. The Courses finished with written and oral examinations and certificate was given to the participants. This certificate will be recognized as a part of the specialist postgraduate course in Infection prevention and control, that is now in the process of developing in the Higher School of Nursing in Zagreb.

**O18****Glass Particles Contamination in Single Dose Ampoules: A Patient Safety Concern (Preliminary Report)***A. Unahalekhaka¹, P. Nuthong², A. Geater³*

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Background: Glass particle fragmentation and ampoule contamination upon opening have been previously reported for more than 5 decades. This study aimed to determine whether there were still glass particles contaminated in single dose glass ampoules.

Methods: The study was conducted in December 2006. Eight hundreds 10-ml. sterile water for injection ampoules were inspected for glass particle contamination upon opening. Ampoules were opened by 400 nursing personnel of 3 tertiary care hospitals using their normal practices (2 ampoules per 1 nurse). Glass particle contamination and size of particles were inspected by stereomicroscope and scanning electron microscope (SEM) respectively. Data were analyzed using descriptive statistics.

Results: Seven hundred and ninety eight ampoules were inspected. Glass particles were detected in 65% of ampoules (95% CI 61.6-68.3). Size of particles, detected from positive samples from stereomicroscope inspection, ranged from 8-172 micron. The mean numbers of glass particles detected were: 105 + 21.2 for particle size < 50 micron, 7.5 + 3.5 for size 51-100 micron and 3 + 2.8 for size 101-200 micron. Among negative samples from stereomicroscope inspection (no glass particle detected), SEM could detect glass particles with sizes ranged from 8 to 54 micron. **Conclusion:** Glass particle contamination occurs on opening single dose glass ampoules.

O19**Clearing-out Local Decontamination***Yaffa Raz**Lady Davis Carmel Medical Center, Haifa, Israel*

Local decontamination of medical devices in hospital wards is a dormant risk factor for infection outbreak. Decontamination of medical devices should be carried out in a controlled environment and by means of validated procedures. Central sterile supply department (CSSD) is the ideal site for decontamination of medical devices.

Until a few years ago, nurses and nurse aides, in Lady Davis Carmel Medical Center, Haifa, Israel, used to decontaminate medical devices, in the hospital's wards. Our aim was to eliminate decontamination of medical devices activities in wards and units, and to restrict it only for surfaces and stationary equipment.

In order to evaluate the extent of those activities, we mapped the areas of the hospital in which cleaning and disinfection were carried out.

Results of mapping showed, that intensive care units as well as several wards were decontaminating medical devices such as ventilation bags, oxygen humidifiers, nebulizers, thermometers, monitor cables and more. Some of the devices were single use devices and some of them reusable. Decontamination facilities were not adequate and no proper personal protective equipment was used. Decontamination methods did not follow infection control principles and guidelines.

A decision-making flowchart was used for each medical device and every ward to determine an efficient solution for each item. The algorithm contained economic, logistical and risk management considerations.

Some of the devices were directed to decontamination in CSSD, single use devices were replaced, whenever possible, by reusable medical devices. In some cases, single use devices were chosen to replace reusable device, thus eliminating the need to reprocess those items.

In order to carry out decontamination in CSSD we purchased a sufficient amount of devices, to enable a proper decontamination and supply chain. Decontamination protocols were established and validated. Some of the devices, like ventilation bags, require a quality control process. A quality control and cooperation scheme was established with ventilation technicians team

A year of extensive intervention resulted in the cessation of local decontamination of medical devices in wards.

This paper will demonstrate the process of eliminating local decontamination and will highlight special practical applications of providing a safe hospital environment for patients and healthcare workers.

O20**Infection Control Survey at a Public Sector Teaching Hospital in Karachi***Shehla Baqi, Nizam Damani, Rafiq Khanani, Sharaf Ali Shah, Patricia Lynch**Dow University of Health Sciences, Karachi, Pakistan*

Introduction: Karachi is a port city of Pakistan with a population of 15 million. Civil Hospital Karachi (CHK) is the country's largest government teaching hospital.

Methods: An Infection Control Survey of 13 clinical units in CHK was conducted using audit tools in January of 2007. The outpatient department (OPD) and isolation ward were surveyed without audit tools.

Results: Audit of 13 Clinical Units

28 health care workers (HCW) were audited; 50% nurses, 25% medical technicians and 25% physicians.

None of 13 units had Infection Control policies. Only the 2 ICUs had hand hygiene (HH) facilities. HH during IV cannulation and injection, phlebotomy, urinary catheterization, ET suctioning was not demonstrated by any HCW.

Gowns were shared amongst HCWs and worn from one patient to the next in the ICUs.

Urinary catheter bags were emptied by janitors into garbage pails.

Ventilator tubing was disposable and single patient use.

Needles were recapped with both hands by 12 of 13 HCWs and thrown in the garbage.

In a spot survey in each unit, of 86 HCWs 85% had sustained needle stick injuries; 60% had HBV vaccination.

N95 masks were unavailable. Patients with tuberculosis or MDROs were not in isolation.

Survey of OPD and Isolation Ward

Dental OPD did not have dental autoclaves. In Surgical OPD, an average of 50 proctoscopies were performed daily without disinfection. Isolation Ward did not have HH or isolation facilities.

Conclusions: Correct Infection Control practices are not followed at CHK and can place patients and health care workers at risk.

O21**Introducing Antimicrobial Guidelines for Surgical Prophylaxis - An Impact****Assessment***Peter Zarb**St. Luke's Hospital, Gwardamangia, Malta*

Introduction: Postoperative infections are an important source of morbidity. Surgical site infections are the third most commonly reported nosocomial infection and are the second most commonly reported adverse event in hospitals, behind medication errors.

Aims and Objectives: This study aimed at evaluating the effect of the "Surgical Antibiotic Prophylaxis Guidelines" on local surgical prophylaxis practices with respect to, indication for prophylaxis, choice of drug, timing of first dose and duration of antibiotic cover.

Methodology: The study evaluated surgical prophylaxis before and after the introduction of guidelines.

Design: A prospective investigation of the clinical records of patients, admitted to St. Luke's Hospital undergoing a surgical procedure.

Setting: The wards assessed included general surgery, urology, orthopaedic, and obstetric and gynaecological wards.

Main outcome measures: The data collected 'before' was evaluated and compared with practice 'after' introduction of the guidelines

Results: The results showed an overall improvement in all 4 parameters. There was a statistically highly significant improvement in 'Indication' (41.5% before to 77.2% after $P = <0.0001$), 'Choice' (52.5% to 79.0% $P = <0.0001$), and 'Duration' of prophylaxis. The improvement seen in timing was not statistically significant (79.6% to 83.1% $P = 0.1894$). However, 'Duration' is still the worst parameter improving from 12.4% to 24.3% ($P = 0.00272$) and is the area which requires major improvement. The results also showed statistically significant decrease in prophylaxis used for minor procedures and increase for major procedures.

Conclusion: There was a net positive effect of the Guidelines on surgical antibiotic prophylaxis.



O22 Incidence of surgical site infections and accompanying risk factors in Algerian patients

Mohammed Atif, Bouadda, Bezzaoucha, Azouaou, Bendali, Boubechou, Bellouni
All Blida Univ, Algeria

Objectives: The aim of this study was to determine the incidence and analyse risk factors for surgical site infections (SSIs) at university hospital of Blida, a reference hospital in Algeria.

Methods: A prospective, longitudinal, descriptive and analytical study was made from January to December 2006 of a clinical cohort of 1094 patients who underwent a surgical procedure with a post-surgery stay of more than 48 h. The criteria for infection were those defined by the Center for Disease Control and prevention (CDC) of the USA.

Results: The SSI incidence rate was 3,7% (41 of 1094); 1,9% incisional SSIs, 1,3% deep incisional SSIs and 0,5% organ/space SSIs. The incidence increased from 2,5% in clean wounds to 5,3% in dirty wounds, or 1,1% in patients with a National Nosocomial infections surveillance (NNIS) risk index of 0 to 13% in patients with an NNIS risk ratio ≥ 2 . In multivariate analysis, having a dirty wound [odds ratio (OR) 1,7; 95% confidence intervals (CI) 1,1-3,6], or American Society of Anaesthesiologists' score > 2 (OR 2,3; 95%CI 1,3-5), were independent risk factors for SSI. Emergency surgery (OR 1,5; 95%CI 0,8-3,4), or duration of procedure > 2 (OR 1,4; 95%CI 0,9-2,2) was of borderline significance.

Conclusions: Our data show that SSIs were frequent and differed widely by wound class. The NNIS risk index was predictive of SSI for this population. Having a dirty wound and American Society of Anaesthesiologists' score higher than 2 were factors that influenced the frequency of SSIs.

O23 Towards harmonised infection control practices in European hospitals

Jacques Fabry¹, Ingrid Morales², Barry Cookson³
¹Claude Bernard University, Lyon, France; ²Scientific Institute of Public Health, Brussels, Belgium; ³Health Protection Agency, London, UK

IPSE (Improving Patient Safety in Europe) aims to resolve persisting differences in preventive practices and outcomes across Europe with respect to Nosocomial Infections (NI) and Antibiotic Resistance (AR). The project is served by an extended partnership of national surveillance networks and Public Health institutes, as well as professional societies as ESCMID, WHO, EU and ECDC.

Results of a project survey highlighted large variations in national Healthcare-associated Infection (HCAI) and Antimicrobial Resistance (AMR) prevention and control activities. IPSE is proposing recommended practices, standards and indicators for the measurement of occurrence and control capabilities of HCAI and AMR. These will set levels of accomplishment appropriate for national Infection Control (IC) programmes. Local tools to enable hospitals to monitor improvements in agreed performance indicators are also being developed.

To strengthen the status of professionals involved in IC activities and improve their capabilities, IPSE proposes a common core curriculum for the training of IC doctors and nurses. Defining the minimal content requirement for IC training will improve capacities to prevent and control HCAI.

IPSE supports countries organising hospital networks for the surveillance and control of NI and AR. The HELICS methodology (surgical site infections (SSI) and ICU-acquired infections) has been sustained and is extending. The challenge of improving surveillance and controlling AR in the ICU is further addressed by CARE-ICU, which aims to achieve a parallel improvement in the use of antibiotics and in hygiene interventions in the ICU.

The growing importance of Nursing Homes (NH) in the incidence of HCAI is addressed by a study of existing systems of care and IC activities in European NH. IPSE assesses the feasibility of a common European approach to HCAI surveillance in NH and proposes a harmonised protocol.

O24 Surveillance

Smilja Kalenic
Cinical Hospital Centre Zagreb, Croatia

O25 Design, construction and renovation

Walter Popp
University Hospital Essen, Germany

During its last meeting in Amsterdam in 2006, IFIC decided to install special interest groups (SIGs). One of it is SIG "Construction and renovation". This SIG started its work in April 2007. There are about ten persons who showed interest in participating and who communicated by e-mail until now.

Unfortunately the aims and content of the discussion are not really clear: Which topics should be of primary interest: e.g. Water, new buildings and design, renovation, sanitation?

Who is addressed by recommendations: wealthy countries, less wealthy countries or poor countries? And should we give different recommendations according to that?

We will have the chance to discuss this in Budapest at the SIG meeting. We also should find a member who will chair the SIG and manage discussion.

Place on the IFIC website will be given in the near future.

O26 Virucidal activity of hand hygiene agents: relevance and current issues in testing and regulation

Sayed Sattar
University of Ottawa, Canada

Human hands can readily acquire infectious viruses either by direct contact with contaminated materials or indirectly via casual interactions with the environment. Many such viruses can remain viable on hands for extended periods, thus conferring on hands the potential to spread a variety of viral infections. This makes proper and regular hand hygiene particularly crucial in protecting infection control professionals themselves as well as those in their care. Currently, there is much justifiable emphasis on preventing the handborne spread of bacterial pathogens. Recent developments not only highlight the potential of hands to spread many viral infections as well, but also make it possible to routinely assess hand hygiene agents against viruses of human health significance.

This presentation will (a) reinforce the significance of viruses as human pathogens, (b) give examples of how hands may acquire viruses, (c) illustrate the comparative stability of enveloped and non-enveloped viruses on the hands of adults; examples will include viruses of current public health significance, (d) show the influence of pressure and friction on the levels of virus transfer during contact between hands and environmental surfaces, (e) critically review current methods to study the virus-eliminating activities of hand hygiene agents and summarize the relative strengths of the fingerpad method, (f) demonstrate the relative effectiveness of handwash and handrub agents and methods of drying washed hands in reducing viral contamination, (g) discuss the criteria to be used in assessing the claims of hand hygiene agents against viruses, (h) describe the current status of regulations for testing and registration of formulations with claims for virucidal activity, and (i) recommend directions for the future.

**O27****Environmental infection control***William A. Rutala*

University of North Carolina (UNC) School of Medicine, Chapel Hill, North Carolina, USA

The acquisition of nosocomial pathogens depends on a complex interplay involving the host, the pathogen and the environment. The purpose of this presentation is to review healthcare-associated infections resulting from an environmental source, including air, water, environmental surfaces, laundry, and regulated medical waste. In addition, animals in health care facilities and microbiologic sampling of the environment will be discussed. It is apparent that the inanimate environment may occasionally play a role as the source or reservoir for healthcare-associated infections. When strong circumstantial evidence or controlled prospective studies indicate a potential danger from such environmental agents, simple precautions have been identified that reduce or eliminate unnecessary risk to susceptible patients.

O28**Improving the evidence base for infection control and antimicrobial stewardship interventions***Barry Cookson¹, Sheldon Stone²*¹Health Protection Agency, Colindale; ²Royal Free and University College Medical School, London,

The ORION statement (Guidelines for Transparent Reporting of Outbreak Reports and Intervention studies Of Nosocomial infection) has been published recently (Stone et al, Lancet Infect Dis 2007; 7:282-88 and J Ant Chemother 2007; 59: 833-840). The objective behind developing the ORION Statement was to raise the standards of research and publication in hospital epidemiology, to facilitate synthesis of evidence and promote transparency of reporting. The guidelines are aimed at researchers, editors, reviewers, and grant assessment panels. They have been produced by the teams that carried out the systematic review of isolation policies in the hospital management of MRSA for the Health Technology Assessment Board and the Cochrane review of interventions to improve antibiotic prescription practices in hospital patients. In this workshop we will introduce you to the statements and you will be able to use them to assess a paper describing an intervention. We will also explore what additional tools you require to teach this approach to others.

O29**Adopting a Risk - Based Approach to Preventing Infections***Barbara Soule*

Joint Commission Resources, Oakbrook Terrace, Illinois, USA

This workshop will describe the rationale for creating and implementing a risk-based strategy to prevent infections. The presenter will discuss the process for developing a risk assessment for an infection prevention program, including issues related to populations, procedures, devices and diseases. The discussion will also include consideration of conditions in the community and the geography of the hospital.

Various options for performing a risk assessment will be presented, and will include sample tools for using either a quantitative or qualitative approach. The participants will complete a risk assessment of their choice using examples from their own institution. The risk assessment priorities will then form the basis for an infection control plan that includes the risk, goal, objective, strategy and evaluation.

Each participant will leave with a risk assessment and IC plan for his or her infection prevention and control program.

O30**Why is Hand Hygiene in Health Care so Important? Experiences from****a local study***Elza Tomola*, Zsuzsanna Molnár*, Edit Kustos***

*Hospital Hygiene, Jahn Ferenc Dél-Pesti Kórház Hospital, Budapest, Hungary; ** Ecolab-Hygiene Kft, Budapest, Hungary

As most nosocomial infections are thought to be transmitted by the hands of healthcare workers, hand hygiene is considered to be the most important intervention to prevent nosocomial infections. However, studies have shown that hand washing practices are poor, especially among medical personnel.

Hands of healthcare workers are the most common vehicle for the transmission of micro-organisms e. g. from one patient to another and from a contaminated environment to patients.

Healthcare workers' hands become progressively colonized with germs as well as with potential pathogens during patient care. In the absence of hand hygiene action, the longer the duration of care, the higher the degree of hand contamination. Therefore hand hygiene must be part of an integrated approach to infection control.

Healthcare workers' adherence to good practice is extremely low. Nurses and physicians usually clean their hands less than half as they should. In critical care situations and when workload is high, adherence to good practices might be as low as 10%.

Hand hygiene behaviour is a complex interaction of many factors and no one behavioural theory can reliably predict hand hygiene behaviour. Improving compliance with hand hygiene practices and understanding of what motivates hand hygiene behaviour will vary from culture to culture. Some of the main parts of hand hygiene are knowledge and education.

In our study we examined hand hygiene behaviour after an education program.

O31**Relevance and developments in hygienic and surgical hand disinfection -****a scientific approach***Manfred Rotter*

Institute of Hygiene and Medical Microbiology, Medical University Vienna, Austria

Both hygienic and surgical hand disinfection are the agreed cornerstones in the prevention of nosocomial infection. Whereas the former solely aims at the transient microbial flora, the latter is also directed against the resident hand flora of the surgical team. The release of transients can be reduced by a 1min hand wash with un-medicated soap by approximately 2-3lg, with antiseptic detergents by 2,5-4lg and with an alcoholic rub by 4 up to nearly 6lg depending on the alcohol species and its concentration. That of the resident flora with a 3min treatment amounts to 0,4lg, 0,8-1lg and 1,7-3,5lg respectively if tested according to the corresponding European norms EN 1500 and EN 12791. A so-called "Hygienic hand wash" with antiseptic detergent meant to be used for hand sanitation for instance in the kitchen or during pharmaceutical activities is tested according to EN 1499 with the requirement to reduce transient flora to a significantly higher degree than un-medicated soap. In its "Guidelines on Hand Hygiene in Health Care" the WHO considers the use of alcohol-based hand rubs on the ward and in the operating theatre as the optimum measure to prevent health-care associated infections. Nevertheless, hand washing with un-medicated or antiseptic soap will still be needed to clean soiled hands, remove residual emollients and jellifying agents or to keep hands in a state of little microbial shedding. For achieving the desired clinical effect, antimicrobial efficacy of the above mentioned measures is of primary importance but compliance to adhere to them is equally important



O32 Manual reprocessing of medical instruments - clean or disinfect?

Bernhard Meyer
Ecolab GmbH. & Co. OHG, Düsseldorf, Germany

There is no doubt about the hygienic status that has to be achieved for medical instruments before use: Critical instruments (i.e. those introduced into sterile body wholes or tissue) have to be sterile, semi critical devices (i.e. those in contact with mucous membranes or non-intact skin) have to be disinfected with an appropriate efficacy spectrum. Non-critical devices have to be cleaned at least, however, to interrupt chains of transmission of health care associated pathogens, like antibiotic resistant bacteria, disinfection may be advisable in many cases. It is now understood that devices have to be clean, before they can be sterilized. Many semi-critical instruments have to be cleaned before final (terminal) disinfection, to achieve the appropriate level of disinfection. During cleaning staff is in contact with those devices, which may harbour pathogens. To avoid infection risk for the staff and spread of pathogens in the hospital environment it is advisable, to assure disinfection during the first reprocessing step (i.e. cleaning). Appropriate disinfectants have to be chosen for this, to avoid coagulation and fixation of organic soil to the instruments and facilitate cleaning. Additionally long drying, which makes cleaning more difficult, can be avoided by immersing instruments in disinfectant immediately after use. The immersion in cleaning agents only will allow microbial growth and facilitate spillage of potentially infective material.

O33 Requirements and procedures for proper reprocessing of flexible endoscopes

Wolfgang Merkens
Manager Corporate Planning International, Schülke & Mayr GmbH, Norderstedt, Germany

The process-orientated reprocessing of flexible endoscopes is becoming more and more a major topic to prevent from infections both for patients and staff. In parallel the maintenance of the valuable instruments is a big point of economic interest.

SGNA (Society of Gastroenterology Nurses and Associates --> USA) and ESGENA

(European pendant) had set up guidelines in the past.

Enhanced by the EN ISO 15883 for machinery reprocessing a clear view on needs in techniques and especially in education is mandatory to gain good results for the benefit of patients, staff and last but not least for the budget.

The speech will highlight, why the topic is that complex and how to anticipate the challenges. Each single step will be described including the choice of different chemistries for cleaning and disinfection. Both manual and machinery reprocessing will be shown. Personal protection as well as proper care for technical equipment and scopes will appear on the slides. At the end the audience should know:

- how to decide for suitable means, measures, techniques and products
- how to prevent from infections
- how to maintain the instruments
- how to perform quality-controlled reprocessing

O34 3M Baclite Rapid MRSA Test - A New Innovation in MRSA Screening

James Collier
3M Health Care

O35 Screen and Clean to beat MRSA

Gertie van Knippenberg-Gordebeke
KNowhow Infection Prevention and Hygiene (KNIP), Venlo-Boekend, The Netherlands

Information about the history and current situation about Meticillin-resistant *Staphylococcus aureus* (MRSA) policy in the Netherlands. Although surrounded by countries with high MRSA incidence, the incidence is under 6%.

The MRSA policy has been pursued in every healthcare setting for more than 10 years.

The guidelines, by the minister of health declared as the official professional standard, are systematically controlled by the Inspectors of Health. The most important measure against MRSA is restrictive antibiotic use by all Dutch physicians.

The other preventive factor is that Dutch hospitals run active infection control programs led by infection control practitioners, practising surveillance and controlling the basic hygiene. Basic hygiene includes Hand-hygiene with alcohol and Mechanical cleaning and disinfecting of nursing and medical devices.

The 'search and destroy' policy means that every patient suspected for MRSA must be screened. The identification is by 4 risk categories (Dutch guidelines, www.wip.nl). Swabs have to be taken from perineum, nose, throat and every wound, skin-lesion and or infection site. In 2007 some laboratories start with rapid testing.

If the patient must admitted to the hospital the category 1 or 2 patient must be cared for in strict isolation till the results are known. If the patients is proved to be MRSA positive the infection control department starts screening every contact which means patients and HCWs. If more as 2 patients are found the outbreak management for MRSA starts. Staff in whom MRSA has been diagnosed and who also have a skin disorder may not work, i.e. they may not carry out any activities in departments in which patients are present.

To fulfil this policy at least 0,5 ICP is needed. A lot of money, but having MRSA outbreaks or an increase will cost much more.

O36 Improving antibiotic practices in hospitals

Smilja Kalenic
Clinical Hospital Centre Zagreb, Zagreb, Croatia

The discovery of antibiotics was a revolutionary event in medicine. Antibiotics saved and yet save millions of lives all over the world where/ if they are available. As microorganisms are living creatures too, they develop resistance to every antibiotic through natural process of mutation: if antibiotics are used when such resistance develops, resistant organisms will overgrow and spread easily, especially if infection control fails. The resistance genes spread then vertically to the offsprings, but can also spread to the other organisms by horizontal gene transfer not only to the same species but to totally different bacteria. As bacteria are exchanged between people, the selection of such resistant strain in an individual can change the resistance in the whole human population. To preserve the susceptibility of microorganisms to antibiotics as long as possible, and/or to postpone the development of resistance, antibiotics should be used rationally.

The basic rules for the rational use of antibiotics can be formulated as follows:

1. antibiotic stewardship programme in hospitals,
2. national and local (hospital) guidelines for antibiotic use based on local resistance data,
3. antibiotic committee and antibiotic management team in hospitals,
4. surveillance of antibiotic use and resistance rates,
5. regular audits and performance feedback to the prescribing physicians together with the antibiotic use and resistance rates,
6. education about antibiotic use beginning in medical school, throughout the physician's life.

**O37** **Dispelling the myths about the cost of healthcare associate infections**

Denise Murphy
Barnes-Jewish Hospital, Saint Louis, Missouri, USA

There are critical elements of their business that every infection prevention and control (IPC) specialists should want and need to know in order to 1) plan and design, 2) garner support and resources, and 3) implement and lead effective programs aimed at the elimination of healthcare associated infections. We must be able to inform senior leaders about the business case for infection prevention and the impact that HAIs have on finances.

These critical elements of the business case for IPC include:

Establishing a vision for IPC that aligns with overall patient safety and organizational goals

Assessing your population for needs and your program for effectiveness against the vision

Conduct a gap analysis to determine what it will take to get to your vision Set priorities: you cannot do everything, so work first on what will have the greatest impact on: morbidity, mortality, patient safety, clinical quality outcomes, and revenue.

The economics of infection prevention, as part of an overall business case, must demonstrate the scope of the problem, which in US hospitals is about 2 million healthcare-associated infections annually with an estimated cost of \$4.5 to 5.6 billion. The financial impact associated with HAI can be broken down into average cost estimates, which are largely perceived to be underestimates (e.g. using dollar estimates from the year 2000 dollars or earlier), as follows:

UTI - \$1,000; VAP - \$10,000; SSI - \$25,000; BSI - \$36,000.

In addition to dollars, length of hospital stay (LOS) is a critical hospital metric because high volumes generally mean increased revenue. The average excess LOS associated with HAIs ranges between 2 days and 2 weeks depending on the type and severity of infection. Finally, the societal cost of HAI range from loss of productivity to death and emotional devastation. IPC experts must remain patient focused but know how elimination of HAI can also create a healthy bottom line for their organization.

O38 **Economics of Infection Control - an alternate view**

Nizam Damani
Clinical Director & Lead Infection Control Doctor
Craigavon Area Hospital. Ireland, UK

It has been estimated that healthcare-associated infections (HAI) cost between \$5-6 billion annually and result in almost 100,000 deaths in the US 1. According to UK National Audit office, hospital acquired infections are costing the UK National Health Service as much as ?1 billion a year 2. They estimated that if 15 percent of HAI could be prevented by better application of good practice, it would release ?150 million of health service resources.

It is important to emphasize that setting up an effective infection control program need resources and the health service managers need to be convinced that investment in infection control is a priority and cost effective. This is not an easy task as the managers and the government are faced with competing priorities and lack of resources. In addition, there is considerable variance in funding of various hospital and healthcare systems worldwide.

Since infection control programs do not generate immediate revenue and the healthcare facility can't charge for infection control service, health service managers and the government need to be convinced that due to high morbidity and mortality associated with HAI, infection control should be part of public and patient safety and the investment in infection control is essential as a part long term gain for the nation.

This presentation will highlight the global burden of HAI, discuss the issue with calculating the true cost of infections, and analyse the existing financing structures in healthcare systems worldwide. It will present evidence that infection control must be a part of quality of patient care and clinical governance and investment in infection control is essential and cost effective.

References: 1. Public Health Focus: surveillance, prevention and control of nosocomial infections. MMWR 41:738-787, Oct. 23, 1992.

2. Report by the Comptroller and Auditor General - HC 230 Session 1999-2000: The management and control of hospital acquired infection in acute NHS trusts in England.

O39 **Improving cost-effectiveness by eliminating dogmas**

Patricia Lynch
Epidemiology Associates, Redmond, Washington, USA

Infection prevention practices are a complex synthesis of scientific findings interwoven with strands of hope. Dogmas (statements of beliefs or opinion) appear often in infection prevention practices and are intended to bridge the gap between science and hopes in unknown territory. Dogmas may exist with sound scientific support, but they may be held strongly by all positions in areas of controversy, and may persist even in the face of evidence to the contrary.

At the 4th Decennial International Conference on Infection Control, 33 dogmatic statements in all three categories were posed to 369 attendees (78% from USA) who voted their beliefs about each statement electronically. (Manangan L, ICHE 2001) The majority agreed with statements that had proven efficacy but there was an even split on controversial statements and many respondents agreed with statements describing practices that were proven to not have value. Since dogmatic statements generate polarized positions, it is important to recognize infection prevention practices that are likely to have strong and perhaps irrational elements of hope and ritual. All infection prevention practices cost money and energy: those with no value and which may even cause harm should not be allowed to continue. These are frequently related to injection safety, isolation, handwashing, and management of patients with MDRO isolated. Belief in "wrong" or unproven practices may represent ritual, inadequate training or lack of research, and will only be fixed with the correct strategy.

Reliance on dogma weakens infection control programs and greatly increases confusion and cost. IC personnel should avoid dogmatic statements, cite references or scientific basis for "rules" and assist staff to think through dogma situations.

