

Abstracts from the Risk and Prevention Conference

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PROSPECTIVE COMPARISON BETWEEN JUGULAR AND SUBCLAVIAN INTRAVENOUS DEVICES IN ONCOLOGY

I. Krieger, J. Gertner, B. Asselain, M.C. Falco, F. Le Queau and J.B. Vedrenne.
Institut Curie, Paris, France.

Objective: This study was designed prospectively to assess catheter-related sepsis and mechanical complications for both types of catheter: jugular and sub-clavian insertion.

Method and population: 1795 consecutive catheters were inserted during the 24-month period from January 1, 1995 to December 31, 1996: 1551 sub-clavian and 244 jugular. We used 391 cuffed catheters (CC) and 1160 simple tunnelled catheters (STC) in the subclavian group, and 135 cuffed catheters and 109 simple tunnelled catheters in the group jugular ($p < 0.0001$). All patients were treated for cancer in a single institution. Catheter Related Blood Stream Infection (CDC criteria) (CRBSI), other complications and catheter outcome are compared by χ^2 analysis. The duration of use was compared with a COX model while the time to complication was assessed by the logrank test and equivalence logrank test.

Results: Mean duration of use for jugular was 154 days and for sub-clavian 149 days. A comparison in cumulative percentage is shown at day 30, 60 180.

Withdrawal for	End use	Local infection	CRBSI	Thrombosis	Mechanical
Jugular D30/60/180	20.3/46.2/56	2.3/6.6/7	0.5/1/1.8	0.5/1.7	1/1.5/2.3
Sub-clavian	23.7/49/58.2	1.3/3/3.5	0.7/2.5/2.6	0.7/1/1.5	2/4.6/6
p ^c	non significant	non significant	non significant	non significant	p=0.006 RR2.4

Overall local infection rate per 1000 days use was 0.32 for sub-clavian and 0.42 for jugular (ns).

CRBSI rate for sub-clavian was 0.20 and 0.10 for jugular (ns). A previous study showed that STC and CC have comparable complications rates from insertion to D180. Although more infections occurred in the CC group (ns), they are balanced by significantly less mechanical complications.

Conclusion: Sub-clavian and jugular insertion have comparable infection and thrombosis complication rates from insertion to D180. The higher mechanical risk has to be correlated with the higher significantly use of CC in jugular insertion.

EFFECT OF PULSE PRESSURE ON CANCER MORTALITY

E. Thomas, K. Bean, J.F. Morcet, L. Guize, A. Benetos.
Centre d'Investigations Préventives et Cliniques (IPC), Paris, France.

Objective: To analyze the relation between pulse pressure and cancer and the role of physical activity and tobacco in this relation.

Method and population: 125,513 men aged 20 to 95 years (mean: 42 years) who had a health check-up at the IPC Center during the period of January 1978 to December 1988. Eight years (1988-1996) of mortality follow-up was considered for this analysis. During this period, 1164 died from cancer. PP was classified in 3 groups: PP1 (<50), PP2 (51-65), PP3 (≥ 65 mmHg). A mean of 2 measures of blood pressure was calculated. Chi-square tests were used to compare mortality rates in each group of pulse pressure. Cox regression models taking into account major risk factors were used to test the association between PP and cancer mortality.

Results: Mortality rates increased positively with PP; mortality rates for cancer were 8.4, 11.1, 29.7/10000 persons/years ($p < 0.001$) for PP1, PP2 and PP3 respectively. This positive association could not be explained only by the first years of follow-up. Survival probabilities continued to be lower in the last group of PP after the first 5 years of follow-up. After taking into account other risk factors, the risk ratio for the increment from one class to the next was 1.3 (1.1-1.4). A separate analysis was performed in smokers (S) and non smokers (NS) and showed that the risk attributable to PP did not differ in the 2 groups. A separate analysis was also done for physical activity. The risk did not differ significantly between subjects who practiced a sport regularly and those who did not practice any sport.

Conclusion: PP was an independent risk factor for cancer mortality and this relation could not be explained by factors which increased PP and cancer mortality at the same time (lack of sport, tobacco). The relation could not be explained entirely by hormonal changes induced by some cancer which also increase PP. In fact, the relation persists after the first years of follow-up. Further investigations must be done to understand this relationship taking into account the site of the cancer and other factors such as the degree of stress experienced by the subject.