O40 **Nosocomial infection surveillance for transplant patients**

Petra Gastmeier
Hannover Medical School, Germany

Transplant patients have a high risk to develop nosocomial infections. On one hand donor-transmitted infections can be expected. In this group it is possible to distinguish latent infections from the donor (e.g. HBV, HCV, CMV, HSV, EBV), acquired infections from the donor due to colonization (e.g. Aspergillus) and contamination during organ harvesting and preservation. On the other hand recipient-associated infections may occur like endogenous infections due to the normal endogenous bacteria or due to immunosuppression and exogenous infections due to cross transmission.

Therefore surveillance of nosocomial infections seems to be in particular interesting in this patient group. We want to describe surveillance results in the group of lung and heart transplant patients as well as in the group of patients with bone marrow or peripheral blood stem cell transplantation. In both patient groups definitions and methods should be modified according to the needs of the individual patient groups. For bone marrow transplant and peripheral stem transplant patients a surveillance network is existing. Even in this patient group surveillance and appropriate feedback can lead to decreased nosocomial infection rates.

O41 **Infections in immunocompromised hosts**

Gyula Prinz
St. László Hospital, Budapest Hungary

The incidence of infections in immunocompromised hosts depends of net immunpression or immunodeficiency. During the chemotherapy of patients with hematological malignancy the mesure and the duration of neutropenia are the major factors in infections. Febrile neutropenia is due bacterial infections and invasive mycoses. The isolation of patients can prevent the infections, antibacterial and antifungal prophylaxis are counterverisal issues. MDR strains, e.g. pseudomonads, ESBL producing Gramme negatives, vancomycin resistant enterococci are crucial in this setting. In early phase after hemopoetic stem cells transplantation the in-



fections are identical, later according the grade of Graft-versus-host disease, the additional immunosuppressive agents, the use of anti thymocytic globulin the reactivation of CMV and other herpesviridae and polyomavirus infections together with the late onset invasive mycoses must be taken in account. Solid organ transplants are complicated by nosocomial surgical infections in early phase. Later, depending from the anti-rejection therapy, the reactivation of CMV and other latent viral infections, and invasive mycoses are the major complication.

O42

Clostridium difficile-associated disease in the immunocompromised: overcoming the challenge

Erzsébet Nagy
University of Szeged, Hungary

Clostridium difficile is the major causative agent of nosocomial antibiotic associated diarrhoea and pseudomembranous colitis affecting mostly elderly patients with severe underlying disease including immunocompromised patients. In the 1980s when *Clostridium difficile* was accepted as a nosocomial enteric pathogen the main diagnostic procedure was to culture *C. difficile* from the faeces of symptomatic patients on selective media and detect the toxin production of the isolates by tissue culture assay. Confirmation was done by neutralisation of the toxin using *C. difficile* antitoxin or antitoxin against *C. sordellii*. *C. difficile* is now recognized as the primary cause of hospital-acquired colitis in patients who receive antibiotics, chemotherapeutics, or other drugs that alter their normal flora. In terms of cost and productivity epidemics caused by toxin producing *C. difficile* became a major burden to the health care system of many countries. Several commercially available antibody-based tests were developed to detect *C. difficile* or its toxins (toxin A alone or toxin A and B in combination) to diagnose new cases or relapses early in the disease process. The detection of variant strains among *C. difficile* (with deletions in different genes encoding toxin A and B) and the importance of binary toxin production of some isolates needed the development and use of toxin-typing by molecular methods. For epidemiological reasons it became important to introduce typing methods to follow hospital outbreaks of nosocomial diarrhoea. Molecular typing methods (such as PCR-ribotyping, PFGE, etc.) help to follow the spread of *C. difficile* in the hospitals and community. Real-time PCR has been developed to detect *tcdB* gene directly from the faeces as a rapid method for symptomatic patients and asymptomatic carriers. The emergence and spread of the hyper-virulent 027 ribotype (belonging to toxin-type III) in the US, Canada and several European countries made it mandatory to improve quick laboratory diagnosis including antibiotic resistance determination of *C. difficile* causing diarrhoea in hospitals and in community, as well as reconsider hospital hygiene measures to stop the spread of the pathogen.

O43

Infection control in the age of HIV and tuberculosis

Shaheen Mehtar
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HIV has had a significant impact on infection control practices in healthcare. The prevalence of tuberculosis in such patients is 6 times higher than in HIV non infected patients. Admissions to hospital for opportunistic infections such as PCP or non-TB pneumonia, can increase the risk of nosocomial infections in vulnerable population, particularly when associated with mechanical ventilation. Other infections, such as diarrhoeal disease, and skin conditions pose a risk to both patients and staff. Here, protection of other patients, who may or may not be HIV infected, is important.

There is up to 60% co-infection between HIV and TB. Staff working with such patients has to be protected from tuberculosis, whether multiply drug resistant (MDR) or sensitive strains of TB. Respiratory protective equipment such as surgical masks and gloves are necessary to deal with reducing aerosol transmission. Definite cases of MDR-TB who have started therapy are deemed infectious. Such cases should be placed in single rooms with negative pressure ventilation and the healthcare

workers working in close proximity to such patients should wear a non-valved N95 mask. Patient isolation should continue in hospital until either the patient has a negative sputum or is well enough to go home to continue on therapy.

Lastly, it is important that members of staff looking after TB patients are not HIV infected.

O44

Changing hand hygiene behavior: A global priority

Carol O'Boyle
University of Minnesota, USA

Appropriate adherence to hand hygiene (HH) recommendations influences the risk of microorganism transmission and can be accomplished by conventional handwashing using soap, antimicrobial soap, or by using waterless alcohol products. Inadequate HH has been associated with outbreaks of healthcare acquired infections (HAI). Although healthcare workers (HCW) have been educated on the merits of HH, adherence to recommended HH practices continues to be inadequate. HH behavior varies according to individual and community variables. Intention to perform HH is reported to be high however, actual adherence is influenced by numerous factors including clinical practice, structural impediments and internal motivational variables such as knowledge, beliefs, attitude, sense of control and intention.

Social psychology has been used to identify, explain and modify the determinants of HH practices and has included efforts to influence beliefs and perceptions about HH outcomes. Improved adherence to HH recommendations is more likely to occur in organizations in which adherence to HH is articulated and modeled by leadership. Organization culture changes are necessary to stimulate behavioural compliance. Role models and mentors have also been associated with improved adherence to HH.

Cognitive factors predict intention to adhere to HH but clinical variables such as workload, and ergonomic factors may determine extent of adherence to HH. Identifying, establishing and implementing critical thresholds for the constellation of internal motivational and external environmental variables that impede or support HH is essential to improve HH in the dynamic healthcare environment

O45

Should Health Care Workers be vaccinated against influenza?

Katinka Giezenan, Bram Palache
Solvay Pharmaceuticals

Health Care Workers (HCWs) with close patient contacts have an increased risk of exposure to and transmission of influenza viruses upon infection. High influenza attack-rates up to 59% have been reported in HCW. Furthermore, in certain hospital units HCWs have been identified as the suspected vector of influenza infections. To prevent influenza infections, safe and effective influenza vaccines are available. Provided there is a good antigenic match, vaccination reduces influenza morbidity in healthy adults (which includes HCW) by 70-90%. A recent systematic literature review demonstrated that vaccination of HCWs in health institutions not only is protective for themselves, but also indirectly reduces morbidity of their patients for whom they care. In a large private-chain care-homes in the UK, it was demonstrated that vaccinating care home staff against influenza prevented deaths and reduced health service use and influenza-like illness in residents during periods of moderate influenza activity. HCWs should be able to provide care for their patients at all times, particularly at the time of the so-called "winter burden" caused by considerable morbidity in the population due to respiratory infections. In 2 pediatric hospitals in Finland a considerable reduction of sick leave days between vaccinated and placebo-treated HCWs was observed. In conclusion, the available evidence suggests that vaccination of HCWs will be beneficial for both the care-givers that are in close contact with patients and their patients. An overview of the literature and its forthcoming recommendations will be presented.

**O46****Device-Associated Infection Rates, Extra Length of Stay, Mortality and Microorganism Profile in 70 Adult ICUs of 38 cities of 12 Developing Countries. Findings of the International Nosocomial Infection Control Consortium (INICC)**

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Objective: To determine the rate, extra LOS and extra mortality of Device-associated infections (DAI) in ICUs of hospital members of the INICC in Argentina, Brazil, Colombia, Croatia, India, Kosovo, Macedonia, Morocco, Mexico, Peru, Philippines and Turkey.

Methods: Prospective cohort surveillance of device associated infection (DAI) was conducted on adult patients admitted to tertiary-care ICUs. INICC designed the protocol, forms and data uploading and analysis system. Data were gathered at the ICUs. CDC-NNIS definitions were applied.

Results: From 01/02 to 04/07 we enrolled 37,554 patients, representing 232,905 bed days. The overall DAI rate was 12.2 per 100 patients, and 19.7 per 1000 bed days. The CVC-BSI rate was 10.9 per 1000 CVC days, the VAP rate was 20.8 per 1000 device days, and CA-UTI rate was 7.0 per catheter days.

Overall 30.0% of all DAI were caused by Enterobacteriaceae -56.7% of which were resistant to ceftriaxone, 54.5% were resistant to ceftazidime, and 28.2% were resistant to piperaciline tazobactam; 17.4% were caused by Pseudomonas sp. infections-54.2% of which were resistant to ciprofloxacin, 51.0% were resistant to ceftazidime, 36.7% were resistant to imipenem, and 32.7% were resistant to piperaciline tazobactam; 16.2% were caused by Staphylococcus aureus infections-82.2% of which were resistant to methicilin; 14.6% were caused by Acinetobacter sp.-78.1% of which were resistant to piperaciline tazobactam; 11.2% were caused by Candida sp.; 5.7% by Coagulase-negative-staphylococci; 2.6% were caused by Enterococcus sp.-2.8% of which were resistant to vancomycin; 0.7% by Streptococcus sp.; 0.4% by Corynebacter sp.; 0.4% by Haemophilus sp.; 0.5% by Stenotrophomonas sp.; 0.1% by Alcaligenes sp.; and finally 0.1% by Aeromonas sp. LOS of patients without HAI was 4.6 days; LOS of patients with CVC-BSI was 14.4 days (RR, 3.11), representing 9.8 extra days; LOS of patients with VAP was 15.3 days (RR, 3.30), representing 10.7 extra days; and LOS of patients with CA-UTI was 13.5 days (RR, 2.92), representing 8.9 extra days.

A total of 5,107 out of 33,629 (15.2%) patients without HAI died; 262 out of 877 patients (29.9%) with CVC-BSI died, and the extra mortality for CVC-BSI was 14.7% (RR, 1.97; 95% CI, 1.74-2.23; P, 0.00001); 465 out of 1,040 patients (44.7%) with VAP died, and the extra mortality of VAP was 29.5% (RR, 2.94; 95% CI, 2.68-3.24; P, 0.00001); and 188 out of 542 patients (34.7%) with CA-UTI died, the extra mortality of CA-UTI being 19.5% (RR, 2.28; 95% CI, 1.97-2.64; P, 0.0001).

Conclusion: This study has identified that the DAI rates were high and increased the length of stay from 8.9 to 10.7 days, and that they are significantly associated with higher mortality.

O47**PICC line infections and complications survey**

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Hotel-Dieu de Montréal (CHUM), Canada

ICC lines (peripherally inserted central catheters) have become increasingly popular to maintain an open IV access for weeks or months. However, various complications, such as thrombosis or infections, can limit the usefulness of these devices.

Purposes: 1. to identify the patients most at risk of complications, and the main risk factors; 2. to evaluate the incidence of the main complications

(infectious (cellulitis, bloodstream infections and septic thrombophlebitis) and non infectious), 3. to identify the most frequent microbial species responsible for an infection and 4. to recommend specific measures to try to decrease these complications.

Methods: In that one year survey, we followed patients in whom a PICC line was inserted to document the complications associated with its use. The incidence of infections was calculated according to the total number of catheter-days.

Results: 606 PICC lines were inserted in that one year period. A remarkably low incidence of complications was documented: 10 non infectious thrombosis, 3 bloodstream infections, and 1 septic thrombophlebitis were documented, for a rate of 0.61 thrombosis and 0.24 infection per 1000 catheter-days. These rates are lower than those generally documented in the literature. S. aureus, E. faecium and Candida were the species implicated. The complete data as well as explanations for these results will be exposed.

Conclusions: PICC lines are a safe and practical way to maintain an open IV access for a period of up to 6 months.

O48**Hospital Cost of Central Venous Catheter-associated Blood Stream infection (BSI) and Cost-Effectiveness of Closed vs Open Infusion System. The case of Intensive Care Units in Italy**

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Objectives: The study aimed at assessing the costs of CVC-associated BSI (CVC BSI) and calculating the cost-effectiveness ratio of the closed system vs. open infusion system. **Methods:** A 2-year prospective case-control study was undertaken at four Intensive Care Units in a teaching clinic in Milan. Patients with BSI (cases) and patients without BSI (controls) were matched for admission departments, gender, age, and severity. Costs were estimated by using a micro-costing approach, i.e. by going through patients. Incremental costs were measured as the difference between implementing the two infusion systems. Effectiveness was measured in "number of BSI per 1000 CVC days". **Results:** Forty-three cases were compared to 97 controls. The mean age was 62.1 and 66.6 years for cases and controls respectively (P: 0.143), 56% of cases and 57% of controls were females (P: 0.922). The mean LOS was 17.41 and 8.55 days for cases and control (P<0.001). On average, total costs were 18,241 and 9,087 for cases and controls (P<0.001). The extra cost for drugs was 843 (P<0.001), for supplies 133 (P: 0.116), for lab tests 171 (P:0.000), for specialist visits 15 (P:0.019) and for hospital stay 7,180 (P<0.001). The rate of CVC BSI was significantly lower during the closed system period compared to the open system period (3.5 vs. 8.2 BSI per 1000 CVC days). **Conclusions:** CVC BSI represents a substantial cost to hospitals. Closed systems significantly reduced the incidence of CVC BSI, CVC BSI related costs and LOS.

O49**National Nosocomial Surveillance Network in Hungary: results of intensive care unit component**

Andrea Kurcz MD, Karolina Böröcz MD, Emese Szilágyi MD
National Center for Epidemiology

Objective: To create a national database for device associated nosocomial infection rates in intensive care units (ICU) and use data to improve practice. **Methods:** National Nosocomial Surveillance Network (NNRS) in Hungary was established in 2004. ICU component is based on Centers for Diseases Control and Prevention definitions and methodology. Participation is voluntary and confidential, required for minimum 6 month. Training and free software has been provided for reporting hospitals. Analysis and feed back of aggregated data is performed by surveillance coordinating team at National Center for Epidemiology. We calculated pooled means of device utilization ratios, and pool means of device-associated infection rates and distribution of pathogens by site of infection. We present results of participating hospitals with mixed ICUs from January 2005 to December 2006. **Results:** In the studied period participated 8 mixed teaching ICUs and 18 mixed non-teaching ICUs. Number of admitted patients was 16,582 and 78,403 patient-days were



registered. Device utilization ratios were very similar to those published by CDC-NNIS. Device-associated infection rates were higher than NNIS rates for central line-associated bloodstream infections and ventilator-associated pneumonia and lower for urinary catheter-associated urinary tract infections. Discussion: ICU component of our surveillance network requires ongoing support and development to fulfil its role in contributing to decreased infection rates in Hungarian ICU-s.

O50 Significance of Traffic Control Strategy in Minimizing Nosocomial Infection of Severe Acute Respiratory Syndrome (SARS) Among Health-Care Workers

Muh-Yong Yen, Chao-Ying Yang, Yusen E. Lin
Muh-Yong Yen

Background: The concept of "traffic control" is an integrated infection control strategy includes triage of patients into hospital, zones of risks and checkpoint installation of alcohol dispensers for glove-on hand rubbing. It was first applied and successfully minimized HCW nosocomial infection of SARS in a study hospital without Negative Pressure Isolation Rooms (NPIRs), later implemented nation-wide with a positive impact to stop SARS epidemic. **Methods:** After the epidemic we conducted a retrospective study to enroll 50 hospitals which had taken care of SARS patients. Among these 50 hospitals, HCWs in 19 hospitals acquired nosocomial infection of SARS while the remaining 31 hospitals had no HCW acquired SRAS. We compared the differences of infection control measures between 2 groups of hospital. Mantel-Handel uni-variant method and multiple logistic regressions were used for statistical analysis. **Results:** Fever screening stations, triage of fever patients, cohorting the SARS patients, separate of entrance/passway between patients and HCWs, increasing facilities of hand washing all demonstrated a protective effect for HCWs ($p < 0.001$). By multiple logistic regression, checkpoint alcohol dispensers for glove-on hand rubbing between zones of risk was the most significant factors in protecting HCWs. **Conclusion:** We speculated that some HCWs may possess false perceived lack of need to wash hands if gloved, and transmitted SARS through casual contact in the setting with personal protective equipments and NPIRs. Zone of risk provide efficient distinction of contamination zones, and the checkpoint alcohol dispensers can improve hand washing in between zones of risk. Through traffic control, we facilitated the standard precaution so as to increase the awareness and a vigilant adherence to routine hand washing when working in between zones of risk, thus to minimize and finally halt the nosocomial transmission of SARS.

O51 Effectiveness of hand disinfection in reducing bacterial contamination of the hands of hospital staff

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The aim of the study was to evaluate the reduction of transient flora on hands due to disinfection with hand alcohol and to estimate the difference between correct and partly correct hand disinfection (HD). **Method:** Structured observation of 117 episodes of care was conducted by trained observers. The observation period started before a procedure and before health care workers (HCW) did HD, and ended when HCW disinfected hands after finishing a patient related procedure. A set of imprints of the fingertips of the dominant hand was taken from each HCW before and after HD was performed. One set before a procedure, and one set after a procedure. Bacteria (CFU) were quantified. **Results:** The predominant flora after HD was coagulase negative staphylococci ($n=155, 66\%$), gram negative bacilli ($n=68, 29\%$) and isolates with *Staphylococcus aureus* ($n=2, 0.8\%$). We tested the coagulase negative staphylococci for alcohol-tolerance. Six isolates were not eliminated after 30 seconds and two isolates neither after 30 minutes. Overall reduction of CFU due to HD was 72% (95 CI 67-77%). The reduction from HD before a procedure was 76% (95CI 70-82%) and after a procedure 67% (95% CI 58-73%). Proper HD was significantly superior in reducing CFU compared to partly correct HD both before and after a procedure, 66% (95% CI 45-78%) and 45% (95% CI 23-66%), respectively. **Conclusion:** Correct HD is effective in reducing the resident flora on hands. Future intervention trials should explore the role of bacteria with possible alcohol-tolerance.

O52 A region-wide plan to increase adherence to hand hygiene among hospital health-care workers (HCW) by using World Health Organization (WHO) multimodal hand hygiene improvement strategy

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Regional Health Authority - Region Friuli Venezia Giulia

Increased adherence to hand hygiene is widely acknowledged to be the most important way of reducing infections in health care facilities. Recent data suggest that a multifaceted intervention, including the use of feedback, education, the introduction of alcohol-based hand wash and visual reminders, may increase adherence to hand-hygiene recommendations. The Regional Health Authority (RHA) of Friuli Venezia Giulia (Italy) introduced in the Health Plan 2007 as mandatory the adherence of all regional hospitals [with at least one Care Unit (CU)] to WHO "Clean care is Safer Care" Campaign. Eighty-five% (17/20) among regional hospitals were involved (both public and private ones) one hospital enrolled 4 CU, 4 hospitals enrolled 2 CU and the other 1 CU, with a total number of 24 CU involved. In every facility a Hospital Coordination Group (HCG) was defined, formed by a Health Direction doctor and a infection control practitioner (ICP). This model has been repeated at Care Unit level too. In this way a Regional Health Network was set, headed by RHA and composed by seventeen HCGs and their CUs. Two days training program concerning the WHO Campaign was developed for all HCGs, including a practical workshop (held by a WHO representative), before and after which an experimental HCW knowledge survey was led. The RHA, also, attended to make available to all HCGs the WHO implementation tools and the alcohol based handrub product. The facility preparedness phase is in progress along with the baseline evaluation phase with the direct observation of the compliance of HCW to hand hygiene, leading to a Report in September 2007 and to the implementation phase in October-December 2007.

O53 Brief report of most important activities of Tehran Heart Center's infection control committee

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Tehran Heart Center, Iran

After the formation of the Infection Control Committee (ICC) and the commencement of its activities, the strategies of this committee are being determined annually. During the past two years, two priorities were defined for this committee. The first issue was to standardize the stages of preoperative preparation of patients for surgery. These stages were modified in different sessions held together with the surgery team and the other personnel that were involved. In one phase, the use of clippers was replaced for routine shaving the night before surgery. In this regard, not only the guidelines were developed, but also the new rules were put into practice with continuous supervision. In the next phase, shower with antiseptic solutions was modified. According to the new agreement, washing with Povidone Iodine, previously carried out with no specific supervision or adherence to guidelines, was substituted with Chlorhexidine 2% (according to specific guidelines distributed among the nursing personnel). Most importantly, antibiotic prophylactic therapy, which was previously performed according to four different protocols by different surgeons in this center, was reconsidered. According to the agreement in the common meeting of the ICC and surgeons, remarks of the consultant infectious diseases physicians, and based on the different antibiotic sensitivity pattern in this center, these protocols were substituted with a single standard protocol for surgical operations in our center. This led to a remarkable reduction in antibiotic consumption.

The second priority of this committee in the last year was the issue of outbreaks in March and April, which coincides with the yearly holidays in our country. The first impression was that because of the long duration of the holidays and possible hurry in evacuation of wards, the quality of patient care reduces. With regards to this hypothesis, ICC significantly increased both supervision on intensive care units (ICUs) and proper education of the nurses and physicians. After these supervision & re-training measures, the rate of postoperative infection significantly reduced and no further outbreak was observed in the last year.

**054****Percutaneous exposure incidents among vietnamese hospital personnel and the impact of a prevention program***Le Ta Thu*

Cho Ray Hospital, Ho Chi Minh City, Viet Nam

Background: Follow-up the occupational percutaneous exposures to healthcare personnel (HP) and setting up the appropriate management is necessary in Vietnam where there is a limited resources. Method: All percutaneous exposures among HP from Cho Ray Hospital, a 1705 bed tertiary Vietnamese hospital, were reported and followed up. Since 6/2001, a prevention program has been conducted, including training, setting up the system of report and supplying appropriate personal protective equipment (PPE) for HP. Results: From 2/2000 to 12/2006, the total number of occupational percutaneous exposed HP was 156 cases, including needlestick (96%) or other sharps-related injuries (4%). Source patients with positive HIV status was reported in 30 cases (19.2%). Nurses were the most commonly affected members 60 (38.5%), followed by cleaners 35 (22.4%) and surgeon 25(16%). Most exposed HP work at surgery department (39%) and emergency department (10.9%). Injuries occurred during waste collecting (22.4%), suturing (20.5%), recapping or removing needles (18%) and giving transfusion (8.3%). The most common injuries were from hollow-bore needles (57.1%), especially needles for blood taking. The most common reason for accidents was unsafe practice (61.5%), non-comply with standard precaution (26.9%) and insufficient of PPE (11.5%). All HIV exposed patients were given post exposure prevention with 2 drug regimen and followed-up in the 6 month period per standard guideline. There is no case of sero conversion with HIV, but two cases have sero conversion with HBV, and one with HCV. After the prevention program, the incidence of exposed HP to HIV reduced significantly although the admissions of patients with HIV increase. Incidence was 0.7/month in 2000 then 1.3/month during the first 6 months of 2001, reduced to 0.1/month in 2002, 0.3/month in 2004 and 0.3/month in 2006 (P=0.007). The number of HP reporting of needlestick with unknown or negative HIV patients increased.

Conclusions: HP have a high risk of percutaneous exposures. Improving safe working environment should focus in Vietnam including application of safe practice, especially safe injection technique and of appropriate PPE use. Prevention program including training, supplying sufficient PPE and reporting system has been shown to be effective in preventing occupational exposures.

055**The WHO Global Patient Safety Challenge***Julie Storr*

National Patient Safety Agency, London, UK

The World Alliance for Patient Safety is a programme of the World Health Organization launched in October 2004 and concerned with facilitating the development of patient safety policy and practice in Member States.

Clean Care is Safer Care is the first of a series of Global Patient Safety Challenges, addressing a patient safety concern of universal significance. It is concerned with health care-associated infection (HAI) and hand hygiene. The First Challenge was launched in 2005, and is gaining momentum month on month.

There three objectives of the Challenge are:

Awareness raising

Country mobilization - country "pledges" to tackle HAI.

Development, testing and evaluation of technical guidelines

The first output of the work is the WHO Guidelines on Hand Hygiene in Health Care (Advanced Draft). Emerging from the Guidelines, the implementation strategy offers a roadmap for organizations and facilities for improving hand hygiene. The Guidelines are unique in relation to many existing national guidelines on hand hygiene, in the following important ways:

They represent a consensus of global expert opinion.

They are undergoing field testing in diverse health care settings across the world,

They are underpinned by an implementation framework comprised of a suite of over 40 implementation tools,

They will be subject to regular review.

Awareness raising activity has attempted to get across messages that HAI

is a problem affecting developed and developing countries and therefore justifying global attention as a WHO programme.

Sixty-nine countries have so far been mobilised to make high level commitments to tackle HAI.

Professional specialist organizations such as The International Federation of Infection Control (IFIC) are increasingly working in partnership with the Challenge Team to take awareness raising and action to a new level with more profound universal impact. This presentation will summarize the story of the First Global Patient Safety Challenge and describe the strategies for sustainability and spread, and the opportunities which this programme of work presents for the future of HAI prevention and control.

056**Safe Needle Use and Disposal***Ed Krisiunas*

Waste Not Want Not International, Burlington, Connecticut, USA

The development of the disposable hypodermic syringe in the 1950's is one of the great achievements in modern medicine. The ability to safely deliver various medicines efficiently and safely greatly improved healthcare for many. Concomitantly, new issues arose that include occupational health and safety, infection control, and waste disposal. The healthcare industry responded with the development of various products and education programs during the mid to late '80s by introducing single uses sharps containers, hepatitis B vaccine, and educational programs. Further advances have been made in the '90s and into the 21st century with the development of safe needle devices and innovative treatment and destruction methods. All told, these developments have improved safety for the healthcare provider. The challenged faced by healthcare providers is to know how to evaluate such devices and as well as to be able to afford such new innovations. Legislation is driving their use in a few countries but challenges remain. In the interim, healthcare providers must review best practices as it relates to their own situation, i.e., legislative, financial, social infrastructure to determine what level of success can be achieved.

057**The new CDC isolation guidelines***Ulrika Ransjö¹, Jane Murphy²*¹Uppsala University Hospital, Sweden; ²Connolly Hospital, Dublin, Ireland

The new CDC isolation guidelines will be distributed, and compared to the IFIC Basic Concepts.

The workshop attendees will then be divided into groups, who will be asked to apply the guidelines in given patient/ward situations in their own settings.

058**Infection Control in Long Term Care Workshop***Carol Goldman¹, Allison McGeer²*¹Consultant, Toronto, Canada; ²Mount Sinai Hospital, Toronto, Canada

Residents of long term care facilities (LTC) are at great risk for developing infections. Infection Prevention and Control (IPAC) Programmes are developing in such health care agencies, however with fewer resources, long term care infection prevention and control professionals often wear many other hats in terms of their responsibilities and there is limited time to devote to infection prevention issues. This results in inexperienced personnel with little or no background in IPAC. Resources, practical tools and basic knowledge about IPAC in LTC is vital.

The workshop will afford the delegate the opportunity to share concerns, challenges, and practical knowledge. Also, guest expert Dr Allison McGeer and moderator Carol Goldman will describe elements of Infection Control in LTC and help set the stage for the delegates to work and collaborate together to define the basics of an Infection Control Programme in Long Term Care.

At the conclusion of the workshop the delegate will:



1. Discuss the common infections associated with Long Term Care Facilities
2. Discuss common outbreaks associated with Long Term Care Facilities
3. Describe elements of an Infection Prevention and Control Programme in Long Term Care
4. Develop a comprehensive reference and resource list for Infection Prevention and Control in Long Term Care

O59 Strategic planning for infection control organisations

Kathy Warye¹, Mary Schanz²

¹Association for Professionals in Infection Control and Epidemiology, USA; ²Columbia County Health Department, Hudson, USA

O60 Cleanliness matters

Betsy McCaughey

Committee to Reduce Infection Deaths

In the United States, infection prevention programs have focused largely on improving hand hygiene compliance. As iconoclastic as it sounds, hand hygiene is not enough to stop drug-resistant bacteria from racing through hospitals. There has been too little attention to four other essential components: training caregivers on how to keep their hands from becoming re-contaminated just seconds after washing and gloving; ensuring that surfaces in hospitals are cleaned effectively; screening incoming patients for MRSA to identify the source of drug-resistance bacteria; and taking effective barrier precautions with all colonized patients.

Research shows that in U.S. hospitals, up to three quarters of patient rooms are contaminated with MRSA and VRE, found on bed rails, over-the-bed tables, television monitors, telephones, IV poles, and especially under beds. Caregivers routinely and unknowingly contaminate their hands when they touch surfaces in patient rooms, even though they have had no direct patient contact. Not knowing which patients are colonized with drug resistant bacteria allow caregivers' clothing and virtually all equipment, including blood pressure cuffs, EKG wires, pulse Oximeters, and stethoscopes to become vectors of disease. Current cleaning routines in most hospitals are inadequate. Rigorous, supervised cleaning is shown to reduce the incidence of VRE and MRSA colonization. Cleaning is highly cost-effective, averting infections that would cost many times as much to treat as the cleaning improvements cost.

Screening patients for MRSA on admission is essential, because you cannot stop the spread of bacteria if you don't know the source. Universal screening is also highly cost-effective, returning as much as 20 to 1 payback the first year.

In the United States, the compelling evidence that screening, cleaning and barrier precautions can reduce infections up to 90% is putting hospitals in a new legal situation. No longer will they be shielded by the long-held presumption that infection is an inevitable risk when you have to be hospitalized. Infection is the next asbestos, the next major cause of class action lawsuits in the U.S.

O61 Quality indicators of infection control

Walter Popp

University Hospital Essen, Germany

Infection control contains structure, process and outcome quality. Structure (e.g. infection control team, laboratory) and process quality (e.g. infection control manual, compliance with guidelines) are typical primary prevention. Structure quality can only be described, process quality may be measurable with limitations (e.g. compliance rates, results of environmental examinations). Outcome quality (e.g. nosocomial infection rates, number of multiresistant bacteria) is secondary prevention and measurable – although with a lot of restrictions. Thus, surveillance is possible for process and outcome quality. Additional quality indicators may be national and transnational legislations and regulations as well as external audits.

In our master class examples of quality indicators of infection control will be given and discussed.

O62 Prevention of infections in intensive care settings

Ulrika Ransjö

Uppsala University Hospital, Sweden

Infections in intensive care are frequent, often life threatening and very costly. Overuse of antibiotics is common, and drives antimicrobial resistance. Over-crowding and under-staffing is also common. Outbreaks of multi-resistant bacteria occur, both as common-source and as cross-infection. Prevention of health-care associated infections can be achieved in intensive care by simple measures such as hand hygiene and protective clothing, correctly applied. Cleaning, disinfection and sterilization are also important. Wasteful overuse both of disinfectants and of disposable equipment must be avoided. Training in proper procedures e.g. for handling of intravascular accesses and for ventilated patients is vital.

Data will be given from investigations both in high- and low income settings, about risks of infection and how these risks may be reduced.

O63 Infection Control Accreditation and Training: Developing a path to accrediting infection control programs & training

Barbara Soule

Joint Commission Resources, Oakbrook Terrace, Illinois, USA

This presentation will focus on the history, philosophy, rationale and benefits of accreditation for infection prevention and control programs. The talk will include a review of the Joint Commission International Standards for the Prevention and Control of Infection as published in the 3rd Edition, 2007, including the 6 sections of the Standard for the Prevention and Control of Infections: Program Leadership; Focus; Isolation; Barrier Techniques and Hand Hygiene; Integration of IC with Quality improvement and Safety and Education.

The presentation will describe a pathway to achieving accreditation in your infection prevention and control program through the application of the Standards to patient care and patient safety, and engaging the organization in using infection prevention principles and methods to reduce risk for patients and staff. The presentation will also include ideas for accrediting education for infection prevention and control professionals; discussing certification as one way to achieve this goal.

At the conclusion of the presentation the participant should leave with practical suggestions to use in preparing for accreditation and continuing education.

O64 Accreditation of Infection Control Programs in developing countries

Pola Brenner

Ministry of Health, Santiago, Chile

Hospital accreditation is defined like a systematic and periodical system of quality evaluation made by external institutions that compares pre established standards with local situation. Indirectly has been associated with quality improvement because promotes the development and compliance of practices recognized as "good quality". Most of the countries have developed hospital accreditation system in order to know quality programs within hospitals and identify areas to be improved. The agencies in charge of the process can be public or private. In general, in the majority of the countries the processes are voluntary but are associated with incentives like insurances or resources allocation. These organizations have been worked since 1951 when Joint Commission was created in United States to evaluate hospitals in this country. Other countries with wide experience in the field of hospital accreditation are Canada, Australia, France, Spain and Indonesia

Since 1990 many countries in Latin America mostly supported by Pan American Health Organization (PAHO) began to implement hospital accreditation processes to establish quality standards and over the last two decades made progress in putting such accreditation programs into place. All the hospital accreditation systems include standards for the



evaluation of local infection control program. In 2002 PAHO with a working group of experts in Infection Control developed a Rapid Guide to Evaluate Infection Control Programs in The Hospitals. This instrument has been applied in more than 10 countries between 2003 and 2006.

In general the accreditation is widely accepted like an excellent methodology to ensure and promote quality within the institutions but there are little evidence in the literature in relation to its impact in change practices or modify quality indicators.

Chile is one of the few countries that can show results in practices modification in infection control attributable to Hospital Accreditation and that improvement is greater in successive evaluations. In this country an accreditation system in infection control was developed by the Ministry of Health as a component of the national nosocomial infection program to evaluate compliance of guidelines throughout the country, identify improvements, promote and evidence changes, show local and general tendencies and guarantee quality attention in infection control. The accreditation in infection control is mandatory for public and private hospitals. Up to date 465 processes have been made in 139 hospitals that represent 100% of high and medium complexity hospitals in the country. 70% of the hospitals have been evaluated in three or more opportunities. The global process has been useful in the identification of infection control problems that can be improved inside hospitals. Nationwide has demonstrated improvement specially in relation to organization for infection control, development of local guidelines, and eradicate ineffective or dangerous practices

The assessment conducted by PAHO in Latin American countries demonstrated important failures in the infection control programs in many hospitals. Common problems are related with the management of sterile material, education of health care personnel in infection control, non compliance with basic practices like hand hygiene and lack of standardization in the procedures among other.

In this session we will discuss the experience of selected countries in the external evaluation of Infection Control Programs including Chile and the implementation of an accreditation process to evaluate infection control programs.

O65**Training in infection control - differences and similarities***Shaheen Mehtar*

Tygerberg Hospital & University of Stellenbosch, Cape Town, South Africa

Infection prevention and control (IPC) is a relatively new specialty in developing and low income countries. Previously, IPC was practiced more by default rather than design and many practices were embedded in nursing practice. The drain on skilled healthcare workers to other countries has also produced a shortage in clinical specialities which, in turn has impacted on IPC training and practitioners.

In each country the entry level into higher education varies in standard and quality. The outcome of healthcare training is usually related to the immediate acute needs of that country or region. Additionally, the infection and infectious disease profile has an impact on the IPC teams.

All these issues have a direct, and indirect, impact on IPC training.

First, most IPC training programmes are aimed at a particular level of higher education and may not be applicable. Then there is the question of English not being the first language, and translations are required. It is therefore, best that training consists of "principles rather than practice" and that the implementation of policies, guideline and recommendations should be taught within those principles. Teaching should be as practical as possible, emphasizing the principles by demonstration in practice.

The method of testing or examination should be more visual, and practical than written thus multiple choice questions are an acceptable form of testing knowledge. The IPC training should extend to the place of work documenting application of what was learnt in the most practical way.

Refresher and other courses are essential to maintain input, quality improvement and high standards. Further courses can be developed based on local needs and requirements.

O66**European standards for disinfectant testing***Adam Fraise*

Hospital Infection Research Laboratory, Birmingham, UK

In order to market a disinfectant in the European Union the manufacturer must apply a CE mark to the product. This mark indicates that the product is of acceptable quality and the manufacturer would normally test the product against a defined European Standard. European standards are coordinated by the CEN in Brussels. The initial development of a new standard is done by a Working Group and the draft is reviewed and approved by the main Technical Committee. At this point it becomes a provisional European Norm (prEN). The prEN will then go out for public comment (the enquiry phase). Following the enquiry, comments by National Standards Bodies will be considered and the standard will be re-drafted. Following re-drafting a formal vote takes place and the standard is then published as a European Norm.

The disinfectant Standards are classified into phase 1, phase 2 and phase 3 tests. Phase 1 tests are simple suspension tests whereas phase 2 tests are designed to simulate practical conditions. Phase 3 tests are to be field tests under practical conditions although the methodology for these tests has not yet been established. It is important that disinfectants are tested under both clean and dirty conditions because dirt and soil on a surface or instrument makes disinfection more difficult. It is also important that any disinfectant is neutralised at the appropriate time during a test to avoid artificially enhanced activity. The choice of test organisms is crucial to the applicability of the test and the rule of thumb is to choose test organisms according to the likely pathogens that will be met in the situation where the disinfectant is likely to be used.

O67**Issues with Endoscope Decontamination***Tina Bradley*

Hospital Infection Research Laboratory, Birmingham, UK

Flexible endoscopes are complex in design and are heat sensitive so process options are limited to low temperature methods. Many are non-invasive and the most widely used method of decontamination is immersion in a high level disinfectant followed by thorough rinsing to remove chemical residues. This method raises issues with assuring adequate decontamination. Automated processes are preferred to provide controls assurance but manual methods are still used in some countries. The personnel carrying out the decontamination, whether manual or automated, should be aware of the factors to consider when selecting a high level disinfectant, safe use of the chemicals, access to all channels of the endoscope, the quality of the rinse water and the importance of training and record keeping.

These issues will be discussed.

O68**Disinfection & the healthcare environment***Peter Hoffman*

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The "environment" is a word with variable definitions. I will use it in this presentation to mean those parts of a hospital that surround a patient but that are not specifically connected with their treatment. This includes beds, mattresses, baths, floors, walls and many other surfaces. These surfaces present a low risk of infection transmission; they are either not in direct contact with the patient or are in contact with intact skin. Here there is a low-grade risk of indirect patient-to-patient transmission. Other routes of transmission, particularly staff hands and medical instruments, have contact with susceptible areas on a patient and transfer a far high inoculum, and so are far more relevant to infection transmission.

Sampling in a hospital establishes that if a floor is cleaned, it removes about 80% of contaminants and if it is disinfected, it removes about 95% of contaminants. However, in both cases, an hour afterwards, contamination has returned to its previous levels. This means there is no real



advantage in routine disinfection of the hospital environment. There may be some indication for environmental disinfection where an end to contamination with a particular organism can be identified, for example when a patient leaves an isolation room or vacates a bed-space. Similarly with communal equipment in a high risk ward; it should be disinfected after each patient contact rather than, for example, once a day.

Fumigation with formaldehyde is hazardous and unlikely to be effective.

Surfaces that claim to be antibacterial are unlikely to be effective outside carefully controlled laboratory tests, but can lead to a false sense of security and a neglect of routine cleaning.

O69

Surface decontamination - cleaning or disinfection?

Markus Dettenkofer

University Medical Center Freiburg, Germany

The inanimate hospital environment is generally thought to be only a minor direct factor contributing to NI, especially when compared with other factors such as the adherence of personnel to well-accepted infection control measures (hand hygiene). In addition, the level of evidence supporting environmental culturing as well as different disinfection and cleaning procedures for decontamination of environmental surfaces is low. However, in case of multiresistant pathogens like VRE, MRSA or *Acinetobacter baumannii*, heavy environmental contamination may occur and frequently touched surfaces have been shown to facilitate transmission. In addition, norovirus and *C. difficile* may be transmitted via the environment. Both pathogens are difficult to eliminate, and require special processes for decontamination. Thus, a targeted microbial examination of the environment as well as a targeted surface disinfection should support adequate preventive measures.

Since emerging resistant pathogens will challenge health-care facilities in future even more than today, well-designed studies addressing the role of environmental contamination and measures for control (surveillance, cleaning and/or disinfection) in the healthcare-setting are needed (see also: Dettenkofer M, Spencer RC. Importance of environmental decontamination--a critical view. *J Hosp Infect* 2007; 65 Suppl 2:55-7).

O70

Prevention of healthcare associated bloodstream infections

William Jarvis

Jason and Jarvis Associates, Hilton Head Island, South Carolina, USA

Increased Central Venous Catheter-associated Bloodstream Infections Temporally Associated with Changing from a Split Septum to a Leur-access mechanical Valve Needleless Device: A Nationwide Outbreak. William R. Jarvis, M.D., Jason and Jarvis Associates, Port Orford, Oregon, USA. HCentral venous catheters (CVCs) are one of the most frequently used medical devices. It is estimated that approximately 80,000 CVC-related bloodstream infections (CVC-BSIs) occur each year in intensive care unit (ICU) patients. These infections cause considerable morbidity and mortality. Each CVC-BSI is estimated to cost between \$34,508 and \$56,000. Thus, in ICU patients alone, CVC-BSIs cost between \$296 million and \$2.3 billion. Risk factors for CVC-BSI include host and practice-related factors. Evidence-based methods to prevent CVC-BSIs include appropriate hand hygiene, use of maximal barrier precautions during CVC insertion, use of chlorhexidine skin antiseptic, appropriate catheter placement, and semi-permeable dressings. Over the past decade, many products have been introduced to decrease the risk of healthcare worker needlestick injury, including the introduction and use of needleless intravascular devices (NDs). The initial NDs introduced were the split septum devices. Once introduced, several outbreaks of CVC-BSI were reported associated with inadequate infection control practices. As practices improved, BSI rates associated with split septum NDs decreased. In the 2000s, NDs with mechanical valves rather than split septums were introduced. These mechanical valve NDs recently have been associated with CVC-BSI outbreaks. The BSIs associated with these NDs appear to be due to inadequate infection control practices and device design. All infection control personnel should conduct surveillance for CVC-BSIs and if their CVC-BSI rate increases investigate all potential causes. Further studies are needed to determine whether NDs with mechanical valves can be used safely.

O71

Where do healthcare workers get advice on Infection Prevention and Control:

A Questionnaire based survey

Ciaran O'Gorman

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The aims of this study were to ascertain how and where healthcare professionals access advice on infection prevention and control (IPC) and to inform the development of up to date accessible educational resources for IPC.

In our area the infection control manual (ICM) is available in a variety of paper and electronic formats. As such we felt it would be appropriate to carry out a survey of the ICM users to assess how accessible the different formats were, which groups of staff were most likely to access the ICM and for which areas of IPC did people seek advice. We developed a FORMIC™ direct data entry questionnaire to investigate these areas. Our aim was to complete 150 questionnaires from medical, nursing and associated staff working in the acute hospital, non-acute hospital and community settings.

Our results show that staff use a wide variety of sources to access information regarding IPC. Whilst the commonest source was the infection control nurse, staff also asked a variety of colleagues, emphasising the need for widespread, accurate penetration of IPC concepts. Relatively few staff utilised the ICM, even fewer its electronic formats.

IPC professionals employ considerable effort in writing manuals for their clinical staff. Our study highlights this effort may be misplaced without careful consideration to design, accessibility and educational theory. Evidence of educational reliability and validity is needed to guide educational interventions in IPC.

O72

Evaluation of Infection Control Activity in a Pediatric University Hospital

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A good infection control program (IC) can reduce the rates of healthcare-associated infections (HAI). We aimed to evaluate the IC program in Cairo University Specialized Pediatric Hospital, a tertiary 400- bed hospital. Methods: We conducted baseline assessment of compliance with standard IC guidelines and rates of HAI in 5 (3 medical and 2 surgical) intensive care units. Our intervention was by an education program to all staff including handhygiene campaign, participation of senior staff in the IC rounds and rectification of defects in reprocessing of instruments and equipment. We conducted quarterly evaluation for one year (March 2006- February 2007). Results: Over one year, compliance with handhygiene practices increased from 25% to 41% for doctors and from 28% to 47% for nurses, and the rates of bloodstream infections per 1000 patient days decreased from 40 to 13.1, and surgical-site infections from 12% to 3%. In spite of improvement, the IC team met unresolved problem including inadequate supplies, understaffing of nurses and housekeeping personnel especially during the afternoon and night shifts, engineering problems in operation rooms and central sterile supply unit, and frequent reconstruction.

O73

Molecular epidemiology of multi drug resistant CTX-M-15-producing

K. pneumoniae epidemic clones in Hungary in 2005

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National Center for Epidemiology

Objectives: To investigate molecular epidemiology of CTX-M-15 producing *K. pneumoniae* epidemic clones (KP-EC) isolated from 6 nosocomial outbreaks and related cases reported to National Center for Epidemiology in 2005. Methods: 396 ESBL-producing KP clinical isolates were submitted to the National ESBL Reference Laboratory for confirmation. Antimicrobial susceptibility testing was performed by both diffusion and microdilution according to the CLSI. According to preliminary phage typing results 190 isolates collected from 38 health care centers were subjected to macrorestriction profil analysis. Furthermore,



molecular typing was performed by TEM-, SHV-, CTX-M-, OXA- and ISEc1 PCR, plasmid profile analysis, transfer of resistance determinants and sequence analysis of PCR amplicons. Results: Three CTX-M-15-producing, highly ciprofloxacin resistant KP-EC were detected among 190 isolates. The Hungarian epidemic clone (HEC) spread to 31 centers, affected 124 patients, and caused 3 nosocomial outbreaks carried two gyrA mutations, parC mutation and blaSHV-28. The second epidemic clone spread to 4 centers, affected 45 patients and caused 2 nosocomial outbreaks, represented common gyrA and parC mutations. The third epidemic clone spread to 3 centers, affected 21 patients and caused one nosocomial outbreak, represented two gyrA and one parC mutations, respectively. ISEc1 was found in third epidemic clone alone. Conclusions: In 2005 change of leading ESBL-type was observed among ESBL-producing KP nosocomial isolates in Hungary. There was evidence that the background of this ESBL change is the nationwide spread of diverse multidrug resistant CTX-M-15-producing KP epidemic clones. Thus the strict implementation of infection control measures in each affected hospital is fundamentally important.

074 Factors that contribute to healthcare workers with hand hygiene guidelines. A multicenter observational study in Ireland

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The primary purpose of this research was to investigate healthcare workers compliance with hand hygiene guidelines in four acute care settings (Centers 1 to 4) in Ireland and to investigate factors that contributed to non-compliance. Data (n=1737 observations) were drawn from a random sample of nurses, doctors, physiotherapists and care assistants (n=208 observational subjects). Descriptive analysis revealed compliance rates of 51% upwards for specific guidelines. In order to investigate contributory factors to non-compliance (independent variable) discipline, area (ward type), gender and center were used as dependant variables. A previously validated observational schedule (Creedon, 2005) was used. Inter-rater reliability (two observers) was established at 0.88. Univariate logistic regression analysis revealed trends previously confirmed. Gender, discipline and area had a statistically significant (all p<.05) impact on healthcare workers non-compliance. However, a key finding using multivariate logistic regression analysis revealed that Center 4 had a significantly higher likelihood of non-compliance than all other centers (p=0.003). Therefore, it appears that the single most important contributory factor towards healthcare workers non-compliance with hand hygiene guidelines was the center they worked in. A possible explanation for this finding may be related to organizational behaviour and hospital culture as each center was equitably funded (public) and staffed. In light of findings from this study, constructs supporting hospital organizational behaviour and culture be considered when investigating non-compliance with hand hygiene guidelines and subsequent design of interventional programs.

075 Infection Prevention & Control The Implementation of Hazard Analysis Critical Control Points (HACCP) in Hemodialysis Unit

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¹Department of Risk Management, Infection Control, St. Michael's Hospital; ²Hemodialysis, St. Michael's Hospital, Canada

Introduction: In a hemodialysis setting, there are many opportunities for transmission of microorganisms between patients, staff and the environment. To date, no extensive efforts have been made to identify risk factors that may contribute to the spread of infections within this population. **Methods:** HACCP in hemodialysis was implemented by following a patient's journey to obtain routine dialysis treatment. Observations were grouped into pre-dialysis, during dialysis and post dialysis. Risk factors were identified using a customized assessment tool. Some key points that were looked at included hand hygiene practices, use of PPE and cleaning of equipments and environment. **Result:** Out of 15 staff observed, hand hygiene compliance during pre-dialysis was only 2 (13.33%). In comparison, compliance during dialysis and post dialysis was 5 (33.33%) and 11(73.33%) respectively. Out of 15 patients observed, none washed/sanitized hands pre-dialysis. During dialysis, hand hygiene did not occur due to the limitations of the procedure. Post dialysis, hand hygiene compliance was 5 (33.33%).

During dialysis, wearing of PPE is not consistent amongst staff. During shift change-over, increased movement of staff, patient and visitors was observed within the unit. As a result, more contaminated environmental surfaces were identified. Sharing of supplies and equipments between patients was also observed.

Conclusion: The use of HACCP principle in identification of risk factors that may contribute to the spread of infections in hemodialysis can help in customizing improvement initiatives addressing concerns of high priority. This allows effective management of limited resources and time designed to improve the quality of patient care

076 Surveillance of bloodstream infections in Hungarian hospitals

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Objective: To determine epidemiology of bloodstream infections (BSI) in Hungarian hospitals **Methods:** Hospital-wide nosocomial bloodstream infection surveillance is one component of Hungarian National Nosocomial Infection Surveillance System (NNSR). Participation of hospitals is voluntary and confidential. Center for Diseases Control and Prevention were used for definition of primary bloodstream infections and HELICS (Hospital in Europe Link for Infection Control through Surveillance) were used for definition of secondary bloodstream infections. Incidence of BSI was calculated per 10.000 patient days. We present data reported from January 2005 to December 2006. **Results:** In the studied period 15 hospitals (10% of Hungarian acute-care hospitals) reported 1430 nosocomial BSIs. The incidence was 6,04 per 10.000 patient-days. Bloodstream infections were catheter-related in 40% of cases, were secondary to an infectious body site in 39% of cases and origin was unknown in 21%. Most frequent infectious body sites of secondary BSIs were pneumonia and lower respiratory tract infections(29,2%) and surgical site infections (24,7%). 45,5% of BSIs occurred in intensive care units and 85% occurred at patients above 40 years old. Most common isolated pathogens were: Coagulase-negative Staphylococci (23%) followed by Staphylococcus aureus (18%) and Pseudomonas aeruginosa (12%). Overall mortality rate of BSIs was 31,2%. We analysed risk factors of lethal cases. **Conclusion:** Epidemiological data on BSIs and recognition of risk factors may help in planning and conducting more effective infection control measures. Because most risk factors for bloodstream infection may not be changeable, prevention efforts should be reinforced.

077 Hand Hygiene surveillance in a surgery department: innovative approach and detailed results provided by nursing students

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Background: A standardised method to measure hand hygiene (HH) compliance in health care facilities is lacking. We trained nursing students to investigate both opportunities and quality of HH in a 95-bed surgery department. **Methods:** Eight nursing students were enrolled to directly collect HH adherence data. We designed a checklist to survey the first ten HH opportunities in the duty. Additional checklists were focused on social, antiseptic, alcoholic and surgical hand hygiene techniques. Each HCW was observed once. **Results:** Opportunities. 86.7% of department HCW were observed. Overall mean adherence was 52.8%, significantly lower during the first duty of the day (50.2 vs 63.1) and between surgeons compared to nurses and hospital-attendants (32.6 vs 58.6 and 59.6). With reference to surgeons, we detected a 41.8% HH compliance before patient contact, while post-care HH was 25.6% (p<0.05). **Quality.** Social HH was correctly performed in 54 out of 99 observed. No-touch use of the tap was critical (74.7%). We studied 32 alcohol-based rubs: procedure length and accuracy were acceptable in 28.1% only. Nurses performed surgical HH significantly better than surgeons for 4 out of 16 parameters, including rinsing and accuracy. When comparing alcohol-based and plain soap HH, a significant difference in good practice rate between alcoholic and social washing was shown (76.1 vs 46.9, p<0.01). **Conclusions:** Our results confirm available data about compliance to HH opportunities in HCW, adding a detailed insight into technique quality. Nursing students, enrolled as field monitors, help in assessing, to develop, set up and evaluate suitable improvement strategies.

**078****Surveillance of antimicrobial resistance in intensive care setting at St Luke's Hospital, Malta**

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St. Luke's Hospital, Gwardamangia, Malta

Introduction: Knowing the resistance profile for the most common organisms that cause infections in a specific intensive care setting can help in guiding the intensivists when giving empiric antibiotic treatment since adequate and timely treatment is of utmost importance to save lives. **Methods:** The main Intensive Care Unit (ICU) in St Luke's Hospital is a 13-bed case-mixed ward, with 97% occupancy rate. To improve surveillance and control antibiotic resistance, we participated in Care-ICU (Controlling Antibiotic REsistance in ICU), a program for infection control surveillance part of the IPSE (Improving Patient Safety in Europe) project.

Results: The most common organisms isolated were *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Staphylococcus aureus*. However, in blood cultures *Enterococcus faecalis* was third in 2005 and second in 2006, preceded only by *P. aeruginosa*. In respiratory specimen we are seeing a shift from *P. aeruginosa*, with 33% of isolates in 2005 and 24% in 2006, to *A. baumannii* from 22% to 34%.

Frequency of antibiotic resistance varies between species and sources. In blood, oxacillin resistance in *S. aureus* reached 86%. In *P. aeruginosa* and *A. baumannii* resistance to carbapenem is 19% and 86% and for 3rd generation cephalosporins is 44% and 85% respectively. These are the commonest antibiotics used.

Conclusions: Resistance rates in our ICU are very high when compared to other centers participating in CARE-ICU, example the median resistance rate for carbapenem in *A. baumannii* is 11.7%. Feedback on antimicrobial resistance may be a useful tool to tackle misuse of antibiotics and emergence of antibiotic resistance.

079**Impact of antibiotic policy in a tertiary care research institute in Egypt: three years experience**

Hala Badawi
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Background: Antibigram is particularly helpful for choosing empiric and pathogen-directed treatment regimens. It also assists in antibiotic "streamlining", the process by which excessively broad-spectrum empiric antibiotic therapy can be switched to narrower spectrum therapy aimed only at the implicated pathogen(s). It must be acknowledged that an antibiogram-based guideline does not have an unlimited duration of utility. It is likely that shifts in antibiotic usage engendered by the creation of the guideline will, over time, lead to a change in resistance patterns. Thus, it is prudent to update antibiograms and antibiogram-based antibiotic guidelines on a regular basis. **Objectives:** The aim of implementing an antibiotic policy in Theodor Bilharz Research Institute (TBRI) Hospital is to offer guidelines for the rational use of antimicrobial agents by promoting the best practice in: Prophylactic therapy, Empirical therapy and Definitive therapy. In an attempt to retard the emergence and spread of resistance. **Methods:** TBRI hospital is a 3ry care hospital with 300 beds. Antibiotic policy was implemented as a part of IC program since 2005. First, a surveillance study was done including infection rates as well as the most commonly encountered microorganism in different TBRI hospital departments. Second, a study of the antibiotics used for prophylaxis, empiric treatment and therapy was done using a well-designed form for data collection (from 1/1/2005 to 31/5/2005). Third, Data analysis was done and an antibiotic policy was proposed. Fourth, one year duration (1/7/2005-1/7/2006; 1/7/2006-1/4/2007) was given for follow up and evaluation of the new policy. Fifth, rolling of antibiogram was done accordingly. **Results:** Controlling hospital infection so that the infection rate could be lowered from 5.8% in 2004, to 3.9% in 2005 to 3.5% in 2006 and to 2.7% in 2007. The prevalence of MRSA was 2.9% in 2004, 0.5% in 2005, compared to 0.2% in 2006 and 2007 and that of ESBL was 23.9% in 2004, 22.2% in 2005, 22.7% in 2006 compared to 16.2% in 2007. This together with decreased post-operative need for anti-bio-therapy and consequently duration of hospitalization; hospital re-admission and mortality rate. Duration of treatment courses was accordant in 20% in 2005 compared to 55% in 2006. **Conclusion and Recommendations:** Our antibiotic policy with annual cycling was found to lower uses

of antibiotics; rate of resistance, diminish expenses of managing hospitalized patients and lower the rate of nosocomial infections. The educational programme should teach the use and miss-use of antibiotics to hospital staff and practicing physicians. This will reduce inappropriate prescribing. Microbiology Labs should be actively participated as a priority: Available in every hospital and adequately equipped.