RISK PREVENTION FOR HANDLING CYTOTOXIC DRUGS IN AN ONCOLOGY CLINICAL PHARMACY UNIT

I. Falco, P. Thomaré, M.F. Abgrall, F. Ballereau*

*Pharmacie Hôtel-Dieu, CHU NANTES, France

**Médecine préventive Hôtel-Dieu, CHU NANTES, France

Objective: Several previous studies have shown the exposure risk during preparation and administration of cytotoxic drugs, for occupational workers. Handling these drugs induces short, medium and long term effects, such as carcinogenicity, mutagenicity, reproduction dysfunctions, and immunological effects. To limit the occupational exposure, and because replacing these agents by other less harmful is not possible, we have developed a total quality insurance system, including centralized antineoplastic agents preparation in an isolator.

Method and population: Such a system offers complete prevention of exposure. Standard operating procedures for handling antineoplastic agents, including recommendations have been written as acute exposure events are possible. Total maintenance of the installation, elimination of waste e.g. used supplies and administration by nurses have been considered. Despite the risk management, it is still necessary, to realize a biological monitoring to the pharmacy technicians, to assess preventive measures.

Results: We have shown no haematologic abnormalities, but we are too close for a proper view to affirm total risk evicton.

Conclusions: Actually, it is not possible to prove the complete evicton with our insurance quality system, because no selective detection methods are available in routine. Total protection, is hard to achieve especially during oral formulation preparations for pediatric purpose and patients care, in spite of cleaning procedures. We propose environmental controls including air contamination and surface measures to quantify the possible exposure risk.

INTRAVASCULAR CATHETER INFECTIONS IN HAEMATOLOGY PATIENTS IN THE CENTRAL CLINICAL HOSPITAL IN WARSAW

H. Marchel, M. Krajewska, M. Luczak, Central Clinical Hospital of Medical University, Warszawa, Poland

Objective: Analysis of frequency of intravascular catheter infections in febrile haematological patients on the basis of microbiological tests and characterisation of microorganisms isolated in 1997-1999.

Method and population: In total 709 samples have been examined, obtained from 290 patients hospitalized in the haematology ward (01.01.1997-31.10.1999), in whom infected intravascular catheter was probably a source of febrile episode. The analysis comprised cultures of 170 catheter tips and 599 peripheral and catheterised blood samples. Microorganisms in the blood samples have been detected by a computerised BacT/Alert system (Organon Teknica). Catheter tips have been cultured by a method according to Maki. The isolates have been identified by an API or Vitek system (BioMérieux). Susceptibility to antimicrobial agents was tested by an Vitek system or a disk-diffusion method, according to the NCCLS recommendations.

Results: The percentage of cultures, in which no growth of microorganisms has been detected in any of the examined samples, was 68%. Application of semiquantitative methods of culture, concerning the number of isolated bacterial colonies, allowed to estimate the percentage of clinically relevant positive samples as 11%. Analysis of separate clinical strains, isolated from these samples, showed a predominant share of coagulase-negative staphylococci (CNS) - 63%. Among these strains 79% were resistant to methicillin. All strains were fully sensitive to vancomycin. Gram-negative rods were isolated with a frequency of 22%, while yeast-like fungi - 2%.

Conclusions: 1. Febrile episodes constitute a very important diagnostic and therapeutic problem in patients with haematological diseases. 2. In the cases, in which an intravascular catheter was a suspected source of infection, this could not be confirmed microbiologically in more than half of these cases. 3. The most commonly isolated microorganisms from cases of intravascular catheter were CNS, as reported in literature.