080**Infection control in Operation Room (OR) - Meeting the educational needs of a multidisciplinary team**

Izhaki Shlomit
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Infection control is a key factor in patient perioperative care. Multidisciplinary team in OR and different educational needs create a challenge to infection control and OR educators.

Our goal was to improve infection control standards in OR.

Methods: An evaluation checklist was formed for each sector of the multidisciplinary team working in the OR. Survey parameters included aspects common to all sectors and unique factors that relate to activities distinctive to a certain sector.

Results: Data obtained from the observations showed that the average performance level of all sectors of OR was 76.4 (max=100). The culprit points for nurses, surgeons and anaesthesiologists were hand scrubbing/hygiene, attire, surgical site disinfections, sterile field maintenance and adherence to protocols of prophylactic antibiotics.

Following survey results, an educational program was constructed for each sector. A slide show presentation accompanied the educational program that included lectures and demonstrations as well as personal feedback to all sectors in OR. Different education programs were written for each sector. We pinpointed themes that needed improvement for each sector, according to the observations.

A second survey was conducted after completion of educational program. Survey results revealed a significant improvement in performance level: 94.1 vs. 76.4 before intervention. The improvement was achieved by all sectors in OR. Nurses' average score in hand scrubbing was 98.7 (vs. 91.4 before intervention), attire average score was 99.2 (vs. 71.8 before intervention). Surgeon's hand scrubbing average score was 94 (vs. 74.1 before intervention). Anaesthesiologists average score improved from 68 to 89. Following survey outcomes, prophylactic medication protocol was changed: the responsibility for prophylactic medications was transferred from surgeons to anaesthesiologists, resulting in 98% proper time prophylactic administration. We also found a need to change protocols of hair removal that will follow international recommendations and a need to reinforce practice guidelines for visiting sectors.

Following the second observation, we have continued to survey OR teams twice a year. Results of follow-up surveys have shown high level of standards performance.

Conclusions: targeting the educational needs of each sector in OR create an infrastructure for effective education program. Combining sectorial group lectures, demonstrations and personal feedback to employees, together with constant monitoring of performance level, contribute to the quality of perioperative care and to promote adherence to infection control guidelines.

081**Device Associated Infections Rates Reduction in Developing Countries Worldwide- Findings of INICC**

Victor Rosenthal
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The International Nosocomial Infection Control Consortium (INICC) (www.INICC.org) - an international non-for-profit organization - consists in an open, multi-centre program based on the US National Nosocomial Infection Surveillance system (NNIS). Established in Argentina in 1998, this collaborative program was the first to set up a global research network which has facilitated a considerable amount of international and national public health progress. The INICC has developed a prospective, targeted, outcome and process surveillance system specifically devised to identify and reduce Health-Care Associated Infections (HAI) rates and their risk factors and associated consequences for each healthcare facility in countries that has become a member of this program. In particular,



INICC implements a plan aimed at multiple approaches that combine different interventions, including process and outcome surveillance, performance feedback, targeted interventions based on risk factor analysis, cost-effective interventions based on cost analysis, surveillance tutorial, training for the application of infection control guidelines, and secretarial and administrative support for data entry and developing graphs and bar charts. Data are entered to build up an individual database for each member hospital and then matched with other member hospitals' data if applicable. Such information is scientifically analyzed and interpreted in order to apply strategic interventions. Additionally, INICC data is shared at scientific meetings and in peer reviewed journals in order to cooperate with comparable healthcare facilities worldwide.

To become a member hospital, the healthcare center's research committee reviews the INICC study protocol and agrees to participate by signing a commitment document sent to the INICC Central Office in Buenos Aires, which is in charge of providing analysis and individual reports on a monthly basis as well as answering study related queries, thus increasing the tutorial and consultative support by means of personal instruction when required.

To collect data and direct infection control interventions, specific forms and software are used for both controls (patients without HAI) and for cases (patients with HAI). Patients' data recorded in these forms includes name, medical record, gender, age, underlying diseases, and severity of illness score at time of admission to the intensive care unit. Daily, data referred to temperature, blood pressure, devices days, cultures taken, and presence of clinical pneumonia, antibiotic use, and characteristics of any infection are collected both for cases and controls. Following this methodology enables INICC to analyze cases and controls in a prospective cohort nested study.

Simultaneously, process surveillance and performance feedback is conducted to assess hand hygiene compliance, mechanical ventilator care, and vascular and urinary catheter care. These processes were evaluated and entered into a standard form by local researchers responsible for the daily, observation of healthcare workers conduct in the study units.

Since 2005, INICC has worked in collaboration with the International Federation of Infection Control (IFIC). INICC has determined and reduced significantly HAI and mortality rates at different member hospitals that conducted both outcome and process surveillance.

082**Safe injection**

Ossama Rasslan
Ain Shams University, Cairo, Egypt

083**Hand hygiene**

Gertie van Knippenberg-Gordebeke
KNOWHOW Infection Prevention and Hygiene (KNIP), Venlo-Boekend, The Netherlands

084**Certification in infection control: the challenge of developing an international certification**

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¹Queen Elisabeth II Health Sciences Centre, Halifax, Nova Scotia, Canada; ²King Abdulaziz Medical City, Riyadh, Saudi Arabia

Infection control has emerged as a critical element of health care in every setting from acute care, ambulatory care, long term care, to the community and home setting. With rapidly changing health care systems, increasingly complex medical treatment, and public and organizational requirements for consistently safe care, professionals skilled in infection control are an essential component of health care world wide.

The Certification Board of Infection Control and Epidemiology, Inc. (CBIC) is responsible for developing and administering an infection control certification program based on North American practice standards to Infection Control Professionals (ICPs). CBIC currently certifies ICPs

in the United States and Canada and approximately 20 other countries around the world.

The first and essential element in developing a valid and reliable certification examination is to clearly define the practice of the professionals that will be certified. This process is known as a practice analysis. By definition, a practice analysis defines a particular body of knowledge about a specific occupational title and requires the systematic process of collecting, analyzing and documenting judgments made about important information included in the nature of that job. A practice analysis can also be useful in defining the scope of practice of a particular occupation even if certification is not the primary focus.

In the summer of 2006 CBIC, along with representatives from other IC organizations, including IFIC, APIC and CHICA-Canada, began the preliminary stages of a project to explore the feasibility of doing an international practice analysis. The purpose of this project is to define and compare IC practices in various regions of the world. Results of this project can be useful in determining education needs in specific regions and in the development of education programs to enhance knowledge and improve the quality of infection control practice and health care around the world.

This presentation will explore the process by which a practice analysis is conducted as well as the challenges of doing a project of this type on a global scale. It will also share the results of pilot surveys conducted at several international Infection Control conferences in 2006.

085**Outbreak management - interactive session**

Michael Borg¹, Nizam Damani², Ulrika Ransjö³
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General guidelines on outbreak management will be given, with practical examples concerning MRSA, norovirus and ESBL-producing gram-negatives.

Some of the common traps will be discussed, such as:

The risks of case-control studies

Case detection when cases are far apart in time and space

Too wide or too narrow case definitions

086**Hospital construction: what is important for infection control?**

Peter Hoffman¹, Markus Dettenkofer²
¹Health Protection Agency, London, UK; ²University Medical Center

This workshop will explore infection control issues in hospital construction and renovation. Whilst the exact science of linking aspects of how a hospital's construction affects the acquisition of patient infection leaves many points open, there are accepted observations and consensuses that should be observed.

It will have two presentations by infection control practitioners from well-resourced areas (UK and Germany) as well as presentations from less well-resourced areas (South Africa and Hungary).

Whilst we will explore guidelines and practices used in well-resources areas, we want to avoid the "This is the way we do it, so should you" approach. The most expensive solutions are often not the best and are totally inappropriate if local resources cannot ensure that they keep functioning effectively (For example, this can be very important in the case of systems providing artificial ventilation and air filtration to operating rooms etc.).

We hope to explore a hierarchical approach to infection control in this area. There will be "basic" recommendations - these are measures that should be in place no matter how limited the resources. There will be "standard" recommendations that should be attainable in all but the most resource-limited areas. There will be "gold standard" recommendations - these are usually measures that can only be adopted by the most resource-rich areas. There tends to be a decreasing productivity the higher up this scale you go, i.e. the most productive measures are often the least costly. We hope that people who attend this workshop will be able to bring information about their problems for discussion and any solutions they may have found to these to share with others.

**O87** **Preparing and presenting a research or grant proposal**

Patricia Lynch
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Research is essential to progress in this evolving part of health care; most of the great contributions have been made by practitioners in the field building stepwise on the scientific contributions of others before them. Investigations may explore new territory, sometimes in the face of contrary beliefs, they may identify a “better way” or refute a wrong way. Publication, at least in the form of an abstract, make the result available to practitioners who need to know, and also increases the author’s potential for raising funds for more research. Many successful investigators start from their own work experience, conversations with others, “hot topics” and the literature.

Literature review is necessary to evaluate a good idea, to summarize the applications that pertain to it and to develop the research question to be investigated. Online literature search tools such as PubMed are available and should be used. Potential funders will be interested in the results of the review as part of the proposal which should also include the title, vision for the successful project, need the project fills and the goals, objectives and timetable, budget, stakeholders and potential partners, and possible benefits to to society and to the funder. Drafts of the proposal and application should be reviewed by and objective, experienced senior, and they should conform closely to and directions provided.

Once completed, the manuscript should be submitted to the most appropriate venue since the same study may NOT be submitted for publication again. Abstract formats are generally either scientific or programmatic. Scientific abstracts follow this format: Background including objectives and hypothesis, methods description, results summarized briefly with appropriate statistical analysis, and conclusions that fully address implications and conclusions. Programmatic format is different: the issue or problem evaluated, project description and methods, results and lessons learned.



Poster presentations

P1

Prevalence of candidiasis, bacterial vaginosis and trichomoniasis in the women with vaginitis symptoms in Rafsanjan, Iran

Hossein Abdollahi, Azita Manshori
Microbiology Department, University of medical sciences, Rafsanjan, Iran

Reproductive tract infection is one of the most common health problems during reproductive age. Epidemiological data on these infections are scarce in this region therefore this study was planned. During this study 120 vaginal swab samples from women with vaginitis symptoms attending antenatal clinic were tested by wet mount and culture methods for the presence of candida, bacteria and trichomonas vaginalis. Overall prevalence of candidiasis, bacterial vaginosis and trichomoniasis respectively 41/4%, 10%, 20% and 19/3% were found. Mixed infection, others samples were negative. The result of this study indicated that the percentage of women who had candidiasis is high in population was studied therefore we recommend that the health care workers make women aware of the risk factors of this infection.

P2

Prevalence of Intestinal Parasitic Infection in Rafsanjan, Southern Iran

S. H. Abdollahi, A. Eatemadi, M. Moradi
Department of Microbiology, Rafsanjan University of Medical Sciences

This study was performed to investigate the status of intestinal protozoa and helminth infection among inhabitants in the area. Stool samples were examined by direct wet smear and formalin-ether concentration methods for the detection of intestinal parasites (cysts and trophozoites of protozoa and helminth ova). Overall, 11000 stool specimens were examined and of these 1100 (10%) were found infected. The most common protozoa being *Giardia* (60.6%) and *Hymenolepis nana* was the commonest intestinal helminth (30.5%). The present study indicated that direct transmitted intestinal parasites are prevalent in this region and it is necessary for increase awareness among inhabitants.

P3

A year with carbapenem-resistant *Klebsiella pneumoniae* at an urban hospital in Israel

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Carbapenem-resistant *Klebsiella pneumoniae* has been spreading in Israel since 2005 and is endemic now in several hospitals in the country. We report our experience with KPC at a 650-bed urban hospital in the Tel Aviv area. From March 2006 to February 2007, 20 patients at E. Wolfson Hospital, Holon, were infected or colonized by carbapenem-resistant *K. pneumoniae* (CRKP). Pulsed-field gel electrophoresis identified a single strain. All isolates were resistant to carbapenems, ceftazidime, piperacillin-tazobactam, and fluoroquinolones, but remained susceptible to colistin. 66% were susceptible to gentamicin. The organism was isolated from urine in 9 patients, from blood in 7 and from a wound in 4. The mean age of the patients was 79.1 years. 12 patients were admitted from a chronic care facility. All patients had chronic conditions, hypertension (15), dementia/CVA (10), being the most common. At the time of CRKP isolation 17 patients were on a medical ward, 2 in surgery and 1 in orthopedics. 8 patients were on mechanical ventilation at the time of CRKP isolation. Prior to CRKP isolation 4 patients stayed in ICU, 11 had surgery (mean, 2 weeks before) and 15 had another admission within the preceding 2 months. The mean duration of stay at hospital before CRKP isolation was 17 days. 17 patients received antibiotics, most often cephalosporins, in the month preceding CRKP isolation. 8 patients died, 6 of whom had CRKP bacteremia (compared with 1 case of bacteremia in the survivors). However, it was often difficult to determine the role of CRKP in patients' outcome.

P4

How did the infection control team of Theodor Bilharz Research Institute struggle to establish a central sterilization unit?

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The challenge: We faced a lot of important problems: 1-The originally constructed central sterilization unit of Theodor Bilharz Research Institute hospital was occupied partly by the engineering department and partly by the storage department and the central sterilizer (autoclave) was left unused in spite of being good one. 2-Alternatively, the surgical instruments and wraps were sterilized in the operation department under very bad conditions, with limited place, facilities, and even experience. Old-fashioned autoclaves that could not indicate the conditions of sterilization were used. 3-Health care workers specialized for cleaning or transportation may be allowed to perform sterilization without any previous experience. 4-Sterilization in other hospital departments was done under very bad conditions to the extent of the use of disinfectants only for instruments, without unlocking or proper cleaning. Efforts and changes: - With great efforts, we could convince the president and the hospital manager of our institute to retain this department. - We followed every step to remove everything from it, find substitute places and convince people. - We got connected with an office specialized in designing central sterilization units in Egypt and provide us with the proper design according to the international standards. - We discuss the design with the engineering department and hospital manager. - We engaged in purchasing committees to purchase central sterilization autoclave, automatic washer and disinfectant, welding machine, water and air pistoles, water destillator, and other requirements as autoclavable sabsos, rolls, incubator for biological indicator,.... - We engaged also in purchasing committee to purchase gas plasma for cold sterilization of fiberoptic endoscopes as our institute has a very busy endoscopy department, and considered to be one of the international training centers in this issue. It also could be used for anaesthesia pipes. - We specialize one of the infection control nurses and two newly employed nurses to be responsible for central sterilization unit, with condensed training and guidance. The unit design enable the nurse supervisor to watch all the workers from her office as most of the walls provided with glass windows. - Pictures of the old and renewed units would be very illustrative. Results: - Now the renewal of the central sterilization unit is completed and we started to perform sterilization under perfect practice according to the opinion of infection control specialists from Germany, France and Egyptian company for sterilization. - All doctors were surprised with the proper packaging and cleaning of instruments and sewed clean gowns. - Overall infection rate was lowered from 5% in 2004 with SSI rate representing 32.6% to 3% in 2007 with SSI rate representing 6%.

P5

Drug resistance to β -Lactam antibiotics of *Escherichia coli* strains isolated from urocultures

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Purpose: Considering the high incidence of urinary infections we made a study in order to determine the antibiotic susceptibility to β -lactams of *Escherichia coli* (E. coli) strains isolated from urocultures of patients admitted in the urology department, as well as from ambulatory patients. Materials and methods: We studied 526 strains of E. coli (350 from ambulatory patients and 176 from the urology department). The germs were identified by the API method (BioMerieux) and the antibiotic susceptibility was realized by disk-diffusion tests Kirby-Bauer. Statistic analysis of the antibiograms and precisising the resistance phenotypes were performed with automatic reading methods (Osiris - Bio Rad Laboratories). For identifying ESBL (beta-lactamase with extended spectrum) producing strains, the synergy tests were also performed. Results: The wild phenotype was present in 49.15% of the strains isolated from



ambulatory patients, and only in 17.04% in patients admitted in the urology department. In ambulatory patients, as well as in patients admitted in the urology department, most of the strains were penicillinase-producing (46.85%, respectively 57.95%). Conclusions: We observed a constant lowering of the sensitivity of *E. coli* strains to β -lactams, especially in urology department, which draws attention to the importance of monitoring antibiotics prescriptions.

P6 Microorganisms in infective complications after valvular replacement

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Objectives: To assess the incidence of microorganisms implied in infective complications in patients after mitral and/or aortic valvular replacement with mechanic or biologic prostheses. **Methods:** 76 postoperative patients (44 men and 32 women) were admitted in the Cardiovascular Rehabilitation Department of the Institute of Cardiovascular Medicine, 2 weeks after mitral and/or aortic valvular replacement with mechanic or biologic prostheses. Mean age of the patients: 58 \pm 8 years. The etiology of valvular disease was various, with the predominance of the degenerative one (53.94%). **Results:** Infective complications had a 15.78% incidence affecting the respiratory tract (33.33%), the operative plague (33.33% incidence each) and the urinary tract (25%). Respiratory infective complications were more frequent in patients with previous respiratory pathology. 4 patients needed further antibiotherapy because of preoperative infective endocarditis. *Staphylococcus aureus* was the most frequent isolated (50%) being the main microorganism implied in respiratory, ORL and plague infections. Respiratory infections were also determined also by *Streptococcus pneumoniae* (8.33%) and *Streptococcus pyogenes* (8.33%). Gram-negative microorganisms lead to urinary tract infections (*Escherichia coli* - 16.66%, and *Proteus mirabilis* - 8.33%) *Pseudomonas aeruginosa* was implied in plague infections (8.33%). **Conclusions:** Infective complications are more frequent early postoperative, in special category of patients (elderly, diabetics, obese). In this situation, there is needed a more attentive medical observation. Exercise training in the rehabilitation program is postponed until the complete recovery after infective postoperative complications.

P7 Detection of metallo betalactamase producing *p.aeruginosa* & *acinetobacter* spp.in a tertiary care hospital

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Objectives: Carbapenem resistant *Pseudomonas aeruginosa* and *Acinetobacter* spp due to metallo betalactamase (MBL) are an emerging threat in tertiary care hospital. Timely detection of MBL producing gram-negative bacilli is necessary to prevent their dissemination. **Methods:** 254 pathogenic isolates of *P. aeruginosa* and 44 isolates of *Acinetobacter* spp were subjected to sensitivity testing to antipseudomonal drugs like amikacin, gentamicin, netilmicin, tobramycin, piperacillin-tazobactam, ceftazidime-sulbactam and ceftazidime, by disc diffusion method as per CLSI guidelines. The production of MBL was detected by the increase in zone size by 7 mm with EDTA impregnated imipenem, meropenem and ceftazidime discs. **Results:** Fifty two percent of *Acinetobacter* spp and twenty one percent of *P. aeruginosa* were resistant to imipenem and meropenem both. Thirty five percent of *Acinetobacter* spp and fifty four percent of *P. aeruginosa* showed enhancement in zone size with EDTA impregnated imipenem, and ceftazidime discs.

P8 Minimum Inhibitory Concentration (MIC) of *Pseudomonas Aeruginosa* from Three University Hospitals in Iran

Mohammed Ali Boroumand
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Objective: Detecting nosocomial infections and the pattern of antimicrobial susceptibility of related organisms has been of great value. This study was done to detect the susceptibility of *pseudomonas aeruginosa* which are among most causative gram negative organisms responsible for health care associated infections.

Methods: Between September 2004 & September 2005, 142 *pseudomonas* bacteria were isolated from patients of three university hospitals in Tehran. Imipenem, ciprofloxacin and Ceftazidime were tested against the isolates by three different methods (E test, disk diffusion and microdilution) to detect the susceptibility. Minimum Inhibitory Concentration (MIC) of Imipenem were compared with two other antibiotics. To analyze data, a stepwise logistic regression was done and for measuring the agreement of antimicrobial susceptibility, the kappa statistic was used.

Results: By Etest, 64.8%, 64.1% & 90.1% of isolates were susceptible to Ciprofloxacin, Ceftazidime and Imipenem respectively. The susceptibility of isolates to both Ciprofloxacin (OR: 0.170, 95% CI: 0.103-0.280, $p < 0.0001$) and Ceftazidime (OR: 0.133, 95% CI: 0.081-0.218, $p < 0.0001$) were lower than Imipenem. No significant differences between susceptibility to Imipenem, Ciprofloxacin and Ceftazidime (OR: 1.055, 95% CI: 0.766-1.452, $p = 0.7445$) by both E test and disk diffusion tests were detected. For Imipenem, Ciprofloxacin and Ceftazidime, detected MIC₅₀ were 2.0, 0.35 and 3.0; While their MIC₉₀ were 5.4, >32 & >256 respectively. Considering microdilution as a gold standard test, sensitivity and specificity of E test were 89.24% and 45.00% respectively. Interpretation of microdilution & E test results showed nearly complete agreement with kappa value of 0.8466 (95% CI: 0.7743-0.9188).

Conclusion: High antimicrobial resistance to *pseudomonas aeruginosa* was detected at our study. Therefore in Iran as same as many other countries, good surveillance and appropriate preventive and diagnostic approaches should be considered to cope with such offensive problems. Furthermore, although detected MIC 50 & MIC 90 of Imipenem were not high, but based on its recorded resistance rate, more attention should be focused on in this regard.

P9 Minimum Inhibitory Concentration (MIC) of Isolated *Acinetobacter* from Three University Hospitals in Iran

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Objective: Even though surveillance of antibiotic resistance of organisms who cause health care associated infection is of great importance, such data are not available in many countries in regular fashion. This study was done to detect the antibiotic resistance of *Acinetobacter* which nowadays is one of the most important bacteria causes nosocomial infection.

Methods: Between September 2004 & September 2005, 191 *Acinetobacter* isolates were detected in patients of three university hospitals in Tehran. The susceptibility of these isolates to Imipenem, Ciprofloxacin and Ceftazidime were tested by three different methods (Etest, disk diffusion and microdilution). The 50 & 90 percentile of Minimum Inhibitory Concentration (MIC) of these antibiotics were determined. A stepwise logistic regression was done to analyze the data and the kappa statistic was used to measure the agreement of antibacterial susceptibility.

Result: The percentage of *Acinetobacter* isolates which were susceptible to Ciprofloxacin, Ceftazidime and Imipenem by Etest were 38.7%, 44.5% and 72.8%, respectively. The susceptibility of isolates to both Ciprofloxacin ($p < 0.0001$) and Ceftazidime ($p = 0.0072$) were lower than Imipenem. In both E test and disk diffusion test, significant differences between susceptibility of isolates to Imipenem, Ciprofloxacin and Ceftazidime were seen (OR: 0.423, 95% CI: 0.329-0.544, $p < 0.0001$). The 50 percentile of MIC of Imipenem, Ciprofloxacin and Ceftazidime by E test were 1.5, 0.5 and >256, while 90 percentile of MIC were >32, >32 and >256, respectively. Sensitivity and specificity of E test comparing to microdilution were 88.20% and 91.95%, respectively. Interpretation of microdilution & E test results showed pretty complete agreement with kappa value of 0.6998 (95% CI: 0.6225-0.7772).

Conclusion: Our study showed, even though antimicrobial resistance of



Acinetobacter is not too high, but the MIC 90s of all those choice drugs for this microorganism are remarkable. To cover this problem, precise surveillance and proper preventive and diagnostic approaches must be considered.

P10 **Pseudomonas aeruginosa infection in an intensive care unit**

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P. aeruginosa (PA) is a well-known cause of hospital-acquired pneumonia (HAP) in intensive care units (ICU). Methods. We conducted an epidemiologic and molecular investigation of endemic PA infection in an ICU. PA strains isolated from hospitalized patients and environmental samples in the ICU of the National Medical Center (NMC) were collected by the hospital infection laboratory of National Center for Disease Control and Public Health, October 2005 - April 2007. The antimicrobial susceptibility of the isolates in vitro was assessed by an agar disk diffusion method, as recommended by the Clinical and Laboratory Standards Institute. The antimicrobial susceptibility data were analyzed using WHONET software. Isolates resistant to cefepime, imipenem, aztreonam, ciprofloxacin, piperacillin, and gentamicin were defined as multidrug resistant (MDR). Results. PA was isolated 89 specimens obtained from 53 patients with HAP. The incidence rate of MDR PA infection was 15,8/100 patient admissions per year. MDR strains were common, making up 28/89 (31,5%) of all PA isolates in this study. In March - August 2006 there was an outbreak of HAP caused by PA. During the outbreak from 25 patients with HAP have been isolated PA. Using PFGE typing, it was observed that twelve PA had same genetic pattern. Environmental investigations demonstrated the presence of PA in the ventilation equipment. In one case, MDR PA was found in microfilter of AV machine. Conclusions. The most predominant etiologic factor responsible for HAP in ICU of NMC was endemic PA.

P11 **Crimean-Congo hemorrhagic fever among health care workers in Kosovo**

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Crimean-Congo hemorrhagic fever among health care workers in Kosova Vishaj A., Ahmeti S., Dreshaj Sh., Buzhala P., Raka L., Bajrami M., Doda T. Murati S. Crimean-Congo hemorrhagic fever (CCHF) has repeatedly caused nosocomial infections among hospital staff in University Clinical Center of Kosova (UCCK), and was often reported as nosocomial outbreaks in developing countries. Objective: Presentation of incidence and clinical manifestations of the Hemorrhagic fever Crimean-Congo in health care workers in Kosova. Methods: Retrospective analysis of cases hospitalized in Clinic for Infectious Diseases with CCHF registered among health care workers. Results: During time interval from 1999 till 2006 we have evidences of four (04) nosocomial infections among health care workers. Three of them were young male doctors in otorhinolaryngology and one was laboratory assistant at the same clinic. During 2001, when was evidenced high incidence of CCHF in Kosova, two ORL doctors were infected as they were stopping bleeding from nose. In the beginning of the epidemics, laboratory assistant was accidentally infected during the cleaning of the test-tubes, due to disrespect of protective measures. In 2004 we have registered one ORL senior doctor, infected with CCHF during the same medical procedure. All of the health care workers had severe clinical picture with intensive hemorrhagic manifestations and systemic inflammatory response. Three doctors have had very hard clinical manifestations of the disease whereas the laboratory assistant had a fatal end. Conclusion: Crimean-Congo hemorrhagic fever is highly contagious disease, with high morbidity and mortality rate, therefore application of standard and complementary protection measures is necessary. Service for prevention of intra hospital infections should have a key role in infection control.

P12 **Investigation of methicillin resistant staphylococcus aureus in students**

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Objective: This surveillance was conducted in order to investigate the carriage rate and risk factors of community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) in our region which is reported to be increasing in different countries. Methods: The study included 2015 students, 1012 were from high schools and 1003 were from primary schools. Nasal MRSA carriage prevalence, risk factors and antibiotic sensitivity patterns were investigated. Standard microbiological methods were used to determine the isolated strains and antibiotic sensitivity. Results: Nasal MRSA carriage could not be found in any of the students. Methicillin sensitive *S.aureus* colonization rate was 14.7%. 93.6% of these isolated strains were resistant to penicillin and 14.2% were resistant to erythromycin. *S.aureus* carriage was found to be more significant between the primary school children. A statistically significant relationship was not determined between the nasal carriage and the risk factors of CA-MRSA. Conclusion: Traditional management methods are still thought to be safe for the empirical treatment of community-acquired *S.aureus* infections. Even if CA-MRSA infections seem not to be a serious threat in our region, it is essential to carry out other prevalence studies from the various parts of the community.

P13 **Effects of caspofungin and liposomal amphotericin b combination in a murine model of invasive candidiasis**

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This study was designed to evaluate the in vivo efficacy of combined therapy with amphotericin B and caspofungin against azole-resistant *Candida albicans*. The mice were randomly divided into twelve groups (including 12 animals each) three untreated control (for each dose group), CAS (0.5 mg/kg/day) alone, AMB (0.5 mg/kg/day) alone, CAS (0.5 mg/kg/day)+AMB (0.5 mg/kg/day) combination, CAS (1 mg/kg/day) alone, AMB (1 mg/kg/day) alone, CAS (1 mg/kg/day)+AMB (1 mg/kg/day) combination, CAS (2 mg/kg/day) alone, AMB (2 mg/kg/day) alone, CAS (2 mg/kg/day) + AMB (2 mg/kg/day) combination treated. Treatment efficacy was assessed by determining reductions in mortality as well as decreases in tissue fungal densities. The fungal densities in tissues were significantly reduced with either CAS alone or AMB alone or combination therapy compared to those of controls. There was no significant difference between CAS and AMB treated alone groups. Decrease of tissue fungal densities was found significant in CAS+AMB (1 mg/kg/day) combination group compared to CAS (1 mg/kg/day) and AMB (1 mg/kg/day) alone groups. All infected untreated mice died of infection between days 3 and 18. Survival rates for CAS (0.5 mg/kg/day), CAS (1 mg/kg/day), AMB (0.5 mg/kg/day), AMB (1 mg/kg/day) groups at day 21 were 33.3%, 66.7%, 50%, 83.3%, respectively. All other mice survived. Treating animals with CAS or AMB or CAS+AMB significantly prolonged survival compared with untreated controls. There were no determined difference of survival rates between combination groups and CAS and AMB alone groups. We found that AMB alone, CAS alone and both drugs combination treatment were effective at reducing the fungal burden and the mortality in a murine model.

**P14****Evaluation of risk factors in patients with candidemia**

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In recent years, hospitalization rate was increasing due to severe underlying disease and surgical operations. In hospitals particularly in intensive care units, because of increase in longer duration and multiple antibiotics usage, immunosuppressive therapies, administration of central venous catheter and total parenteral nutrition, nosocomial fungal infections become an important problem. The study is designed to investigate the characteristics of 41 candidemia cases at Celal Bayar University hospital in Turkey from January 2004 to January 2007. The mean age was 52.808.43 years and the mean hospitalization period was 46.787.80 days. 58.5 % of patients were male and 41.5% were female. Most of the patients (68.3%) were hospitalized in internal medicine department and 31.7% of the patients in surgical departments. The source of candidemia was central venous catheter (CVC) in 14.7%, urinary tract infection in 7.3% and respiratory tract infection in 2.4% of cases while the source of candidemia was unknown in 31 (75.6%) cases of candidemia. 70.7% of patients had central venous catheter, 46.3% had underlying diseases, 26.8% had surgical operations and 31.7% had history of invasive intervention. All patients had a prior antibiotic usage. The mortality rate was found 41.5%. The risk factors like steroid usage, urinary catheterization, mechanical ventilation, total parenteral nutrition, hypoalbuminemia, leucocytosis, sepsis, shock and hypoxia were significantly correlated with mortality ($p < 0.05$, Fisher's exact chi square test). But none of these factors were independent risk factors for mortality in the multivariate analysis. In conclusion, nosocomial fungal infections have to be thought when an infection is determined in patients with various risk factors and longer duration of antibiotic usage.

P15**Sexually Transmitted Diseases: Knowledge, Attitudes and Behaviors of Students**

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Sexually transmitted diseases continue to be an important public health problem for many industrialized and developing countries. This study is aimed to evaluate the knowledge of sexually transmitted diseases (STDs), sexual attitudes and behaviors of students. The study was conducted in Celal Bayar University, Manisa, a city in western region of Turkey. 493 students who volunteered to participate into the study completed a questionnaire investigating the knowledge and attitudes regarding STDs (previous education of STDs, types and risk groups of STDs, transmission routes, signs and symptoms, attitudes and prevention behaviors of sexual activity, source of knowledge). The study group consists of 278 (56.4%) male and 215 (43.6%) female students. 26.4% ($n=130$) of students had a previous education about STDs. The mostly known STDs were HIV infection and AIDS, but the knowledge about the others was insufficient. The main sources of knowledge were visual media (83.6%), print media (82.6%) and friends (62.9%). The knowledge about transmission routes, signs and symptoms of STDs was inadequate. Monogamy (66.3%) and using condoms (71.6%) were determined as the most efficient ways to prevent the STDs. Among the sexually active students, 45.6% of them used a type of contraception method and condoms were mostly preferred. In recent years in our country, risk factors associated with transmission of STDs including young age of onset of sexual activity, drug addiction, multiple sexual partners, inconsistent use of barrier method contraceptives have been increasing. This study shows the knowledge of students about STDs is insufficient and the STDs control and education programs have to be performed.

P16**Evaluation of an Automatic Surveillance System for Nosocomial Urinary Tract Infections**

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Background: Rapid and accuracy to detect nosocomial urinary tract infections is important issues in the clinical setting. Manual review of patient records and clinical laboratory data remains cumbersome, time-consuming tasks for infection control practitioners (ICP). Automatic surveillance system have shown the efficiency and accuracy of nosocomial infection surveillance Objective: To validate an automatic surveillance system for the detection of patients with nosocomial urinary tract infections. Methods: Retrospective analysis of data from the hospital information system. We applied nosocomial urinary tract infection suspicion criteria to develop detection rules in the automatic surveillance system. Data from automatic surveillance system were compared with ICP using by traditional chart review method for nosocomial urinary tract infections surveillance. Sensitivity, specificity, positive predictive value, and negative predictive value were calculated to evaluate the performance of automatic surveillance system. Results: The sensitivity of the automatic surveillance system was 99 %, and specificity was 47 %. The positive predictive value (PPV) was 41 %, and the negative predictive value (NPV) was 99 %. Conclusions: Automatic surveillance system has the potential to decrease ICP workload and make urinary tract infection surveillance efficient. The automatic surveillance system is a useful tool and can provide immediately alert for ICP to prevent of nosocomial urinary tract infections in clinical setting. Key Word_Nosocomial Infection_Surveillance System_Automatic Detection

P17**Compliance of hand hygiene among nurses after introduction of an alcohol-based handrub**

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Hand Hygiene of HCWs is a basic measure of hospital infection control. The improvement of attitudes concerning hand hygiene in health care facilities is an hot issue. The observational study, carried out in the intensive care, surgical and medical area of an university hospital, evaluates the effects of the introduction of an alcohol based handrub in HCWs. It consisted in three surveys: before and at 7 and 30 days after the product introduction. Overall 432 nurses' working-hours and 3451 handwashing occasions were observed. The compliance increased significantly from 19.3% (244/1262) in survey 1, to 28.1% (314/1119) and 27.1% (288/1070) ($p < 0.01$) and it was more frequent after performing (443/1133) a nursing procedure than before it (329/2092) ($p < 0.01$). The compliance significantly decreased with the increase in number of occasions per hour only when the handrubbing had not been introduced yet [30.2% 0-7 occasions/h vs 21.8% >8 occasions/h ($p < 0.05$)]. No differences in gender's compliance were found. Our results are consistent with other studies published in literature that remark the problem of limited adherence to the handwashing guidelines. In fact, the compliance in the three surveys was <30%. The higher compliance seen after the execution of the nursing procedure shows that the staff is more concerned with its own safety than the patient's.

**P18 Efficacy of Thai - Modified Endoscopic Decontamination at Rajavithi Hospital, Bangkok, Thailand**

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Background: Successful cleaning of endoscopes has been recognized to be of major importance for effective decontamination process. **Objective:** To evaluate the efficacy of endoscopic decontamination processes between the conventional method and the Thai -modified SIGNEA guideline. **Methodology:** This study was conducted during June- December 2006. Four different types of endoscopes (gastrosopes, duodenoscopes, colonoscopies and bronchoscopes) were tested. We determined the 220 samples from conventional method (n=100) and the modified SIGNEA's method (n=120). Instead of automated washing, we used a manual cleansing method and immersed the endoscopes in 2.4% Glutaraldehyde and rinsing of 10 ml. sterile water through the therapeutic channel after disinfection. Samples were cultured for aerobic, anaerobic bacteria, including bacterial spores, HIV, HBV, HCV and Candida species and fibrin test was done by Hemocheck-S. **Result :** Both cleansing methods were free from fibrin molecules (size 0.1 µg). 12 of 100 samples (12 %) were positive during the assessment of bacterial assay from the conventional method. Only 3 of 120 assays (2.5 %) were positive from the Thai -modified method. **Conclusion** Thai -Modified Endoscopic decontamination was an effective decontamination process.

P19 Resistant phenotype of Escherichia coli isolated from newborn and premature departments

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Introduction: There were collected 724 samples (nasal, pharyngeal swabs, gastric aspirates, ocular and umbilical secretions, verix, urocultures and faeces) from premature and newborn department on Clinical Hospital. **Materials and Methods:** From 724 collected samples we have isolated 385 bacterial strains with nosocomial potential. Testing the chemotherapies sensibility was done by two methods: Kirby-Bauer and automated API (BioMerieux). From 385 bacterial strains with nosocomial potential have been isolated 210 strains of E. coli, from which 65 strains have been isolated from newborn department and 145 strains of E. coli isolated from premature department. **Results and Conclusions:** After analyzing the sensibility results we get to the conclusion that the resistant phenotypes are: At premature departments -48 strains of Escherichia coli was presented PAZA phenotype In newborn departments - 22 strains of Escherichia coli was presented PAZA phenotype -13 strain of Escherichia coli was presented aminoglycoside resistance phenotype -6 strains of Escherichia coli was presented CAZA phenotype -4 strains of Escherichia coli was presented BLSE phenotype (beta-lactamase with extended spectrum) From 65 strains of Escherichia coli isolated by the newborn department 20 strains was presented S phenotype In conclusion this study shows the increase of resistant strains to antimicrobial chemotherapy's.

P20 Hand washing

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Hand washing remains an important preventative method for making the transmission of nosocomial infections redundant. Many diseases are transmitted from person to person through hands. Probably the most important one is the common cold virus (but) we know there are many other more serious infections that are also transmitted through that route. Hand washing is the single most effective way to prevent the spread of infections. "Good" hand washing techniques include using an adequate amount of soap, rubbing the hands together to create friction, and rinsing under running water. The use of gloves is not a substitute for hand washing.

Objective of this study was to monitor and observe the adherence to the hand washing technique and compliance of the health care workers pre and post procedures during routine patient care. **Design:** Observational study, **Setting:** Teaching hospital in Bahrain **Participants:** 60 health care workers. **Measurements:** Compliance with hand washing. **Result:** The study reported here found that compliance to hand washing was quite poor. **Result of the observation** by infection control staff found that 43.3 % did Hand washing (medical or surgical) properly according to the manual and 56% NO. Hand washing is being carried before and after removing gloves 43% were YES and 56% were NO. Hand washing is done before and after each procedure, before 16% and after 83%. Hand washing is done between procedures 85% were NO and 15 % were yes. **Conclusions:** Compliance with hand washing was moderate. Variation across hospital ward and type of health care worker suggests that targeted educational programs may be useful. Even though observational data cannot prove causality, the association between noncompliance and intensity of care suggests that understaffing may decrease quality of patient care.

P21 Presence and antibacterial susceptibility of pathogenic bacteria in oral cavities of local dogs in makurdi, nigeria and its effects on human health: challenges for health extension

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Presence and antibacterial susceptibility of pathogenic bacteria of zoonotic potentials in oral cavities of 213 local dogs in Makurdi area of Benue state, Nigeria were studied between February to July 2005. Swabs from the oral cavities were cultured on nutrient, blood, MacConkey and eosin methylene blue agars followed by biochemical tests for species identification. Identified bacteria species were subjected to antibacterial sensitivity. One hundred and sixty dogs (74.6%) were positive for one or more species of bacteria. The species identified were Staphylococcus aureus (20.7%), Escherichia coli (14.6%), Proteus mirabilis (8.9%), Klebsiella pneumoniae (8.0%), Streptococcus fecalis (7.0%), Enterobacter aerogenes (5.2%), Streptococcus canis (2.3%), Listeria monocytogenes (1.9%), Corynebacterium renale (1.4%), Bacillus cereus (0.9%), Pseudomonas aeruginosa (0.9%) and Pasteurella multocida (0.5%). Drugs of choice for treatment of dog bite wounds or infections by oral routes in decreasing order were ciprofloxacin, gentamycin, nitrofurantoin and penicillin. The study concluded that the bacteria species identified have zoonotic potentials and can possibly infect humans. It was recommended that high health extension education be adopted to sensitize people within the environs and beyond of these dangers.

P22 Laboratory diagnosis of chlamydia (chlamydia) and mycoplasma spp in acute lower respiratory tract infection in children decreases misuse of antimicrobials

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Background and Aim: Infections caused by Chlamydia and Mycoplasma spp. require different antimicrobials from those used for other bacterial infections. This study was conducted to detect the contribution of Chlamydia and Mycoplasma spp in acute lower respiratory tract infections in pediatric population. **Methods:** One-hundred-eleven children under five years of age diagnosed as acute lower respiratory tract infection visiting the out-patient-clinic of a university hospital in Egypt during a 6-month period were tested for anti-Chlamydia immunoglobulins G (IgG) and M (IgM), and anti-Mycoplasma immunoglobulins G (IgG) and M (IgM), by enzyme immunoassay (EIA) using VIRCELL ELISA kits (Santa Fe, Granada, Spain). **Results:** Chlamydia spp IgG and IgM and Mycoplasma spp. IgG and IgM antibodies in serum were demonstrated in 6 (5.4%), 13 (11.7%), 3 (2.7%), 5 (4.5%) cases respectively, of which one case was positive for both Chlamydia IgG and IgM, and 4 (3.6%) cases were positive for both Chlamydia IgM and Mycoplasma IgM suggesting co-infection. Based on serology, 18



(16.2%) and 8 (7.5%) out of 111 children were found to be suffering from Chlamydomydia and Mycoplasma infection respectively. Conclusion: Chlamydomydia and Mycoplasma spp. play a significant role in respiratory tract infections in children less than 5 years. Laboratory tests to detect these pathogens are warranted before initiation of antimicrobial therapy.

P23

A comparative study of chromogenic and non-chromogenic culture media for the detection and isolation of methicillin resistant *Staphylococcus aureus* (MRSA) directly from clinical screening samples

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Elaboration: Methicillin resistant *Staphylococcus aureus* (MRSA) is a major cause of nosocomial and community acquired infection worldwide. Clinicians and Infection Control Teams rely on accurate and timely results from patient screening to ensure appropriate control measures are implemented. This evaluation was undertaken to comparatively assess the performance of a range of conventional screening media (Mannitol Salt Agar, Mannitol Salt Agar with oxacillin, Oxacillin Resistance Screening Agar and Baird-Parker Agar with ciprofloxacin) and new generation chromogenic media (Oxoid Chromogenic MRSA Agar, BioRad MRSA Select, bioMérieux MRSA ID and Chromagar MRSA). Routine screening samples (n=450) were inoculated directly onto each medium. Results were recorded after 18-24 hours incubation and re-read after 48 hours, with the exception of Oxoid Chromogenic MRSA Agar (which only requires a maximum of 24 hours incubation). The chromogenic media achieved sensitivities in the range 92.4% to 94.9%. These were higher than non-chromogenic media (except for Baird-Parker Agar with ciprofloxacin, 97.5%). Specificities of chromogenic media were in the range 83.6% to 94.6%, which were higher than all non-chromogenic media. Oxoid Chromogenic MRSA Agar achieved the highest combined sensitivity and specificity after only 24 hours incubation. All other media recommend re-incubation up to 48 hours and still did not match the overall performance of the Oxoid medium. In conclusion, chromogenic media provide improved sensitivity and specificity compared to conventional screening media for the detection of MRSA. Oxoid Chromogenic MRSA Agar offers the greatest sensitivity and specificity and shortest incubation time (18 to 24 hours), allowing timely reporting of results.

P24

Impact of Universal Preadmission Screening on Clinical MRSA Isolates and Antibiotic Use

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Impact of Universal Preadmission MRSA Screening on Clinical MRSA Isolates and Antibiotic Use Liz Fleet, Senior Antibiotic Pharmacist, Dr G Gopal Rao, Consultant Microbiologist, Moira Talpaert, Antibiotic Pharmacist, University Hospital Lewisham, London U.K. Introduction: Methicillin resistant *Staphylococcus aureus* (MRSA) is a healthcare associated infection of major clinical significance throughout the world. Screening and subsequent decolonisation of patients of MRSA carriers is acknowledged to be important for controlling MRSA infections in hospitals. In October 2004, University Hospital Lewisham (UHL) implemented an MRSA screening and decolonisation programme for all adult emergency admissions to hospital (1). Aim: To examine the relationship between prevalence of MRSA colonisation at time of admission, clinical isolates of MRSA (as surrogate marker of clinical infection) and antibiotic use. Method: MRSA carrier rates and MRSA from clinical isolates were obtained from the laboratory and infection control databases. Annual antibiotic usage data for anti-staphylococcal agents that cover MRSA was calculated from reports generated from Pharmacy database. Results: Prevalence of MRSA colonization progressively decreased from 12.9% in October 2004 to 5.1% in September 2006. During this period, there was a corresponding 43% reduction in number of MRSA isolated in

clinical specimens and corresponding decrease in defined daily doses (WHO) of 37% for anti-MRSA antibiotics (Vancomycin + Teicoplanin + Linezolid) with 41% direct cost saving of 80 700 Euro. Conclusion: Falling prevalence of MRSA carriers secondary to implementation of pre-admission MRSA screening and decolonisation programme was associated with substantial decrease in clinical isolates of MRSA and use of systemic antibiotics for treatment. References 1)G Gopal Rao, P. Michalczyk, N Nayeem, G Walker, L Wigmore. Prevalence and risk factors for methicillin resistant *Staphylococcus aureus* (MRSA) in adult emergency admissions - a case for screening all patients? *J Hosp Infect* 2007;66: 15-21

P25

Septicaemia in neonates caused by *Acinetobacter ursingii*

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Neonatal infections can be caused by a lot of different micro-organisms, however, to our knowledge, *Acinetobacter ursingii*, newly described member of the genus *Acinetobacter*, has not yet been reported. During two months, three premature babies were admitted and treated in the NICU, University of Szeged, having nosocomial infection caused by *A. ursingii*. Our aims were to show these cases, to characterize the epidemiological background of the isolated strains, and to find the common source of this bacterium. During septic phases, 6 blood samples were taken from the mentioned 3 infants (4 samples in patient 3 at different time) and incubated at 37°C until the positive signal. In all cases, Gram-negative coccobacilli could be isolated. ERIC1-2 PCR typing and plasmid purification were carried out to compare these strains. To identify the species, partial 16S rDNA sequence of a representative isolate was determined. The generated sequence was compared to all sequences in the GenBank database by the Blast client program and BIBI software. The results of molecular typing method clarified that the isolated strains are epidemiologically related. 16S rDNA sequence analysis revealed that these strains belonged to *Acinetobacter* genus and their sequence showed 100% similarity to the sequences of *A. ursingii* control strains in the database. In all cases, numerous risk factors were present facilitating the development of nosocomial infection caused by *A. ursingii*, but our attempt to find the common source of the infections was unsuccessful.

P26

Occupational hazards in the dentistry

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Occupational hazard can be defined as a risk to a person usually arising out of employment. It can also refer to a work, material, substance, process, or situation that predisposes, or itself causes accidents or disease, at a work place. In carrying out their professional work, dentists are exposed to a number of occupational hazards. These cause the appearance of various ailments, specific to the profession, which develop and intensify with years. In many cases they resulted to the diseases and disease complexes, some of which are regarded as occupational illnesses. Close contact with the patients, with their saliva and blood, exposes the dentist to occupational biohazards, mainly of the contagious kind. The occupational hazards found among dentists and other clinical dental workers are similar worldwide and include a wide range of risks and sometimes even legal hazards. The source of these hazards is the work environment which can include physical, chemical, biological, mechanical, and social aspects.

The present paper discusses about selected occupational hazards-occupational biohazards, stressful situations, and latex hypersensitivity, as well as factors leading to the musculoskeletal system diseases and diseases of the peripheral nervous system.

Key Words: Dentistry, Occupational hazards

**P27****When sinks become your source!***Hirji Z., Dedier H., Vicencio E., Hota S., Stockton K., Gardam M.A.*
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Objective: To describe an outbreak of multidrug resistant (MDR) *Pseudomonas aeruginosa* involving the intensive care (ICU) and transplant units of a large tertiary hospital. **Methods:** Lab-based surveillance confirmed increased MDR *P. aeruginosa* isolates resistant to all antimicrobials except amikacin and colistin in transplant and ICU patients. Environmental sampling of patient rooms, equipment and supplies was conducted. Strains were compared using pulse field gel electrophoresis (PFGE). Effective control measures included contact precautions, closing the hand hygiene (HH) sinks, minor renovation of sinks, installation of splash guards, and education about proper HH sink usage. **Results:** Between December 2004 and March 2007, 31 patients were colonized or infected with 2 outbreak strains of MDR *P. aeruginosa*. Environmental sampling identified the same organism in 18 HH sink drains on these units. Factors contributing to the outbreak included, poor sink design causing environmental contamination and poor staff practice with HH sinks. Closing the HH sinks stopped the outbreak. Sink spouts and drain traps were replaced and splash guards were installed to prevent contamination of work surfaces. No new cases have been reported since these measures were put into place. **Conclusion:** Simple flaws in sink design and inappropriate sink use caused the outbreak. Tracking the epidemiology of the outbreak was difficult because of the high risk population being transferred between multiple units.

P28**Device related hospital infections at general surgery intensive care unit of dicle university hospital***Geyik M.F., Ustun C., Hosoglu S., Celen M.K., Ayaz C.*
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Objective: The aim of this study was to evaluate device-related infections (DRI) rate at General Surgery Intensive Care Unit (GS-ICU) at Dicle University Hospital. **Patients and Methods:** A prospective surveillance of DRI throughout the General Surgery Intensive Care Unit by using the definitions of the Centers for Disease Control and Prevention (CDC) and National Nosocomial Surveillance System (NNIS). DRI rates were calculated as the number of infections per 1,000-device-days. The proportion of device usage was calculated as device-days/patient-days. **Results:** During the one year period of 2006, 420 patients were followed up at the GS-ICU. Forty-four hospital infections episodes were detected in 43 patients. From in these infections 22 DRIs were identified (50%). Of 22 DRIs, 12 mechanical ventilator associated pneumonia (VAP) (54.5%), five were urinary tract infections (URIs) (22.7%), and five central venous catheter infections (22.7%). Device usage proportions were 35.7% for CVC, 65.1 for urinary catheters and 13.2 for mechanical ventilators. The rate of DRIs (infection/1,000-device-day) were 3.3 for CVC related bacteremia, 1.8 for urinary infection and 21.3 for VAP. **Conclusions:** These data show the need for more-effective infection control program at General Surgery Intensive Care Unit. The rate of VAP is higher than NNIS comparable U. S. ICUs.

P29**A Devastating Outbreak of *Acinetobacter baumannii* Bloodstream Infections in a Neonatal Intensive Care Unit in Diyarbakir, Turkey***Salih Hosoglu, Medine Hascuhadar, Ekrem Yafar, Sinan Uslu, Bedri Akbudak*
Dicle University Hospital and Diyarbakir Children Hospital

We studied an outbreak of a multi-drug resistant clone of *Acinetobacter baumannii* in the Neonatal Intensive Care Unit of Diyarbakir Children Hospital Diyarbakir city center, Turkey, from December 2006 to April 2007. We analyzed the risk factor for *Acinetobacter* bloodstream infections (BSI) with a case-control study. Forty-five neonates who developed multi-drug resistant *A. baumannii* nosocomial BSIs were matched to 90 neonates who were admitted to the same unit and did not develop an

infection during the outbreak period. Thirty-nine out of the 45 neonates died (86.7%). Epidemiological investigation included molecular typing, using pulsed field gel electrophoresis. Environmental and healthcare worker hand cultures were positive in the NICU. The same clone was brought into the unit by an infected patient who was transferred from another hospital. All isolates recovered from these 45 patients had same antibiotic susceptibility pattern and all of them were susceptible only to imipenem/cilastatin and netilmicyne. The group led us to conclude that several factors contributed to infection with *A. baumannii*. The risk factors associated to *Acinetobacter* BSI were intubation ($p=0.004$) and re-intubation ($p=0.000$). None of the following factors was associated with AB-BSI: sex, age, birth weight, gestational age, diagnosis, Apgar score, catheter use and before antibiotic use. **Conclusion:** AB-BSI is a serious complication in neonates, breaks in aseptic techniques may facilitate transmission from the environment to the patient. Prevention of *Acinetobacter* BSI should be an infection control priority in the NICU.

P30**The Value of Point Prevalence Surveillance of Healthcare-Related Infections***Salih Hosoglu, Cemal Üstün, Mehmet Faruk Geyik, Zafer Parlak, Celal Ayaz*
Dicle University Hospital

Objective: The aim of this study was to assess the value of repeated point-prevalence surveillance study and compare this method with conventional prospective surveillance method at Dicle University Hospital (DUH) during the 2006 year. **Material and Methods:** For comparison, periodic point-prevalence surveys and active incidence studies were conducted during the 2006 year. Each Wednesday, an infection control team reviewed all clinical records of all patients present that day to identify those with healthcare infections. For each day on which a point prevalence survey was conducted, a healthcare-related infection (HRI) rate was calculated for the entire hospital and for each clinical area. **Results:** During the study period in the 2006 year, 602 HRIs in 545 patients were detected by the active surveillance method. HRIs rate was 1.5% and incidence rate was 2,4/1,000-patient-day. At the same period, 1,287 healthcare-related infections were detected from 37,466 patients by repeated point-prevalence surveys. The repetition rate of same case was found as 2.36 times. The average time of hospital duration was 31 ± 25 days for these patients. Neurology had the highest HRI rate followed by Departments Reanimation unit of and Burn unit. The average of HRIs was 3.4% for all departments. According to the point prevalence surveillance results, the HRI rate was 4.3% in surgical wards and 2.5 in medical wards. The most prevalent infections were found as pneumonia, urinary tract infections and surgical site infections in this period. **Conclusion:** Repeated point prevalence surveillance is a useful and easy method for following of Healthcare-related infections.