FREQUENCY OF INFERTILITY AND INDUCTION OF OVULATION IN IRANIAN OVARIAN CANCER PATIENTS

R. Alaghebandan, M. Ashrafi, S. Tavajjohi, Iran University of Medical Sciences, Behdeh Health Care Center, Hormozgan, Tehran, Iran

Objective: To determine the frequency of infertility and induction of ovulation and their relationships with types of ovarian cancers in Iranian ovarian cancer patients.
Method and population: During the 10 year period from 1988 to 1997, a total of 278 patients were admitted at the four Gynecologic Oncology centers in Tehran, with the diagnosis of ovarian cancer. Medical record numbers of all patients were identified and retrieved. The data were extracted from the medical records on to a pre-prepared structured questionnaire.
Results: Frequency of infertility and nulliparity among our ovarian cancer patients were 5% (95% CI, 2.8%-8.3%) and 18.3% (95% CI, 14%-23.4%), respectively. Frequency of infertility among epithelial ovarian cancer patients was 4.6% (95% CI, 2%-8.9%), while in non-epithelial ovarian cancer was 5.7% (95% CI, 2.1%-12%). Frequency of induction of ovulation in our patients was 4.3% (95% CI, 2.3%-7.4%). Frequency of induction of ovulation in epithelial and non-epithelial ovarian cancer patients were 4.05% (95% CI, 1.64%-8.16%) and 4.76% (95% CI, 1.56%-10.76%), respectively. There was no significant statistical difference between infertility in epithelial and non-epithelial ovarian cancer patients ($P = 0.7$). No significant difference, however, was not seen between induction of ovulation in epithelial and non-epithelial ovarian cancer patients ($P = 0.86$).
Conclusions: Our data do not support the incessant ovulation hypothesis as a main etiopathologic factor in the development of epithelial ovarian cancer. However, further investigation is required to resolve the question of the possible association between infertility and fertility drugs with ovarian cancer through large epidemiological studies.

LEUKEMIAS AND MYELODYSPLASTIC SYNDROMES IN CHERNOBYL CLEAN UP WORKERS

D. Gluzman (1), I. Abramenko (1), O. Vasilenko (2), M. Simonet (2),
 (1) R.E. Kavetsky Institute of Oncology Problems, Kyiv, Ukraine, (2) French Centre "Children of Chernobyl", Kyiv, Ukraine

Objective: Morphocytochemical and immunophenotypical study of leukemias and MDS in Chernobyl clean-up workers.
Method and population: A consecutive series of 103 Chernobyl clean-up workers with haematopoietic malignancies and disorders of haemopoiesis has been analyzed during 5-year period from January 1, 1995 to November 10, 1999. Cytomorphological and cytochemical techniques as well as immunophenotyping (APAAP, ABC) with broad panel of monoclonals to leukocyte differentiation antigens were used.
Results: Leukemia and MDS have been diagnosed in 58 clean-up workers (ALL - 2, AML - 10, CML - 8, essential thrombocythemia - 3, MDS - 5, CLL - 12, MM - 6, HCL - 2, PLL - 1, NHL in leukemization phase - 5, leukemia from BGL - 3, Sezary syndrome - 1). Nonmalignant blood disorders (AA, GA, ITP and others) and metastatic lesions of bone marrow have been registered in 45 patients.
Conclusions: All main forms of leukemias including B-CLL and other chronic lymphoproliferative diseases have been revealed among Chernobyl clean-up workers under study. High percentage of patients with AML had previous MDS. The characteristic reaction of bone marrow stroma due to accumulated radionuclides with accompanying appearance of significant number of alkaline phosphatase positive dendritic cells has also been found out.