P31**Neonatal Intensive Care Unit: Three-Year-Surveillance Results***Knoll M., Lieser U., Haase R., Wittek S., Körholz D., Borneff-Lipp M.*
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Background: According to the German Infection Law (IfSG) operators of hospitals are obliged to register hospital acquired infections. Data collection is standardized by an assessment instrument named NEO-KISS and was developed by the German National Reference Centre for Surveillance of Nosocomial Infections (NRZ), Berlin in 2000. This instrument is meant to disburden neonatological intensive care units to determine their state of quality. Comparisons to a published reference value were the aim of the studying order to analyze surveillance data. **Patients and Methods:** Patients were included in the study according to the birth weight (categories <499g, 500g-999g and 1000g-1499g). Days of patients stay, days of devices usage (e.g. central venous catheter [CVC], peripherally inserted central catheter [PICC], intubation, controlled tracheal respiration [CPAP]) and days of antibiotic usage were registered. In dependence on the NRZ module NEO-KISS those hospital acquired infections registered over three years (01.07.2002 and 31.06.2005) were evaluated. In accordance infection control measures were adapted sequentially. **Results:** Three types of illnesses could be confirmed: pneumonia, primary sepsis and necrotizing enterocolitis (NEC). Furthermore device application rates,



device associated infection rates and density of incidence were determined. These results turned out to be within the reference values published by the NRZ (NRZ 2006). However, increased values above these reference data were determined for device application rates, namely application rate of CVC and intubation (25% quantile). Also, the antibiotic application rate and the pneumonia density of incidence of all three weight groups was increased (25% quantile). This was true also for the intubation associated infection rate (weight group 1000-1499g) and for the CPAP associated infection rate (weight group 500-999g and weight group 1000-1499g), as well (25% quantile). Compared to the reference groups (median) all increased values have been between 25% quantile and 50% quantile (= median). Conclusion: Surveillance of hospital acquired infections is an assessment instrument to determine the quality standard to be compared to a nationwide reference values. Furthermore the application of devices and antibiotics can be determined in the context of stated hospital acquired infections. Low infection rates may be caused by highly usage of antibiotics. Voluntary benchmarking within the framework of quality development (for example, based on result quality belonging to EFQM system) is a chance to pediatricists for controlling. Implementing surveillance systems the requirements of quality management can be met by learning from expert excellence for the benefit of all patients.

P32 Transparency of the costs of nosocomial infections

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Background: Nosocomial infection cause costs which could have negative effects on economic-oriented hospitals. Objective: The objectives of this clinical study are to show the costs of selected nosocomial infection. Hypothesis: The costs of diagnosis and therapy of nosocomial infection exceed the financial adjustment of the German-Diagnosis Related Groups (G-DRG). These result in a loss on the hospital's part being affected cost-cuttingly by hygienic prevention. Design and Setting: We decided on a descriptive design with prospective and retrospective parts. The surgical ward, setting of this study, is part of a university hospital (maximal supply, categorized in Germany as supply standard IV). Methods: A surgical site infection A1-A3 has been defined in accordance with the Centers for Disease Control and Prevention (CDC). The measures of diagnosis and therapy of the duration of stay of patients with nosocomial infection have been documented. Data has been collected about a period of eighteen month (between 1st July 2003 and 31st Dec 2004) Results: Data of 58 patients with at least one nosocomial infection has been documented. Corresponding to the CDC-criteria 30 patients with an A1-, 8 patients with an A2- and 25 patients with an A3- infection have been classified. 26 of the 58 patients had had another operation because of the nosocomial infection. 17 of the 58 patients with nosocomial infection had had to be hospitalized again. Discussion: The patients of a university hospital are mostly of old age who suffer from polymorbidity. Comparable studies show that elderly patients enduring polymorbidity are susceptible to the occurrence of nosocomial infection. Consequently, a significant distortion in contrast to, for instance, a hospital of minimal supply (categorized in Germany as supply standard I) is to be expected. Conclusion: First results of this continuous study indicate higher costs of diagnosis and therapy of patients with nosocomial infection. The further course of this study will show if the costs of patients with nosocomial infection may be considerably higher than the costs of patients without nosocomial infection.

P33 Surgical site infection surveillance for colon surgery in Szent Rókus Hospital

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Objective: To determine surgical infection rates and appropriateness of perioperative antibiotic prophylaxis for colon surgery in 2 periods of 6 month. Setting: Non-teaching hospital in Budapest, Hungary, 78 beds general surgery department. Methods: We joined National Nosocomial Surveillance Network of Hungary (NNSR), that is based on Center for Diseases Control and Prevention definitions and methodology. Active, prospective surgical site infection (SSI) surveillance was conducted in 2

periods: from October 2005 to March 2006 and October 2006 to March 2007 for colon surgery. In the studied periods we evaluated choice and duration of perioperative antibiotic prophylaxis (PAP)used for colon surgery. Results: In the 2 surveillance periods 313 patients were included in the study and 18 SSIs occurred. Deficiencies identified during the first surveillance period were corrected, and SSI rates of the second period were 27% lower than in the first period. Inappropriateness in PAP identified in the first surveillance period were feedbacked. As result of intervention use of antibiotics declined significantly. Conclusion: With active, prospective surveillance we reduced SSI rates and use of antibiotics.

P34 Five years of hospital district-wide prevalence surveys of healthcare-associated infections (HAIs) in Southwest Finland

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Background: The Hospital District of Southwest Finland consists of a University Hospital (UH) and five district hospitals (DHs) with 1676 bedplaces. Repeated prevalence surveys were performed in the hospitals as a way to register the effect of intensified hospital hygiene efforts during the years 2001-2005. Objectives: To assess the magnitude and characteristics of HAIs in the district and to establish prevalence surveys as a useful method for routine surveillance. Methods: Prevalence study was performed in each DH once a year, and twice a year in the UH. HAIs were classified according to the modified CDC definitions. Results: 13% (1120/8635) of all patients had HAI. The overall prevalence rate was 14.9% (1289/8635). 81.7% of all HAIs originated from the surveyed hospital. The most frequent HAIs in UH were surgical-site infection (21.8%), pneumonia (19.7%) and bloodstream infection (16.9%) while the most common HAIs in DHs were UTI (26.3%), pneumonia (24.9%) and surgical-site infection (18.5%). The rate of antibiotic use was 37.6% of all patients on the prevalence days. The overall reduction of HAIs during the study period was 33.8%. Conclusion: Prevalence surveillance showed that HAIs are more frequent than expected. High risk wards and procedures were identified and intensified infection control measures were performed. A new IT-system has been developed as a part of the incidence surveillance system (SAI) to make data collection and analysis easier.

Keywords: prevalence surveillance, healthcare-associated infection.

P35 Detection of Nosocomial Outbreaks by Using Control Charts

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The surveillance of incidence rates is essential to the outbreak investigation, and the aim of our study was to apply the control chart as an automatic, efficient surveillance tool for the incidence rates. All nosocomial urinary tract infections, respiratory tract infections, primary bloodstream infections and surgical site infections occurred in a medical center in Taiwan between July 2005 and April 2006 were used to validate the control charts. There were five potential outbreaks, accounted for 0.46% of all nosocomial infections. The sensitivities of control charts ranged from 0% to 60%, the specificities ranged from 85.3% to 97.61%, and the positive prediction values ranged from 0% to 1.82%. The Half-Sum-transformed FIR-CUSUM charts with monthly incidence density by ward and infection site outperformed others, the sensitivity was 60%, and the specificity was 90.67%. With weekly infection counts, the EWMA chart and the FIR-EWMA chart discovered one potential outbreak not detected by the infection control professional, and the sensitivity and specificity were 50% and 85.62%, respectively. Excluding the unrelated infections through temporal and geographical analysis, the positive prediction values were improved without reducing the sensitivities. Because the sizes of all potential outbreaks limited to 2 or 3 cases, using control charts alone can't detect all of them. The control charts could detect one potential outbreak not detected by routine surveillance, but the positive prediction values were too low. To encourage the further application in practices, we can tune the parameters to the seasonal fluctuations, and incorporate the microbiology reports to exclude the unrelated infections.

**P36****Multi drug resistant germs isolated from high risk departments in the South-Western part of Romania***Licker M.¹, Branzeu C.², Ionita H.³, Anghel A.¹, Baditoiu L.¹, Hogeia E.¹, Zugravu R.¹, Berceanu-Vaduva D.¹, Moldovan R.¹*¹University of Medicine and Pharmacy "Victor Babes" Timisoara, Romania, ²Timisoara County Hospital, ³Timisoara Municipal Hospital

Purpose: The aim of our study was to determine the prevalence of most important phenotypes of multi drug resistant (MDR) strains isolated in patients hospitalized in high risk departments. Methods: Germs were identified using the API system (BioMerieux France) and antimicrobial susceptibility was performed by disk - diffusion (CLSI standards) with automatic reading methods (Osiris -Bio Rad Laboratories). We classified these germs according to their phenotypic patterns. ESBL production was assessed by disk synergy tests and PCR-SHV and TEM genes identification. For *Pseudomonas* spp. we identified Oxa group 1 genes. Results: From 2198 samples collected during a period of 2 years (2004-2006) from intensive care units, surgery, oncology and hematology departments, we isolated 807 microbial strains with nosocomial potential. Of these, 107 were ESBL producing enterobacteria (27.48%), 19 ESBL *Pseudomonas aeruginosa* OXA group 1 + (25%), 53 MRSA (25.73%) and 12 MRCNS strains (70.59%). Both bla SHV and bla TEM genes were present in 81.67% of all *Klebsiella pneumoniae* strains, 18.33% of these presenting only bla SHV. Isolated positivity for bla TEM gene was found in 40.91%, while 13.64% of *E.coli* strains only carried the bla SHV gene. Only one strain was positive for both genes (4.55%). Positivity for bla OXA group 1 was detected in 19 of the 21 ESBL producing *Pseudomonas aeruginosa* strains (90.45%). Conclusions: This high prevalence of MDR germs enforces the input of a rational policy in prescribing antibiotics in each hospital and for better team work of the infection control staff.

P37**Health Care Worker's Needlestick and Other Sharps- Related Injuries at Hospital and Their Prevention***R. Lukianskyte, L. Radziunaite*
Kaunas District Hospital

The aim: to evaluate the occurrence of needlestick and other sharps-related injuries of health care workers. Methods: the health care workers belonging to higher risk group participated in the study. Total of 320 questionnaires were handed out, 280 of them returned. Frequency of replies - 88%. The analysis of the survey data was conducted using the statistical data analysis package "SPSS". Results. Needlestick and other sharps-related injuries were experienced by 53.2% of the questioned employees. Most of the needlestick and other sharps-related injuries occurred during the process of injection and the main reason was hastiness and lack of accuracy. Most often nurses had needlestick and other sharps-related injuries in the procedure-room (68.3%), whereas doctors - in the operating-room (70%). 47% of health care workers were injured by the instruments used for patient's cure. Conclusions. 1) More than half of the health care workers had needlestick and other sharps-related injuries at their job. The most common injuries were experienced during injections, and the main reasons of injuries were lack of accuracy and hastiness as well as work overload. 2) Needlestick and other sharps-related injuries registration at hospital is carried out ineffectively - more than two thirds of the respondents did not register them. Nurses registered needlestick and other sharps-related injuries more often than doctors and were better aware of the procedures of injury registration ($p<0,05$). 3) It was revealed that the highest risk of micro-injuries is among general practice nurses, middle aged workers, in the surgeries and procedure-rooms, working with instruments tainted with patient's blood ($p<0,05$).

P38**Second national prevalence study of nosocomial infections in Serbia***Markovic-Denic Lj., Milic N., Jankovic M., Knezevic T.*
Institute of Public Health of Serbia

Although infection control committee and infection control program for each hospital were legally introduced several years ago in Serbian hospi-

tals, national nosocomial infection surveillance has just recently been established in Serbia. Prevalence study is the first, simple, cheap and fast method that provides the information about nosocomial infections (NI). Aim: To determine the prevalence of NIs in Serbian hospitals. Methods: The national prevalence study was conducted in May 2005 in 56 acute care hospitals. The participation of hospitals was voluntary. The study was performed by following the CDC guidelines (Atlanta). Results: The overall prevalence rate of NIs was 3.1% (521/16,512) and prevalence of the patients with NIs was 3.5% (580/16,512). The overall prevalence per survey varied from 0.2% to 13.1%. The highest prevalence occurred in intensive care units (5.5%), urology (4.8%) and surgical departments (3.9). Urinary tract infections were the most common NI (29.0%), followed by surgical site infections (SSI) (24.3%) and sepsis (8.1%). NIs were more frequent in males ($p<0.01$). The prevalence rate of patients with SSIs in clean surgical procedures was 1.3% and in clean-contaminated 3.3%. 67.48% of NI had microbiological confirmation. The most frequently reported isolates were *Staphylococcus aureus* (14.2%), *Escherichia coli* (11.2%), *Pseudomonas aeruginosa* (10.6%), and *Enterococcus* spp. (9.0%). Conclusion: Even though comparisons must be made with great caution, the prevalence of NIs was lower than in the first national prevalence study, mainly due to lower rates in clinical centers where infection control measures are widely in used.

P39**The differences in the knowledge level about hospital infections between medical students following old and new education programs***Ljiljana Markovic-Denic¹, Jadranka Maksimovic¹, Olivera Sbutegal¹, Isidora Sbutegal¹, Aleksandar Lebi²*¹Institute Of Epidemiology, School of Medicine, Belgrad ²Institute for Orthopaedic Surgery and Traumatology, Belgrade, School of Medicine

Introduction: Like the health care workers, medical students have to go through clinical practices. Proper behavior regarding infection control may be learned during their preclinical and clinical training. Objective: The aim of this survey was to investigate the differences in the knowledge level about hospital infections (HI) between medical students who had old and new education programs. Methods: Two cross-sectional studies were conducted in January 2000 and 2007 at the Faculty of Medicine in Belgrade, Serbia. Anonymous self-administrated questionnaires were distributed to all third year students. In 2000, students followed the "old" system of education, and in 2007 they have followed the new curriculum according to the Bologna Process. The questionnaire consisted of 21 fixed-choice questions. The information collected included students' age, gender, previous education, knowledge of HI, infection control and perception of risk for health-care professionals. Results: Questionnaires were answered and returned by 79.8% (517/648) students who had the "old" education program and 71.9% (271/377) "new" curriculum students. Students who had the new program knew more than students who had old one about definition of HI ($\chi^2=60.0$ $p<0.001$), their reservoirs ($\chi^2=7.7$ $p<0.05$), importance of endogenous reservoirs of HI ($\chi^2=11.7$ $p<0.001$), etiology ($\chi^2=28.2$ $p<0.001$), transmission ($\chi^2=12.9$ $p<0.001$) and prevention ($\chi^2=147.9$ $p<0.001$) of HI. A great number of students (70.7%) who followed the old program and 45.7% students who attended the new one suggested a need to increase their knowledge level of HI ($\chi^2=50.6$ $DF=2$ $p<0.001$). Conclusion: Knowledge about HI is improved by theoretical and practical sessions during early clinical training by the Bologna curriculum.

P40**Healthcare Associated Infection (HCAI): what can make a difference?***Alex Mears*
Healthcare Commission

Healthcare Associated Infection (HCAI) is a serious problem for health services, and is a priority for government agencies and National Health Service (NHS) trusts alike. The aim of this study was to investigate the practice-related factors that are linked to lower rates of Healthcare Associated Infection (HCAI) in English acute hospitals. A questionnaire tool was sent to all acute NHS trusts in England. Resulting data were analysed with key outcome measures for MRSA and *C.difficile*, as well as other national indicators. Lower rates of *C.difficile* infection were related to good antimicrobial prescribing practice, infection surveillance, and cleanliness. Lower rates of MRSA infection were related to handwashing



and provision of isolation facilities. Overall, a relationship was found between strategic, planned interventions and lower infection rates. We also found negative relationships for some other processes. There are key findings related to each type of infection. Strategic, planned interventions (indicative perhaps of an embedded culture of infection control) are linked to lower infection rates. Other interventions might be termed 'reactive practice', initiatives possibly introduced following an outbreak (ie training provision).

- Improve antimicrobial practising,
- Develop infection surveillance
- Improve cleanliness
- Encourage handwashing
- Provision for isolation facilities
- Embed infection control within trust culture

P41 Positive Mycobacterium tuberculosis PCR due to an inadequate decontaminated bronchoscope

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Background: Many guidelines have pointed at the problems associated with endoscope decontamination. We describe a case of presumed tuberculosis in an immunocompromised patient due to an inadequate cleaned bronchoscope.

Case description: A broncho alveolar lavage (BAL) was performed in a patient with pulmonary symptoms and concurrent use of immunosuppressive drugs for M.Wegener. DNA of Mycobacterium tuberculosis was detected by PCR. Consecutive specimens were PCR negative, so diagnosis of tuberculosis was rejected. An investigation showed that the bronchoscope used was probably the source of the positive PCR. It was used directly after a strongly positive patient.

Discussion: Since two weeks a new brand of bronchoscopes (Pentax®) were in use. Only the suction and biopsy channel were connected to the automated endoscope reprocessor (AER Wassenburg®), while the air channel was covered with a lid. This resulted in a low flow of the cleaning agent and the disinfectant in the bronchoscope head which was considered as the cause of the false positive PCR. Connecting all three channels to the AER, as we were used to do with the Olympus® endoscopes solved the problem. After 10 weeks all cultures were negative, so the positive PCR had shown DNA of non-viable bacteria.

Conclusions: The cause of the positive PCR was an inadequately cleaned bronchoscope. Although disinfection was effectively reached, DNA was still present. The PCR showed no viable bacteria in this case. New types of endoscopes have to pass department infection prevention to guarantee that endoscopes can be properly cleaned and disinfected. To use PCR tests on BAL fluids effective DNA removal is clearly needed.

P42 Outbreak of MRSA in a nursing home

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Haugesund sjukehus and Vindafjord Commune

We have had a minor outbreak of MRSA in a nursing home in the west of Norway from 2004- 2005. Long term colonization of 2 residents have lead to great challenges in organizing and accomplishing the infection control measures recommended by our national authorities. We have made 2 posters in which we wish to focus on how this outbreak was handled locally, and focus on some of the consequences an outbreak like this could have if one follows our national guidances for handling MRSA outbreaks. Poster 1 shows what happened and what we did, poster 2 shows more the consequences and some reflections on being isolated for a longer period of time for employees, patients and relatives.

P43 Improvements in infection control after caesarean section at a university hospital in Gran Canaria, Spain

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Objectives: To determine the extent of improvement in infection control on women undergoing caesarean section.

Methods: Design: Prospective study on the incidence of nosocomial infections in all women with caesarean section in 4 periods: P1, June-November, 2000; P2: June-November, 2003; P3: January-March 2006; P4: November-December, 2006. P1 was considered as the reference period.

Surveillance: Patients were followed through hospital stay, from the intervention day to delivery. NISS index to stratify risk and CDC criteria for nosocomial infections diagnosis were used.

Interventions: Feed-back on the results of surveillance. Guidelines revision of perioperative antibiotic prophylaxis (PAP).

Results: We observed an increase in NNIS index risk over time (NISS ≥ 1 : 21,5% in P1; 24,7% in P4; p value for trend, 0.10).

Hospital stay lowered from 7,3 days in P1 to 5,6 days in P4 (p<0,01). High levels of inadequate PAP were observed in P1, P2 y P3 whereas only 7,3% were classified as inadequate in P4. Incidence rate of surgical site infection (SSI) was clearly improved from 4,0% in P1 to 2,1% in P4. 4,4% and 1,7% of women had urinary tract infection in P1 and P2 respectively, whereas none of such infections were observed in P3 and P4.

Conclusions:

1. Most of women were classified in NNIS-risk category 0, but the risk was greater over time.
2. The percentage of adequate PAP was highly improved.
3. After implementing infection control measures the incidence rate of SSI was lowered, and no urinary tract infections were observed.

P44 Antimicrobial Resistance of Staphylococcus aureus Isolated from Rafsanjan Clinical Laboratories, IRAN

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Background: Antimicrobial resistance rate varies depending on the countries and even on the hospitals due to the extent of antimicrobial selective pressure. A rapid increase of antimicrobial-resistant bacteria especially Staphylococcus aureus, has become a serious problem in Iran. The study was aimed to determine the prevalence of resistance among Staphylococcus aureus isolated in 2005, from Rafsanjan clinical laboratories, Iran. **Methods:** Routine susceptibility data for Staphylococcus aureus in 2005, were collected from 4 university laboratories, Rafsanjan, Iran. Antimicrobial susceptibilities were tested and the data were interpreted using NCCLS guidelines. **Results:** The proportions of methicillin-resistant Staphylococcus aureus (MRSA) were %27, of 63 total samples. But vancomycin or rifampin resistant strains were not detected. All strains of methicillin-sensitive Staphylococcus aureus (MSSA) were sensitive to chloramphenicol, ciprofloxacin, cephalotin and cephalixin. **Conclusions:** The results show sensitivity of Staphylococcus aureus to antibiotics is decreasing in Iran, also it need more attention to MRSA as one the most agent isolated from patients. With the increasing prevalence of resistant bacteria, nationwide surveillance has become important for optimal management and the control of nosocomial infection.



P45 Evaluation of a dot-immunoblot assay for detecting leishmanial antigen in *Phlebotomus papatasi* (Diptera: Psychodidae) in Iran

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Leishmaniasis is a polymorphic disease of the skin and viscera caused by an intracellular Protozoan. Zoonotic Cutaneous Leishmaniasis (ZCL) is a major health problem in rural areas of Iran. A simple and highly reproducible dot-immunoblot assay was developed to detect leishmanial antigen in *Phlebotomus papatasi* that were naturally infected with *Leishmania major*. The test was sensitive to as little as 10 ng of antigenic protein and also appeared to be specific, in that it gave a positive result with some *P. papatasi* (the primary vector of *L. major* in Iran) and *L. major* but not with *P. sergenti* or other pathogens. When used to investigate a large number of sandflies collected from areas of the Iran where cutaneous leishmaniasis is endemic, the assay appeared sufficiently sensitive and specific to detect the naturally infected insects. The simplicity, reproducibility, high sensitivity and high specificity of the assay should make it useful for field studies.

P46 Ultraviolet Sterilised Bed Room Air Protects Patients Against MRSA

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The frequent contamination of hospitals with MRSA is a risk for patients. MRSA becomes easily air borne following normal patient care. Consequently, the patient may be colonised. Hypothesis: ultraviolet light (Medixair Unit) can control MRSA contamination and cross infection in a clinical setting. Study design The case-control study defines "a case" as a single bed-room with one patient and a Medixair Unit - the "UV-room". The "control-room" is similar without UV light. Patient and room environment are screened for MRSA three times a week for eight weeks. Result: The analysis includes 23 set of patient-environment MRSA screening. In the "UV-room" and "control-room" MRSA was present in the environment in 39% versus 100% ($p < 0.001$), respectively and the patient's screening sets 0% versus 47% ($p = 0.001$), respectively. One control patient developed clinical MRSA infection. After the study the Medixair Unit was moved to the "control-room" and another 17 environmental screening sets were collected. The "UV-room" remained at the same level - 38% versus 23% ($p = 0.33$), while the Medixair Unit reduced MRSA from 100% to 47% ($p < 0.001$). Discussion and conclusion: This case-control study shows ultraviolet light's effectiveness in protecting patients by removing air borne MRSA. No patients in the "UV-room" got colonised with MRSA. It also showed that the effect on the environment lasted many weeks after the Medixair Unit was removed. It is speculated that Medixair may be used for providing makeshift isolation rooms in case of epidemics.

P47 The prevalence of Shiga toxin-producing *Escherichia coli* (STEC) in Children with Diarrhea in Mansoura University Children Hospital (MUCH)

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Five hundred and seventy children with Diarrhea in Mansoura University Children Hospital, and 50 healthy children as control group were investigated for the prevalence of Shiga toxin-producing *Escherichia coli* (STEC), then the isolated strains were further analysed to characterize their serotypes, virulence genes by PCR. We detected that *E. coli* O157 accounted for 3.5 % of acute diarrhea of the studied cases, isolated from both watery diarrhea (80%) and bloody diarrhea (20%). All confirmed *E. coli* O157:H7 strains in the present study were significantly associated with bloody diarrhea, monthly variation revealed that the isolation of *E. coli* O157 were highest in summer and early autumn than other seasons of the year. A considerable percentage of *E. coli* other than serotype O157 fails to ferment sorbitol and reliable on Sorbitol MacConkey agar

(SMAC) for detection of STEC of other serotypes is not specific, stx2 gene (346bp) was detected in 80 % and 100% of the isolated stains *E. coli* O157:Non Motile and *E. coli* O157:H7 strains, respectively. while stx1 gene was not detected. Children below 5 years, drinking raw/unpasteurized milk and contact with animal were considered as risk factors. We recommend culturing all stool specimens that contain blood as a routine on SMAC for early detection of *E. coli* O157, PCR analysis of primary fecal cultures is probably the most sensitive and specific means of screening for the presence of all STEC strains regardless serotype and other stx-carrying bacteria.

P48 Nosocomial infection in a Neonatal Care Unit at Mansoura University Children's Hospital, Egypt

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The nosocomial infections (NIs), causative organisms, and antimicrobial susceptibility patterns among neonates admitted to neonatal intensive care units (NICUs) at Mansoura University Children's Hospital, Egypt were studied retrospectively. Among 596 neonates, 147 were presented with nosocomial infection with 134 gave positive culture. Nosocomial Infection rate (NIR) / 100 discharge was 24.6% while Patients Infection rate (PIR) / 100 discharge was 22.48%. The most frequent NIs site were bloodstream infection (63.5%) followed by device related (13.3%) and wound infection (11.6%). *Klebsiella* sp. represent 25% of the isolates followed by MRSA by 13%. Vancomycin, imipenem, amikacin were the most efficient antibiotic in the unit by rates 100%, 72.9% and 57.7% respectively. While for gentamycin, augmentin (22.1%), unasyn 20%, 9.6% for cefaclor and cefotaxime, 4.3% for ceftriaxone, 2.5% for cefuroxime and no effect for ceftazidime. The most effective antibiotics against *Klebsiella* spp were imipenem, amikacin and azteronem respectively by 100%, 47%, 33.3%. For MRSA it was 100% and 26% against vancomycin and imipenem respectively. The efficacy of antibiotic was 100%, 68% and 66% for blood stream infection against vancomycin, meronem and imipenem, for device related infection it was 83.3%, 69% and 68% for Imipenem, azeteronem and amikacin respectively. An awareness of the prevalence and patterns of resistance among nosocomial pathogens is vital for the appropriate treatment of hospitalized patients, strict antibiotic policy are important in prevention of nosocomial transmission of resistant bacteria in the NICUs.

P49 Prevalence of Nosocomial Candiduria in a Neonatal Care Unit at Mansoura University Children's Hospital, Egypt

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It has been observed that nosocomial urinary tract infections have increased in the two last decades, probably due to many predisposing factors associated with occurrence of candiduria. The objective of this study was to determine the incidence and identify the possible predisposing factors for candiduria from neonates and children admitted to Mansoura University Children's Hospital. A total of 479 urine samples were obtained 351 from ICU patients and 119 from different wards at, the urinary specimens, sent from hospitalized patients, obtained within 72 hours were evaluated. Data such as sex, age, and variables as antibiotics, underlying diseases were collected. In vitro susceptibility was done. Candiduria (at least one urine culture that yielded > 10³ yeast colonies/ml) was diagnosed among 90 ICU patients (91.8%) and 8 non ICU cases (8.2%). The commonest predisposing factors were antibiotic therapy (94.9%), indwelling urinary catheter (89.8%), Diabetes (93.9%), using 3 invasive procedures (86.7%) and Parental feeding (91.8%). Both sex are approximately equal in the prevalence of infection female (51%) and males (49%). The most effective antifungal treatment were Amphotricin B (85%), followed by ketoconazole (60%) fluconazole (53.7%) and itraconazole (41%). The high frequency of candiduria and the possible predisposing factors found in ICU patients show that candiduria surveillance should be performed to help reducing nosocomial infections.

**P50**

The antibiotic susceptibility patterns of bacterial isolates: A survey from six University Affiliated Hospitals in Mansoura, Egypt

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Antimicrobial resistance among bacterial pathogens is a global problem, but in Egypt data are sparse. From Nov 2005-May 2007, a total of 9610 specimens were collected from 5127 patients, 3795 nosocomial infections were encountered from 2952 infected patients from whom 5177 organisms were isolated from 6 university affiliated hospitals in Mansoura, Egypt. Surgical site infection was the commonest site of infection (24%), with the most effective antibiotic were vancomycin, imipenem, amikacin, and meronem (97%, 86%, 82% and 80% respectively). Urinary tract infection (18%), the most active agents were imipenem, meronem, amikacin and vancomycin (93%, 88%, 88% and 84% respectively), against blood stream infection (15%) vancomycin, amikacin, imipenem and meronem (99%, 84%, 77% and 73% respectively) were. For pneumonia (11%) imipenem, vancomycin, amikacin, and meronem were the most effective (93%, 88%, 85% and 84% respectively) Imipenem was the most effective antibiotic against *Citr. sp.*, *E.coli*, *K. oxytoca*, *K. pneumoniae* and *enterococcus sp.* (92%, 97%, 96%, 96% and 83% respectively), while amikacin was the most effective against *P.mirabilis* and *P.aeruginosa* by 87% for each. Susceptibility of MRSA to vancomycin was 96%. The susceptibility of isolates of *Citrobacter sp.*, *E. coli*, *K.sp.*, *P.aeruginosa* *P.sp.* to ceftazidime was 2%, 9%, 6%, 5% and 10%, respectively. This suggests a potentially high rate of extended-spectrum β -lactamase (ESBL) and/or Amp-C enzyme production. The results obtained in this study offer indications for guiding empirical therapy and implementing specific interventions to fight antibiotic-resistant bacterial infections and their transmission in the hospitals.

P51

Needle stick injuries: epidemiological study in endoscopy unit: Mansoura Specialized Medical Hospital, Egypt

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The aim of the research is to characterize the epidemiology of needle stick injury (NSI) in health care workers (HCWs) in endoscopy unit, Mansoura Specialized Medical Hospital, Egypt. We surveyed HCWs by face to face interviewing. HCWs were interviewed regarding needle stick injury in the previous year, job category, area of work, years of employment, liver function testing, immunization history. Out of 33 HCWs in the unit 16 (12 males and 4 females) were only responding to the questionnaire. Statistically significant data were obtained between nursing and blood spillage ($p < 0.001$), needle prick exposure among nurses ($p < 0.05$). Out of HCWs 11 nurses (100%), 1 doctor (50%) and 3 workers (100%) were victim of NSI. Percentage of blood spillage exposure were more among all nurses, doctors in the study and one worker. Frequent needle prick were detected among 93%, in the hand among in 87.5%, history of deep pricks was obtained among 56%. Knowledge about risk of NSI were perfect in only 18.8%, moderate 75% and no knowledge among 6.3%. No history of Hepatitis markers testing were detected among 56% of the studied group, only 20% had a history of hepatitis B (HBV) vaccination. Although the number of the studied group is small, but it suggests that NSI are an important workplace hazard in the endoscopy unit, immunization and educational efforts should be made along with better designs of devices to reduce the risk of infection. Further studies will continue.

P52

Antibacterial effect of african indigenous honey on some selected pathogenic bacteria

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The honey obtained from farmer was evaluated for its antimicrobial potency in both its crude viscous state and diluted form. The test organisms (*Salmonella typhi*, *Shigella dysenteriae* and *Staphylococcus aureus*) were obtained from the State Specialist Hospital Akure Nigeria, in their pure forms. The crude honey showed high antibacterial activity over the test organisms with halos ranging from 4mm to 20mm. The diluted honey was sampled for its minimum inhibitory concentration (MIC) evaluation which however showed higher antimicrobial potency on the test organisms than its crude form. The MIC of the honey sample ranged from 1 to 7% (vol/vol) on the test organisms signifying its high potency. Meanwhile, the test organisms that were resistant to some of the commercial sensitivity discs were inhibited by the honey in both its crude and diluted form.

Keywords: Honey, antibacterial activity, crude form, MIC

P53

Surveillance results of nosocomial infections of the ICU in Kenézy Hospital, based on two years data

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According to data in the literature the number of nosocomial infections in the ICU is far higher than in non-ICU patients. As a result of improving lifesaving technologies the risk of nosocomial infections increases in ICUs. Utilization of epidemiological methods is recommended for the detection and follow up of nosocomial infections. Aims: A prospective surveillance to assess the epidemiology of nosocomial infections in an ICU. Methods: Kenézy Hospital is a county hospital with 1637 beds and a 16-bed central ICU. During the investigated period (01.04.2004-31.03.2006.) 1490 patients, with a total 8058 ICU days were hospitalised in the mixed medical-surgical ICU. The commonest primary diagnosis were respiratory failure, multiple trauma and head injury. Surveillance was performed by a trained infection control nurse and was supervised by an infection control physician and infectious disease physician. CDC definitions were used to define nosocomial infections. Results: A total of 194 nosocomial infections in 134 patients were detected during the study period. The overall incidence and incidence density of nosocomial infections were 13.0 per 100 patients and 24.0 per 1,000 patient-days. Respiratory tract infections (44.4%) were the most frequent nosocomial infection, followed by urinary tract (21.1%) and bloodstream infections (20.1%). Conclusions: Nosocomial surveillance is useful in detecting nosocomial infections in ICU. A multidisciplinary approach and partnership between the physicians and infection control nurses is needed. Patient-to-nurse ratio is an independent risk factor for nosocomial infections in intensive care, this must be kept in mind when planning rationalization of the number of nursing staff.

P54

Antibiotic resistance of group D Streptococcus (Enterococcus) in patients from community, hospital and long term care institutes

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Background: Enterococcus is a Gram positive bacterium often responsible for hospital acquired infections. Generally this microorganism is sensitive to Penicillin, but sometimes it may present some antibacterial resistances which make the treatment of the infections difficult. Aim of the work: we verified the level of antibacterial resistance of clinical isolates of Enterococcus from patients in hospital, long term care institutes



and subjects in community. Material and methods: the clinical samples sent from January to December 2006 to the Clinical Pathology Laboratory of the S.Orsola Fatebenefratelli Hospital have been sown in Blood agar plates (Bio Merieux code N. 43071), incubated in aerobiosis for 16-18 hours at 36.5 °C. The isolated bacterial colonies have been submitted to the biochemical identification and antibacterial susceptibility tests by Vitek 32 System (Bio Merieux). Statistical evaluation has been made by Fisher test. Results: the highest level of resistance has been found in Enterococci isolated from patients of long term care institutes, immediately followed by bacteria from hospitalized patients. Lower resistances were found in Enterococci isolated from subjects of the community. For 5 out of 13 evaluated antibacterial drugs, the differences between subjects of the community and hospitalized or in long term care patients were also statistically significant ($p < 0.1$). Conclusions: the resistance of Enterococci is not only a problem of the hospital but it is present also in long term care institutes different from hospital. The need of a strict surveillance by a more careful policy on antibiotic prescription is suggested also in these institutes, however ampicillin remains everywhere the most useful antibacterial drug against group D Streptococcus.

P55 Evaluation of efficacy of established "satelit model" as a control system in Clinical Center Skopje

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Macedonia, as most of developing countries, has not established organized control system of nosocomial infections, yet. Law and by law regulations in this field are insufficient. There is no national surveillance program with relevant data about the rate of nosocomial infections in the country. Annual reports to the ministry of health from incharged institutions for sanitary control in the hospitals (Republic/city institute for public health), are still consider as an infection control. This overlook the lack of proper educated personel in each level of health protection. Clinical Center in Skopje, has begun since 2003, with establishing as pilot model, multidisciplinary approach in infection control system. There has been implemented a spider network between Central Commission for Infection control (CCIC) and Infection Control Teams (ICT) in each clinic by "satelit model". This model was followed with education and implementation of completely new profile of nurse in Macedonia - Infection Control Nurse (ICN) with proper bylaw regulations. Pediatric Clinic has developed the best links and results in control system. Significant benefit was estimated by comparative analysis in period from 2002 - 2005, for the first half of each year. Measured parameters were: rate of infections, number of outbreaks, number of patients in each outbreak, number of days of hospitalization.

P56 Denial, media and endurance in infection control

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Nosocomial infections constitute an important public health problem in developing and transitional countries. Communicable diseases are a major health problem in Kosova. Fourty percent of inhospital mortality is among infants. Only half of population drink safe water. Per capita government expenditures in health care is only 35€.

Infection control in Kosova is in its infancy. Main challenges in this field are the lack of financial support and political commitment, inadequate number of trained personnel, overcrowded wards, poor management and technological gap.

In the past infection control activities were limited to passive monitoring activities. Nosocomial infections were denied or hide by hospital administrators. Many suggestions and proposals to prevent hospital infection rates were underestimated by hospital managers and stakeholders.

Public and massmedia had great impact on initiation of governmental activities in the field of safety and quality in health care institutions. Turning point in approach to infection control was pressure by mass-media after an MRSA outbreak in ICU during december 2005. Consequently, on May 2006 the Ministry of Health established National

Committee for Prevention and Control of Nosocomial Infections (NCPCNI).

Although with a budget of 0 €, small steps were made towards ensuring safer care in the hospitals. The activities in the field included: education of health care workers, written protocol on hand hygiene, initiation of immunization of health care workers with hepatitis B vaccine, donations and cooperation and donations from international infection control societies; translation in albanian of IFIC handbook (Infection control basic concepts and training), signed pledge of WHO (World alliance for patient safety) and research projects.

Future directions should be directed towards improvement of sterilization and disinfection practices, education of healthcare workers, occupational health, legislation, compiling policies on specific infection control and prevention issues and expanding international collaborative projects.

P57 Infection control of the prevention and the therapy of the pressure sore

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In our institute we have taken an interest in the pressure sore since 1994. We have been examining the efficaciousness of the prevention and the therapies for years, of which multidisciplinary functions were emphasized by the hospital surveillance which has been working since 1997. In our lecture we would like to present the efficiency of the infection control according to the prevention and the therapy of infections, caused by the pressure sore. We also analyzed the following facts: the frequency of inoculation used in the preceding years, the distribution of those pathogens that were indicated by inoculations and the efficiency of these therapies. In 2006 we registered 16 decubital cases, as nosocomial skin and soft tissue infections (these types were the 5,8 percent of the total nosocomial infections). According to the above cases, bacteriological sampling was made only in four cases. With analyzing these cases we would like to answer the emerging questions.

P58 Increasing Role of ESBL-producing Gram-negative Strains between Multidrug Resistant Organisms in a University Hospital

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Multidrug-resistant organisms (MDROs), including methicillin-resistant Staphylococcus aureus (MRSA) and Gram-negative bacilli: Extended-Spectrum-Beta-Lactamases (ESBL) and Metallo-Beta-Lactamase (MBL) producing organisms have important infection control significance all over the world.

Surveillance is a critically important component of any MDRO control program, allowing detection of newly emerging pathogens, monitoring epidemiologic trends, and measuring the effectiveness of interventions. We would like to introduce the incidence of these MDROs retrospectively between 2003-2007*. (*2007 is not a complete year, till 15th September) in our Clinical Center.

To prevent the transmission the importance of isolation and hand hygiene is outstanding.

P59 The Impact of Infection Control Measures in promoting safety of patients with MRSA - Bahrain

Rayees Zainab Al Bahrain

Introduction: Healthcare acquired infections are just one of many events that threaten patient safety in healthcare facilities. Infection control professionals are poised to assist staff and patients in reducing the risk of



this complication in the clinical setting. Methicillin Resistant Staphylococcus Aureus (MRSA) is an important cause of nosocomial infections worldwide that affect patient safety. In this paper I have studied and analyzed the persistent MRSA infection that represents a major problem in some of the critical care areas in Salmaniya Medical Complex-Bahrain. A comparison has been made in three critical care areas (ICU, burn unit, Medical ventilated ward). Objectives of The Study:

1. Measuring the incidence of MRSA infection in three critical care wards/ units (Intensive Care Unit, Burn Unit, Medical Ventilation Ward) in S.M.C.
2. Assess existing Infection Control nursing procedures/ policies to suite the standard of patient safety policies.
3. Promote and improve the quality of the HCW's practices as regards to MRSA. 4. Propose a protocol for reducing/ preventing the incidence of MRSA in order to maintain patient safety.

Methodology & Material: • Patients included • Departments included • Type of sample

Conclusion: In this study it was found that requisition of MRSA infection increases with age, With multiple hospital admission, with longer hospital stay, with more intubations, with malpractice

P60

Antibiotic usage in a Georgian hospital

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Introduction: There is scant published information in English describing in-hospital antibiotic usage using standardized metrics from hospitals in the Former Soviet States. The Academician Z. Tskhakaia West Georgian National Centre of Interventional Medicine, a 100 bed demonstration referral hospital serving adults only, was established in 2006. It is unusual among hospitals in the Former Soviet States in that all antimicrobials are provided by the hospital and are dispensed from a central pharmacy. Methods: We compiled antibiotic usage data describing monthly distribution of antibiotics by ward. Data were collected on the 50 most common antimicrobials identified in a survey of 130 US hospitals [Polk, et al, Clin Inf Dis 2007;44:664]. Denominator data were collected from computerized administration records. WHO Defined Daily Dosage analytic methods were used. Results: Between July 1, 2006 and March 31, 2007, 1938 patients stayed 10920 patient-days. Aggregate antimicrobial usage was 1221 DDDs/1000 pt-days [versus 792 in the Polk survey], 6797 in ICUs and 583 in non-ICUs. The 5 most commonly used antimicrobials were ceftriaxone 259 DDDs/1000 pt-days [45 in the Polk survey], cefuroxime 241, amikacin 197, cefepime 186, metronidazole 82. The last 4 drugs were not among the 10 most common drugs in the Polk survey. Antibiotics used tended to be those effective against the most resistant organisms. For instance, cephalosporin usage, classified by the ATC generation definition, was 0 1st generation, 34% 2nd, 39% 3rd, 27 4th. Conclusions: In a Georgian demonstration referral hospital, compared to US hospitals, there was increased usage of antibacterials and the usage spectrum was shifted toward advanced, highly potent antibacterials.

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Device-Associated Infection Rates, Extra Length of Stay, Mortality and Microorganism Profile in One Hospital of El Salvador. Findings of the International Nosocomial Infection Control Consortium (INICC)

Due & I de; as L.¹, Rosenthal V.D.², Bran-Casares A.C.¹, Jesús-Macucha L.¹
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Objective: To determine the rate, extra length of stay (LOS) and extra mortality of Device-associated infections (DAI) in a pediatric intensive care unit (ICU) of a hospital member of the INICC in El Salvador. Methods: Prospective cohort surveillance of device associated infection (DAI) was conducted on pediatric patients admitted to the ICU. INICC designed the protocol, forms and data uploading and analysis system. Data were gathered at the ICU. CDC-NNIS definitions were applied. Results: From 01/07 to 03/07 we enrolled 190 patients in the pediatric

ICU, representing 1,305 bed days. The overall DAI rate was 5.4 per 100 patients, and 11.2 per 1000 bed days. The CVC-BSI rate was 8.16 per 1000 CVC days, the VAP rate was 11.1 per 1000 device days, and the CA-UTI rate was 7.53 per 1000 catheter days. Overall 25.0% of all DAI were caused by Enterobacteriaceae infections, 25.0% were caused by Candida sp. and 50% by Pseudomonas sp. The LOS of patients without DAI was 5.3 days the LOS of patients with CVC-BSI was 18.6 days (RR, 3.48 95% CI, 2.81-4.31 P< 0.001), representing 13.3 extra days the LOS of patients with VAP was 20.3 days (RR, 3.80 95% CI, 3.18-4.53 P, < 0.001), representing 14.9 extra days and the LOS of patients with CA-UTI was 15.5 days (RR, 2.90 95% CI, 2.03-4.15 P, < 0.001), representing 10.2 extra days. Extra mortality for VAP was 28.6%, (RR, 2.44 P= 0.213) we did not calculate the extra mortality of patients with CVC-BSI and CA-UTI due the small sample size. Conclusion: This study has identified that CVC-BSI, VAP, and CA-UTI rates were high, and they increased from 10.2 to 14.9 days the length of stay of patients at the ICU.

P62

Probability of Developing a Central Vascular Catheter Associated Bloodstream Infection When Comparing Open and Closed Infusion Systems in Argentina

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Objective: Determine probability of developing central vascular catheter associated bloodstream infection (CVC-BSI) when comparing open (plastic semi rigid container) and closed infusion systems (Viaflex) in 4 ICUs in Argentina. Methods: An open label, prospective cohort, active healthcare-associated infection surveillance, sequential study was conducted in adults with CVC in place >24 hours. NNIS definitions were used for device-associated infections. Probability of developing CVC-BSI was compared between open and closed system periods. Time to first CVC-BSI was examined in sequential 3-day intervals and analyzed using log rank test and graphically using Kaplan Meier curves. Simple life table conditional probabilities are presented graphically to explain changing risk of CVC-BSI over time. Results: From Aug99 to Mar02, 979 patients were enrolled. Compliance with CVC site care (>86%) and hand hygiene (>66%) was achieved. Open period CVC-BSI rate was 10.0 CVC-BSI per 1000 CVC days and 3.5 during closed period (RR=0.34, 95% CI=0.15-0.77, P=0.007). Six clinical sepsis events occurred in open period versus zero in closed period. In closed period, conditional probability of acquiring a CVC-BSI was relatively constant (0.0% days 2-4 to 0.0% days 11-13). In open period, conditional probability of acquiring a CVC-BSI was higher in each interval compared to closed period, ranging from 2.3% days 2-4 to 1.0% days 11-13. Chance of a patient acquiring a CVC-BSI was significantly decreased (76%) in closed period (Cox proportional hazard ratio 0.24, P=0.001). Conclusion: Adoption of a closed infusion system resulted in significant reductions of cumulative probability of developing a CVC-BSI.

P63

Effectiveness of Outcome Surveillance for Reducing Ventilator-Associated Pneumonia and Mortality in a Hospital in India. Findings of the International Nosocomial Infection Control Consortium (INICC)

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Objective: To determine the effect of outcome and process surveillance (intervention) on the rate of ventilator associated pneumonia (VAP) and mortality in one ICU of New Delhi, India. Methods: Prospective cohort surveillance of DAI was conducted on adult patients. The protocol and forms design data uploading and data analysis was in charge of INICC. Data collection was performed in the participant ICU (Outcome Surveillance), and CDC-NNIS definitions were applied. Infection Control measures were applied based on CDC guidelines. The VAP rate and crude mortality rate during baseline was compared to the one during an intervention period. Results: From 07/04 to 07/05 3052 adult ICU patients were enrolled (1,169 in the baseline period and 1,883 in the intervention period). Patient's demographic characteristics were similar over the two



periods (Patient gender, $P = 0.3203$ Age, $P = 0.7478$). The incidence of VAP rate during the intervention period was significantly lower than during the baseline period (26.3 [45 VAP and 1,709 mechanical ventilator days] vs 10.9 [21 VAP and 1,923 mechanical ventilator days] VAP per 1000 MV days, $RR = 0.41$, 95% $CI = 0.25 - 0.70$, $P = 0.0005$). The percentage of patients with VAP during the intervention period was significantly lower than during the baseline period (3.8% [45/1,169] versus 1.1% [21/1,883] $P < 0.0001$). The crude unadjusted mortality rate was also significantly lower during the intervention period (1.7% [20/1,169] versus 0.5% [10/1,883] $RR = 0.31$, 95% $CI = 0.15 - 0.66$ $P = 0.0013$). Conclusion: Outcome surveillance and infection control measures resulted in a significant reduction of VAP rate and crude mortality.

P64

Effectiveness of Outcome and Process Surveillance for Reducing Device-Associated Infection Rates in a Hospital of Colombia. Findings of the INICC

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Objective: To determine the effect of outcome and process surveillance (intervention) on the device-associated infection (DAI) rate in one neonatal intensive care unit (ICU) of Bogotá, Colombia. Methods: Prospective cohort surveillance of DAI was conducted on neonatal patients. The protocol and forms design data uploading and data analysis was in charge of INICC. Data collection was performed in the participant ICU (Outcome Surveillance), and CDC-NNIS definitions were applied. Infection control measures based on CDC guidelines were applied. An Infection Control nurse observed and collected health care workers behavior (Process surveillance). The overall DAI rate during baseline was compared to the one during an intervention period. Results: From 10/04 to 11/05, 128 neonatal ICU patients were enrolled (47 in the baseline period from 10/04 to 02/05 and 81 in the intervention period from 03/05 to 11/05). Patient's demographic characteristics were similar over the two periods (Patient gender, $RR = 0.89$, 95% $CI = 0.55 - 1.43$, $P = 0.6347$ Mother's Age, $P = 0.3656$). Compliance with hand-washing was higher in the intervention period (75.1% vs. 85.5% [$RR = 1.14$, 95% $CI = 0.99 - 1.30$, P -value = 0.0610]), although the difference was not significant. The percentage of patients with DAI was significantly lower during the intervention period (21.3% [10 DAI and 47 patients] versus 6.2% [5 DAI and 81 patients] overall DAI percentage, $RR = 0.29$, 95% $CI = 0.10 - 0.85$, $P = 0.0161$). Conclusion: Outcome and Process surveillance, plus infection control measures, resulted in a significant reduction of the overall DAI rate, which was 71%.

P65

Effectiveness of Outcome Surveillance for Reducing Overall Nosocomial Infection Rates in a Hospital in Turkey. Findings of the International Nosocomial Infection Control Consortium (INICC)

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Objective: To determine the effect of outcome surveillance (intervention) on overall device-associated infections (DAI) rates in two intensive care units (ICUs) of Duzce, Turkey. Methods: Prospective cohort surveillance of DAI was conducted on adult patients. The protocol and forms design and data uploading and analysis were in charge of INICC. Data collection was performed in the participating ICU (Outcome Surveillance), and CDC-NNIS definitions were applied. Infection control measures based on CDC guidelines were applied. The rate of DAI during baseline was compared to the rate during an intervention period. Results: From 09/05 to 03/06, 72 adult ICU patients were enrolled (40 in the baseline period from 9/05 to 12/05, and 32 in the intervention period from 1/06 to 3/06). Patient's demographic characteristics and underlying diseases were similar over the two periods (Gender, $P = 0.8690$ Age, $P = 0.1818$ Angina Pectoris, $P = 0.2713$ COPD, $P = 0.2206$ Cancer, $P = 0.8743$ Renal impairment, $P = 0.5023$ Abdominal surgery, $P = 0.4338$ Trauma, $P =$

0.6926 Stroke, $P = 0.1175$ and Immunocompromise, $P = 0.0830$). The percentage of patients with DAI was significantly lower during the intervention period (55.0% [22 NI and 40 patients] versus 18.8% [6 infections and 32 patients] overall DAI percentage, $RR = 0.34$, 95% $CI = 0.14 - 0.84$, $P = 0.0142$). Conclusion: Outcome surveillance resulted in a significant reduction of the overall DAI rate.

P66

Effectiveness of Outcome Surveillance for Reducing Central Vascular Catheter-Associated Blood Stream Infection in a Hospital in Morocco. Findings of the International Nosocomial Infection Control Consortium (INICC)

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Objective: To determine the effect of outcome surveillance (intervention) on the rate of central vascular catheter associated blood stream infection (CVC-BSI) in one intensive care unit (ICUs) of Rabat, Morocco. Methods: Prospective cohort surveillance of DAI was conducted on adult patients. The protocol and forms design and data uploading and analysis were in charge of INICC. Data collection was performed in the participating ICU (Outcome Surveillance), and CDC-NNIS definitions were applied. Infection control measures were applied based on CDC guidelines. The rate of CVC-BSI during baseline was compared to the rate during an intervention period. Results: From 12/04 to 10/06, 826 adult ICU patients were enrolled (377 in the baseline period from 12/04 to 1/05 and 449 in the intervention period from 11/05 to 10/06). Patient's demographic characteristics and underlying diseases were similar over the two periods (Gender, $RR = 1.11$, 95% $CI = 0.91 - 1.34$, $P = 0.2950$ Age, $P = 0.8602$ Endocrine disease, $RR = 0.87$, 95% $CI = 0.61 - 1.23$, $P = 0.4271$ Cardiac Failure, $RR = 0.84$, 95% $CI = 0.41 - 1.72$, $P = 0.6317$ Angina pectoris, $RR = 0.67$, 95% $CI = 0.18 - 2.50$, $P = 0.5504$ Cardiac surgery, $RR = 2.52$, 95% $CI = 0.26 - 24.22$, $P = 0.4072$ COPD, $RR = 0.70$, 95% $CI = 0.42 - 1.19$, $P = 0.1850$ Cancer, $RR = 0.99$, 95% $CI = 0.44 - 2.21$, $P = 0.9849$ Renal impairment, $RR = 1.14$, 95% $CI = 0.57 - 2.27$, $P = 0.7105$ Hepatic failure, $RR = 0.54$, 95% $CI = 0.25 - 1.16$, $P = 0.1093$ Abdominal surgery, $RR = 1.01$, 95% $CI = 0.51 - 2.00$, $P = 0.9827$ Thoracic surgery, $RR = 1.68$, 95% $CI = 0.15 - 18.52$, $P = 0.6686$ Trauma, $RR = 0.84$, 95% $CI = 0.32 - 2.24$, $P = 0.7263$ Previous infections, $RR = 1.18$, 95% $CI = 0.85 - 1.64$, $P = 0.3129$ Stroke, $RR = 1.68$, 95% $CI = 0.63 - 4.47$, $P = 0.2944$ and Immunocompromise, $RR = 1.56$, 95% $CI = 0.62 - 3.91$, $P = 0.3393$). The incidence of CVC-BSI rate during the intervention period was significantly lower than during the baseline period (22.9 [12 CVC-BSI and 525 CVC days] versus 8.3 [6 CVC-BSI and 727 CVC days] CVC-BSI per 1000 CVC days, $RR = 0.36$, 95% $CI = 0.14 - 0.96$, $P = 0.0334$). Conclusion: Outcome surveillance and infection control measures resulted in a significant reduction of CVC-BSI rate.

P67

Effectiveness of Outcome Surveillance for Reducing Central Vascular Catheter-Associated Blood Stream Infection in a Hospital of India. Findings of the INICC

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Objective: To determine the effect of outcome surveillance (intervention) on the rate of central vascular catheter associated blood stream infection (CVC-BSI) in one intensive care unit (ICUs) of Mumbai, India. Methods: Prospective cohort surveillance of DAI was conducted on adult patients. The protocol and forms design and data uploading and analysis were in charge of INICC. Data collection was performed in the participating ICU (Outcome Surveillance), and CDC-NNIS definitions were applied. Infection control measures were applied based on CDC guidelines. The rate of CVC-BSI during baseline was compared to the rate during an intervention period. Results: From 07/05 to 03/07, 2,032 adult ICU patients were enrolled (737 in the baseline period from 7/05 to 2/06 and 1,295 in the intervention period from 3/06 to 3/07) Patient's demographics (Patient gender, $RR = 1.02$, 95% $CI = 0.92 - 1.14$, $P = 0.6868$ Age, $P = 0.2447$ Thoracic Surgery, $RR = 0.00$, 95% $CI =$



undefined, $P = 0.0608$ Previous Infection, $RR = 0.00$, $95\% CI =$ undefined, $P = 0.1849$) were similar over the two periods. The incidence of CVC-BSI rate during the intervention period was significantly lower than during the baseline period (12.0 [28 CVC-BSI and 2,332 CVC days] versus 5.05 [24 CVC-BSI and 4,749 CVC days] CVC-BSI per 1000 CVC days, $RR = 0.42$, $95\% CI = 0.24 - 0.73$, $P = 0.0013$). The percentage of patients with CVC-BSI was also significantly lower after the intervention period (3.8% [28 CVC-BSI and 737 patients] versus 1.9% [24 CVC-BSI and 1,295 patients]). Conclusion: Outcome surveillance and infection control measures resulted in a significant reduction of CVC-BSI rate, which was reduced 58%.

P68

Device-Associated Infection Rates, Extra Length of Stay, Mortality and Microorganism Profile in 13 Hospitals of Turkey. Findings of the International Nosocomial Infection Control Consortium (INICC)

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Objective: To determine the rate, extra length of stay (LOS) and extra mortality of Device-associated infections (DAI) in 14 ICUs of 13 hospitals members of the INICC in Turkey.

Methods: Prospective cohort surveillance of DAI was conducted on adult patients admitted to tertiary-care ICUs. INICC designed the protocol, forms and data uploading and analysis system. Data were gathered at the ICUs. CDC-NNIS definitions were applied.

Results: From 07/04 to 01/07, we enrolled 3,899 patients, representing 45,767 bed days. The overall DAI rate was 39.7 per 100 patients, and 33.8 per 1000 bed days.

The CVC-BSI rate was 16.5 per 1000 CVC days, the VAP rate was 25.8 per 1000 device days, and the CA-UTI rate was 8.1 per catheter days.

The LOS of patients without DAI was 6.6 days; of patients with CVC-BSI was 18.8 days ($P < 0.001$); LOS of those with VAP was 16.1 days ($P < 0.001$); and LOS of those with CA-UTI was 16.9 days ($P < 0.001$).

Extra mortality for VAP was 14.9%, ($P < 0.001$); for CVC-BSI, 5.0% ($P = 0.2166$); and for CAUTI, 5.9% ($P = 0.309$).

21.9% DAIs were caused by *Acinetobacter* sp; 19.0% by *S aureus*-89.3% of which were MRSA; 19.0% by Enterobacteriaceae -48.2% resistant to ceftriaxone, 52.0% to ceftazidime, and 30.0% to piperaciline tazobactam; 18.7% by *Pseudomonas* sp infections-51.1% resistant to ciprofloxacin, 50.3% to ceftazidime, 39.0% to imipenem, and 30.0% to piperaciline tazobactam; 12.6% by *Candida* sp; and 2.2% by *Enterococcus* sp.-1.9% resistant to vancomycin.

Conclusion: This study has identified that CVC-BSI, VAP, and CA-UTI rates are high, increased the LOS of patients, and VAP is significantly associated with higher mortality.

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Healthcare-associated Infection Rates, Extra Length of Stay, Mortality and Microorganism Profile in 12 Adult ICUs of 7 Cities in India. Findings of the International Nosocomial Infection Control Consortium (INICC)

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Objective: To determine the rate, extra length of stay (LOS) and extra mortality of Device-associated infections (DAI) in 12 ICUs of 7 hospitals of seven cities members of the INICC in India. Methods: Prospective cohort surveillance of DAI was conducted on adult patients admitted to tertiary-care ICUs. INICC designed the protocol, forms and data uploading and analysis system. Data were gathered at the ICUs. CDC-NNIS definitions were applied. Results: From 07/04 to 03/07, we enrolled 10,835 patients, representing 52,518 bed days. The overall DAI rate was 4.4 per 100 patients, and 9.0 per 1000 bed days. The CVC-BSI rate was 7.9 per 1000 CVC days, the VAP rate was 10.46 per 1000 device days, and the CA-UTI rate was 1.4 per catheter days. The LOS of patients without DAI was 4.4 days the LOS of patients with CVC-BSI was 9.4 days ($P < 0.001$) LOS of those with VAP was 15.3 days ($P < 0.001$) and LOS of those with CA-UTI was 12.4 days ($P < 0.001$). Extra mortality for VAP was 19.0%, ($P < 0.001$) for CVC-BSI, 4.0% ($P = 0.0174$) and for CAUTI, 11.6% ($P = 0.010$). 27.3% of DAI was caused by *Pseudomonas* sp-28.6% resistant to ciprofloxacin, 64.9% to ceftazidime, 42.0% to imipenem, and 42.6% to piperaciline tazobactam 6.2% by *Acinetobacter* sp 3.1% by *S aureus* infections-87.5% MRSA 46.4% by Enterobacteriaceae -71.4% resistant to ceftriaxone, 74.1% to ceftazidime, and 42.6% to piperaciline tazobactam 8.2% by *Candida* sp 2.6% by *Enterococcus* sp.-33.3% resistant to vancomycin. Conclusion: This study has identified that CVC-BSI, VAP, and CA-UTI increased the LOS and are associated with higher mortality.

P70

Device-Associated Infection Rates, Extra Length of Stay, Mortality and Microorganism Profile in One Hospital of Morocco. Findings of the International Nosocomial Infection Control Consortium (INICC)

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Objective: To determine the rate, extra length of stay (LOS) and extra mortality of Device-associated infections (DAI) in one ICU of a hospital member of the INICC in Morocco. Methods: Prospective cohort surveillance of DAI was conducted on adult patients admitted to tertiary-care ICU. INICC designed the protocol, forms and data uploading and analysis system. Data were gathered at the ICU. CDC-NNIS definitions were applied. Results: From 11/04 to 04/07, we enrolled 1,133 patients, representing 7,868 bed days. The overall DAI rate was 15.9 per 100 patients, and 22.8 per 1000 bed days. The CVC-BSI rate was 12.1 per 1000 CVC days, the VAP rate was 45.3 per 1000 device days, and the CA-UTI rate was 9.7 per catheter days. The LOS of patients without DAI was 5.3 days LOS of those with CVC-BSI was 10.0 days ($P, 0.004$), LOS of those with VAP was 10.8 days (< 0.001) the LOS of those with CA-UTI was 13.8 days ($P, < 0.001$). Extra mortality for VAP was 52.0%, ($P < 0.001$) for CAUTI, 5.9% ($P = 0.844$). 24.7% DAI were caused by *Acinetobacter* sp .9% resistant to piperaciline tazobactam 4.8% caused by *S aureus*. 3% MRSA 38% by Enterobacteriaceae 4% resistant to ceftriaxone, 50.7% to ceftazidime, and 52.2% to piperaciline tazobactam 26.7% by *Pseudomonas* sp infections 6.7% resistant to ceftazidime and 15.0% to imipenem 2.7% by *Candida* sp. Conclusion: This study has identified that the CVC-BSI, VAP, and CA-UTI rates were high, increasing length of stay, and that VAP was significantly associated with higher mortality.



P71 **MRSA; how much are we missing? - Capture-Recapture approach for determination of true prevalence in hospital and community**

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Introduction: In UK, national guidelines recommended MRSA screening of only risk patients in hospital and known cases in community until late 2006. Consequently true magnitude of the epidemic is unknown and a large proportion of reservoir remains not accessible for intervention. Realising this, the new UK guidelines recommend 'Search and Destroy' policy that worked successfully in Scandinavian countries and Netherlands. Objective of this study is to demonstrate for the first time the capture-recapture approach for estimation of true prevalence of MRSA in hospital and community. **Material and Methods:** The data is from a large acute hospital in UK for the year 2001 with a served population of 156,000. The hospital has 58,966 admissions and 215,554 bed days. Corrected hospital number is sum of patients detected positive one month before hospital admission, during hospital stay and one month after discharge. This is assuming that patients seldom are screened and cleared of infection within one month in community. Corrected community number is sum of patients positive from 7 days before discharge, entire community period and within 2 days after hospital admission. **Results:** Number of MRSA isolates, positive patients, corrected numbers, corrected rates and uptake for hospital-community are 1124-410, 367-209, 412-344, 0.0019-0.0022 and 89.0%-60.7%. **Discussion and Conclusion:** Estimation of true burden of MRSA is an important prerequisite for designing proper intervention programme. Present study demonstrates that capture-recapture technique detects significant number of MRSA positive patients missed in hospital and community and provides a prevalence closer to true burden.

P72 **Implementing infection control programme in Kano, Northern Nigeria**

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Hospital infection control aimed at reducing hospital associated infections is essential that, absence of such a programme has a number of consequences. Lack of infection control awareness among HCWs resulting to poor wastes segregation and disposal, needle stick injuries and absence of PEP protocols are among the problems faced in AKTH. Others include poor suction machine/catheters care, high CAUTI rate and absence of training/in-house lectures for HCWs. **Interventions:** The ICU conducted sensitization rounds emphasizing adherence to standard precautions. IC topics are incorporated into biweekly in-house lectures for nurses. NIs surveillance introduced and HAIs monitored and documented. Wastes disposal system improved with provision of colour coded bin liners, sharps boxes for immediate disposal of used sharps and hospital incinerator repaired to normal function. PEP protocols developed and use of commodities with safety features promoted. House keeping and general cleanliness is maintained to the high standard. Routine monitoring and cleaning of suction apparatus intensified more pro-active efforts to prevent CAUTI. **Results/Conclusions:** The ICT worked tirelessly to promote infection control awareness to about 90%, compliance to standard precautions raised to 86%. We succeeded in reducing the hospital infection from 5.8% in 2003 to 2.8% by 2006. Wastes segregation improved to 80% and hospital wastes now properly incinerated and disposed of through burial. Sharps injuries reduced, CAUTI and nosocomial pneumonia dropped to 33% and 6% respectively.

P73 **Virological evaluation of the multiple use system and water renovation at poultry processing plant (APPP)**

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Objectives: The present study was designed to valuate the multiple use system and water renovation at Alexandria Poultry Processing Plant (APPP) through isolation and identification of viruses.

Materials and Methods: 576 water samples tap water and reused chlorinated APPP water were inoculated on Vero cells, chick fibroblast cells and on the chorioallantoic membrane of 11 days old fertile hens eggs. Water samples were inoculated directly and after Tale celite concentration.

Results and Discussion: >From reused water 8 specimens should cytopathic changes on vero cells, of which 2 were neutralized by polioviruses antisera and one with adenoviruses. Meanwhile 2 specimens gave cytopathic changes on chick fibroblasts and 4 specimens gave pocks on the chorioallantoic membranes. All suspected cytopathic changes and pocks tested by neutralization test for polio, Cocksackie, ECHO, Herpes 1 and 2 and NDV and all proved negative. Except the 2 strains of polio from washer and scalding tanks after 6 hours use of 3 and 4 times previously used water.

The adenovirus strain was isolated from the chiller tank after 6 hours use of once previously used water. No isolates could be obtained from renovated water. This study stresses the possibility of enteroviruses contamination in the recycling water process, which is a potential hazard to human health.

The Talc celite filter may partially remove viruses from water but not completely. To avoid viruses occurrence and accumulation such as bird Flu in the reuse of recycle process water, the free residual chlorine concentration entering the multiple use system, must be adjusted to constant level during the whole operational period.

P74 **The risk of serious nosocomial infection by staphylococcus aureus and the relation with improper handwashing in hospitals**

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A study was done at Damanhour Teaching Hospital (1300 Bed) to evaluate handwash practice among medical staff using staph. Aureus presence or absence as a serious measure for infection control.

56 of hospital physicians and nurses from Haemodialysis unit and from Heamatemesis unit were subjected to a questionnaire about hand washing and Infection control also tests for the presence of staph. aureus in their hand flora swabs culture directly after handwashing before and after patients contact.

The study showed knowledge about the mode of viral B & C hepatitis transmission between physicians 70% while nurses 21%. The percentage of vaccinated staff against HBV infection was very bad 36% of physicians & 47% nurses. Usage of gloves & masks and goggles during contract with patients was very low, this was explained by pressure of work. Bad system of medical waste disposal (needles, Syringes & Scaples...) was discovered in the questionnaire.

There was a very high rate of positive staphylococcus Aureus hands swabs cultures from hands of physicians & nurses (50% in Heamodialysis unit & 75% in Heamatemesis unit. Which have alarm about the high risk of severe nosocomial infections development in the future. Educational programs along with training courses on infection control and proper handwashing already have been started in the hospital by the author.



P75 Nosocomial infection surveillance in a surgical department

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Objective: To establish the occurrence and rates of nosocomial infection in a surgical department and to review practice. **Setting:** Six month study in a teaching hospital, Hungary. **Methods:** We joined Surgical Site Infection Surveillance component of the Hungarian National Nosocomial Infection Surveillance Network (NNSR), that is based on Center for Disease Control and Prevention definitions and methodology. For a period of 6 months, from October 2005 to March 2006 we conducted an active prospective surveillance of site specific nosocomial infections (NI) in a 67 beds surgical department. We determined incidence, incidence density of NIs and rate of surgical site infections (SSI). We analysed risk factors and SSI rates for cholecystectomy and compared our rate with national rates. **Results:** In the studied period 1354 patients were admitted and 9260 patient days were registered. Number of identified nosocomial infections was 99. The overall incidence of nosocomial infections was 7/100 admissions and incidence density was 10,7/ 10000 patient days. Most frequent NIs were SSI-s (58%), followed by skin and soft tissues infections (20%) and pneumonia and lower respiratory tract infections (16%). Urinary tract infections represented 3% and blood-stream infection represented 2% of identified NIs. A total of 992 operations were performed, out of which 129 cholecystectomies. Overall SSI rates was 5,7%. **Lessons learned:** Beside having our first NIs rates, surveillance activity was very useful to review practice, to monitor adherence to local guidelines. Identified deficiencies, feedback of results and necessary interventions had been done in order to reduce NIs rates.

P76 CHCA surgical site infection prevention collaborative: experiences of a pediatric cardiothoracic workgroup

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Background: Surgical site infections (SSI) are among the most common and serious complications associated with pediatric cardiac surgery. **Objective:** To improve the quality of care delivered to pediatric patients undergoing cardiac surgery through the application of evidence-based practices (EBP) to prevent SSI. **Methods:** A multidisciplinary team reviewed existing EBP associated with the prevention of SSI. Team members included representatives from cardiac anesthesia, pharmacy, quality improvement, and infection control. Identified practices were implemented for all patients undergoing cardiac surgery via a mediastinal incision. Data on adherence to recommended practices and episodes of SSI were reviewed each month to identify additional educational needs. **Results:** Three evidence-based practices were implemented: 1) perioperative antibiotic administration (selection, timing, intra-operative redosing, and post-operative discontinuation within 48 hrs); 2) appropriate pre-operative skin preparation (appropriate technique for skin antisepsis and hair removal); and 3) basic SSI prevention strategies. The team designed, tested, and revised strategies for implementation of best practices in the cardiac operating room and intensive care unit. When possible, redundant systems were established to prevent failures. Following implementation of EBP, observational data reveal more than 95% of cardiac surgery patients now receive care according to institutional guidelines and suggest a reduced rate of mediastinitis. **Conclusions:** Implementation of EBP can reduce the rate SSI and improve the process of care among children undergoing cardiac surgery.

P77 Investigation of outbreaks caused by extended-spectrum beta-lactamase (ESBL) producing Gram-negative pathogens (GNP) at a large hospital in Budapest

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Objectives: To investigate outbreaks and carriage of ESBL-producing GNP among patients admitted to a large hospital in Budapest during 4 months period. **Methods:** 132 ESBL-producing GNP clinical isolates were collected from October 2006 to January 2007 from 82 patients and hospital staff as follow: *Klebsiella pneumoniae* (KP)(n=86), *Escherichia coli* (EC) (n=35) and other species (n=11). On the basis of preliminary phage typing results KP and EC isolates were tested by PFGE. Furthermore, molecular typing was performed by SHV, CTX-M and TEM PCRs, plasmid profile analysis, transfer of resistance determinants and sequencing of resistance genes. **Results:** During the study period 132 ESBL-producing GNP strains were isolated from 18 hospital wards including isolates from three nosocomial outbreaks in the NICU (n=51), the ICU (n=13) and the neurosurgery (n=18). In addition a colonisation rate of 55% (20/36) with ESBL-producing GNP was found in the chronic internal medicine ward (CIMW). The SHV-5 producing KP strains isolated at the NICU were resistant to 3rd gen. cephalosporins and gentamicin but susceptible to ciprofloxacin. Contrarily the CTX-M-15-producing KP strains isolated at the ICU, the neurosurgery and the CIMW were mostly multiresistant and showed susceptibility only to carbapenems. PFGE analysis revealed four outbreak KP clones: clone X caused the outbreak in the NICU, clone S was found in the neurosurgery and the CIMW, clone L caused the outbreak in the ICU and clone N (Hungarian Epidemic Clone) recovered from two patients in the CIMW. **Conclusion:** The dissemination of these multidrug resistant clones pose a serious problem in Hungarian health care institutions. Immediate intervention is needed for efficient eradication of these clones and continuous epidemiological monitoring is required for control of their spread.

P78 High prevalence of SHV-5-producing *Serratia marcescens* strains in a neonatal intensive care unit during one year period

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The extended-spectrum beta-lactamases (ESBLs) of Gram-negative rods constitute the most rapidly evolving mechanisms of antibiotic resistance in pathogenic bacteria. It is well-known that the mortality of nosocomial infections caused by ESBL producing strains is significantly higher when carrier status remains unexplored and the patient is treated with cephalosporines. The prevalence of ESBL-producing Gram-negative pathogens at the University of Debrecen shows an increasing tendency. ESBL-producing *Serratia marcescens* strains were isolated from various specimens of 32 new-borns in the Neonatal Intensive Care Unit of University of Debrecen between April 2006 and April 2007. The isolates were recovered as follow: throat (45 cases), tube (29 cases), conjunctiva (3 cases), ear and nose (2-2 cases) and pharynx (1 case). The strains were identified using routine criteria and VITEK 2 system. All isolates showed ESBL producing phenotype using E-test and VITEK 2. On the basis of disk diffusion results the strains showed in vitro susceptibility only to carbapenems and fluoroquinolones. The phage typing and macrorestriction profile analysis of representative isolates showed that all of them belonged to the same genetic clone. The blaSHV gene was detected using a multiple PCR technique. Direct sequencing demonstrated the presence of SHV-5 type ESBL gene. No serious symptoms related to *S. marcescens* could be recognised. The source of the outbreak despite the efforts to find a reservoir remained obscure.

**P79 Nosocomial infections in National Medical Centre of Georgia**

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Even though reliable information on the rate of occurrence of nosocomial infections (NI) in former Soviet Union countries is limited, we postulated that the problem is both grave and urgent. An epidemiology study of NI was undertaken at the National Medical Center. Methods. During 2005-2006 years infection data were collected for 2,314 patients and, entered into a database and analyzed using MS ACCESS software. The antimicrobial susceptibility of isolates in vitro was assessed using an agar disk diffusion method, as recommended by the Clinical and Laboratory Standards Institute. The antimicrobial susceptibility data were analyzed using WHONET software. Results. Rate of NI was 7,8% (6,9% of patients). The most common NI was clinical sepsis - 38,8% (of all nosocomial infections), lower respiratory tract infections - 26,1%, bloodstream infections - 12,8% and surgical-site infection - 10,0%. A total of 259 strains of microorganisms were isolated, 43,6% of which were *P. aeruginosa*, 14,6% *S. aureus*, 12,0% *E. faecalis* and 6,6% *E. coli*. MRSA accounted for 55,3% of all isolated *S. aureus*. Mortality of patients with nosocomial infections was 15,5% (25/161) compared to 1,8% (38/2153) for patients without nosocomial infections (odds ratio, 10,2 95% confidence interval, 6,00-17,45). Several independent risk factors for NI were found: age > 60 years and neonates, admission to intensive care, length of stay, mechanical ventilation, central venous catheter and inadequate antimicrobial prophylaxis. Conclusions. This study confirms the importance of NI in Georgian health services and the need for aggressive monitoring for infection control activities.

P80 Antimicrobial activity of glucoptamin containing disinfectants

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Effective antimicrobial agents for rapid disinfection are very important factors in eradication of hospital infections spreading. Glucoptamin, recently developed multi-component substance, consists of a mixture of reaction educts and products, which show synergistic activity. This complex substance is an active component of some disinfectant agents. Three preparations: pure glucoptamin 50% and two different disinfectants - Incidin Plus containing glucoptamin 26% and Sekusept Plus containing glucoptamin 25%, were investigated in this study, in order to analyze the antibacterial and antifungal activity. Sixty clinical bacterial strains, 10 isolates from each group of: *E. cloacae*, *P. mirabilis* + *P. vulgaris*, *A. baumannii*, *P. aeruginosa*, MRSA, and *Enterococcus* sp., with different susceptibility to antibiotics and chemotherapeutics, mostly multiresistant, were included. These strains were isolated from different clinical materials obtained from patients, who suffered from the disease in hospital, where Incidin Plus is being routinely used for surface disinfection for a long time. Additionally, 184 fungal strains: *Candida* spp. (n=133), *Trichophyton* spp. (n=24), *Aspergillus* spp. (n=7) and other species (*Microsporum canis* - 5, *Geotrichum* spp. - 3, *Cryptococcus* spp. - 3, *Saccharomyces cerevisiae* - 2, *Scopulariopsis brevicaulis* - 2, and single strains of *Epidermophyton floccosum*, *Penicillium citrinum*, *Acremonium kiliense*, *Fusarium oxysporum*, *Zygosaccharomyces* sp., isolated from different specimens of hospitalized patients and outpatients, were under investigation. Antibacterial and antifungal activities of preparations were evaluated according to EN 1040:2005 and EN 1275:2005, respectively. Minimal inhibitory concentrations of the preparations were also calculated. Glucoptamin and both disinfectants containing this substance, proved to be very effective and rapidly acting antibacterial and antifungal agents.

P81 Diagnosis of Asymptomatic Trichomoniasis

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Introduction: Trichomoniasis is an extremely common infection worldwide and is associated with important public health problems, including amplification of HIV transmission. This disease has found to be in forms of symptomatic and asymptomatic in women and may depend on host as well as parasite variables. Thus the aim of this study was to evaluate the patients attending gynecology clinic with different symptoms and checked them for *Trichomonas vaginalis* infection. Methodology: The vaginal secretion and urine samples of the patients attending gynecology clinic, Imam Reza hospital, Amol city, have been checked by direct smear and cultured in TYI-S-33 culture media. Isolates obtained from patients complaining of vaginal discharge and/or pruritis, dysuria, and dyspareunia considered as symptomatic patients isolates. Isolates from those with no complain of above mentioned symptoms considered as asymptomatic patients isolates. Data were analyzed by using Epi-info software. Results: Results showed that the numbers of asymptomatic patients for trichomoniasis were 1.3 times more than infected samples belong to symptomatic ones. Per speculum examination revealed that 75% of *T. vaginalis* positive subjects had normal appearance of vagina and cervix. Discussion: The most important aspect of control the infectious diseases is diagnosis. Most of the physicians according to the symptoms complain by the patients, without checking by different laboratory methods, prescribing the drugs for the patients as well as their partners. While as we checked more than 70% of the suspected patients had other problems, but not trichomoniasis. Thus laboratories could play important role for diagnosis of infection and help the physicians for properly treatment. According to the epidemiological aspects, these asymptomatic patients are very important as healthy carriers, and *T. vaginalis* infections are commonly associated with other STDs and are a marker of high-risk sexual behavior.

P82 Prevalence of nosocomial infections in surgical and intensive care unit patients: Results of the first nationwide survey in Bulgaria, 2006

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Summary: A one-day point-prevalence survey of nosocomial infections (NI) was carried out in November 2006, in 23 randomly selected acute-care hospitals across Bulgaria. One thousand three hundred and fifteen (1315) surgical patients (without gynecology/obstetrics) and 130 intensive care unit (ICU) patients were surveyed. The study was designed to estimate the prevalence of NI, as well as to estimate the prevalence of various risk factors. With some minor changes, the study protocol originally developed by the Hospitals in Europe Link for Infection Control Trough Surveillance/HELICS (Version 7.0) was adopted. The investigators were trained centrally. All patients aged more than 1 year who were hospitalized for at least 48 h were included. Four major types of NI were studied: a) surgical site infection/SSI, b) bacteraemia, c) nosocomial urinary tract infection/UTI (without asymptomatic bacteriuria) and d) nosocomial pneumonia. The overall prevalence rate of NI was found to be 4.18% in surgical patients (5.61% in those who underwent surgery), and 14.62% in the ICU patients (22.45% in those who underwent surgery and subsequently were transferred to the ICU). Prevalence varied considerably between different specialties. A total of 993 surgical operations were registered, and 36 SSI were found (3.62%). Information was collected also for: severity degree of the main condition (ASA-score), wound contamination class, device utilization rate, antibiotics consumption, and other risk factors. The results from the study will be used to define areas of concern such as the need for more 'prudent' use of antibacterials, and to plan respective infection control interventions. The survey was kindly sponsored by The Swiss Agency for Development and Cooperation (SDC), under the Bulgarian-Swiss Hospital Hygiene Programme (BSHHP).
Keywords: nosocomial infections, prevalence, surgical site infection, infection control

**P83**

Surgical Site Infection Surveillance of Caesarean Section Procedure

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Welsh Healthcare Associated Infection Programme

Background: Healthcare Associated Infections (HAI) are an important problem adversely affecting healthcare quality and outcomes. A multi-centre scheme for clinically based surveillance of surgical site infections (SSI) has been developed as a component of the National Assembly for Wales funded Welsh Healthcare Associated Infection Programme. **Objectives:** To determine incidence rates of surgical site infection following Caesarean Section Procedure to enable data to be used for national and international comparisons. **Methods:** All C sections in all the trust in Wales recommended for surveillance SSIs were detected on inpatients and on readmission. Standard internationally agreed definitions (CDC, Atlanta) were utilised, providing a database which is compatible with European initiatives (IPSE). Information was collected by clinical staff with support and co-ordination provided by infection prevention & control teams. The forms was design for the use optical scanner. These methods of data transfer provided flexibility. **Results:** The overall all Wales SSI rate for C section for the 1 year period (2006) was 23.4% (519/2220) **Conclusions:** The data set permits the calculation SSI rates, allowing comparisons between hospitals and within a hospital over time. The data set will also provide collaboration Pan Celtic Reports of C-section (coordinated by Scotland)

P84

Occupational Safety Education Influences on the attitudes of Medical Personnel from Preventing Biohazards in one Regional Taiwanese Hospital

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Background: Biohazards are risk factors threat to medical personnel. Recently, many emerging and reemerging infectious diseases outbreaks occurred in hospital. The knowledge of biohazards for medical personnel is very important for preventing job-injury events. **Objective:** Through job education may help medical personnel to prevent these risks. **Methods:** The cross-sectional survey with a self-complete closed questionnaire was adopted. The self-designation of attitude questions with five-point likert-type scales were included in questionnaires (Cronbach Alpha=0.8012). The information of job education is collected retrospectively in this study. The survey was sent to the regional teaching hospital with 675 beds and 350 medical staff, located on southern Taiwan. **Results:** (1)The questionnaire's respondent rate is 95% (285:300). (2)142 staff (49.8%) have been attended Biohazards job education programs compared with 142 staff (49.8%), who have never been attended these programs. One is a missing value. The results of attitudes show significant differences between two groups ($P<0.001$). The total scores of attitudes in non- attended were 31.61, and were compared with attended which were 44.47. (3) Female staff had higher attitudes average scores (4.85) than male (4.14) ($P<0.05$). However, most of male are doctors (55%) and most of female are nurses (67%), so attitude of Drs vs Nurses? (5)Seniority also influences on attitudes. Higher seniority of medical staff is appear more positive attitudes than lower seniority ($P<0.05$). (4)The correlation coefficient between occupational safety education and attitudes of medical personnel on preventing from biohazards is 0.344 ($p<0.001$). **Conclusion:** Education is influences effectively on medical personnel's attitudes from preventing biohazards. However, educators need to make some special programs to induce motivation of doctors and junior staff in order to involve them into with the education programs.

P85

H pylori seroprevalence in blood donors and outpatient in Rabta hospital of Tunisia

Tunisia

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H pylori is the most common cause of gastritis peptic and duodenal ulcers in adults. Although, H pylori prevalence has been found to be considerably high in many countries and several risk factors have been identify. The purpose of our study was to detect frequency and distribution of H pylori in asymptomatic blood donors and outpatients consulting in gastroenterology: 2 groups symptomatic and control. Data were collected in 250 blood donors and 146 outpatients by trained interviews using standardised questionnaire (height, weight, cigarettes consumption, alcohol intake and rural or urban origin). In the two populations, H pylori anti IgG and anti-Cag were detected using the ELISA. In blood donors, the mean age was 33,5 and sex ratio w/m was 0,18. 78% of patients don't take alcohol and 53,2% don't smoke. Seroprevalence of H pylori was 64% and 27% had anti-Cag. Drinking alcohol beverages was found to be negatively associated with H pylori infection. All positives anti-Cag patients were positives with anti H pylori. In outpatients, the mean age was 46,8 and sex ratio w/m was 1,03. Seroprevalence of H pylori was 99,3%. A significant difference exists between anti-Cag and symptomatic (66,7%) and asymptomatic (39%) patients. Many studies have suggested positive associations with cigarette smoking and H pylori seropositivity, our results are not yet conclusive. Symptomatic patients had a higher rate of anti-cag 66,7% compared with control 39% and blood donors 27%. H pylori seroprevalence in blood donors is low 64% compared with symptomatic patients 99,3%. The anti-Cag was statistically associated with symptomatic patients. Research unit: UR 23/04.



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