INTERLEUKIN-6 AND C-REACTIVE PROTEIN DURING START OF FEVER IN PATIENTS WITH NEUTROPENIA

M. Maachi, J. Chapiro, S. Bailleul, G. Lefevre, J.-P. Lotz, Biochemistry Laboratory, Tenon Hospital, Paris, France

Objective: The aim of this study was to evaluate the predictive power of cytokines (IL-6 and TNF- α) and C-reactive protein (CRP) in the prediction of fever in neutropenic patients treated for solid or haematologic malignancies. We also related cytokine levels to blood culture and clinical findings.
Methods and Patients: Twenty-one patients were being treated for solid or haematologic malignancies at the Department of Oncology, Tenon hospital, France. Their mean age was 42 years (range: 16-59). Plasma interleukin-6 (IL-6) and Tumor necrosis factor alpha (TNF- α) were assayed by an ELISA method (Immunotech). Cut-off level for IL-6: 25 picogram/ml and CRP by an immunonephelometric method (Array Beckman; Cut-off level: 25 microgram/l) daily from the admission until resolution of fever. Fever was defined as body temperature at 38° or more.
Results: Blood culture results were positive in five patients. Sixteen patients remained without evidence of bacteremia. Twenty-four hours before start of fever (DF-1), IL-6 levels were increased in all patients except one. The next day (DF), IL-6 levels had raised significantly ($p < 0.001$ chi2 test). On the opposite, only three patients had high CRP levels at DF-1 and there was no significant difference in CRP levels between DF-1 and DF. There was no difference in IL-6 levels between patients with bacterial infection and those with unexplained fever. TNF- α levels were not detectable in the circulation in most of febrile patients.
Conclusion: IL-6 level may be more predictive of the outcome of fever in neutropenic patients than CRP level. TNF- α level seems to be of limited diagnostic value.

PREVALENCE OF CLOSTRIDIUM DIFFICILE CARRIAGE IN A LONG STAY HOSPITAL

V. Neman-Simha, M.C. Rousseau, P.A. Doyard, Hôpital San Salvador, AP-HP, Hyères, France

Objective: Evaluation of the *Clostridium difficile* (Cd) carriage and identification of associated risk factors in a young population of patients with developmental disabilities.
Method and population: The studied population included 284 patients with developmental disabilities aged from 2 to 43 years hospitalized in 9 different wards. During 3 months, stool specimens were obtained from all patients after several months of hospitalization. The samples were inoculated onto selective Cd agar plates bioMerieux®, then incubated anaerobically for 48 hours at 37° C. Colonies suspected to be Cd (on the basis of their macroscopic aspect and their characteristic odor) were confirmed by using biochemical tests (Rapid ID 32 A bioMerieux®). For each positive sample, toxin A production was assessed by an enzyme-linked immunosorbent assay (Immunocard toxin A, Meridian, Guilford). For positive carriers, risk factors for Cd acquisition were recorded.
Results: The prevalence of Cd carriage in the studied population was 4.6% (13 positive patients). Of these patients, 12 remained asymptomatic and 1 had diarrhea. Toxinogenic strains were isolated from 3 patients hospitalized in 2 different wards. Of the 13 positive patients, 10 received antibiotics (beta-lactam) within 8 weeks before stool cultures, 10 received laxatives, 5 antacids, 3 had a gastrostomy and 6 a nasogastric tube. Duration of hospital stay was at least 5 years.
Conclusion: Our study has evaluated the prevalence of Cd carriage in a young population with developmental disabilities hospitalized in a long stay hospital. At least 2 risk factors were identified for the Cd carriers. Most colonized patients remained asymptomatic but they serve as a reservoir for the organism within a long-term-care hospital and a possible source of nosocomial transmission.

ECONOMIC IMPACT OF NOSOCOMIAL INFECTION: METHODOLOGICAL ISSUES

B. Allenet^{1,2}, T. Lebrun²
¹ Faculté de Pharmacie, Lille 2.
² CRESGE-Labores, URA CNRS n°362, Université Catholique de Lille.

Objective: Provide a review of the medico-economic articles on nosocomial infection in order to trigger the methodological issues around the appraisal of the economic consequences of nosocomial infection.
Methods: A computerized search was performed on three different databases: Nosobase, Medline, OHE. The time period considered was the last ten years (1990 - today). The key words selected were "cost" and "nosocomial". Out of the 50 retrieved articles, 9 were selected because they presented a case-control design, considered as the standard approach to assess imputability of health care consumption to the infection [Haley et al. 1980]. The critical analysis of these articles was based on the French standards of medico-economic evaluation [College des économistes de la Santé 1997].
Results: The most critical element is the variability on quality and exhaustivity of the matching of infected patients to controls (level of matching situated on an average of 40% of the original infected sample, considering demographic criteria and site of infection). The economic analysis only takes into account direct costs (health care consumption directly linked to the infection), usually assimilating them to a prolonged hospital stay (whatever investment made during that period) and using local daily costs for monetary expression.
Conclusions: The economic consequences of nosocomial infection are generally underestimated, due to bias in terms of matching (excluding the most severe cases) and in terms of health care consumption. Moreover, the transposability of such results is limited, due to large differences between settings, in terms of practice and costing.

NOSOCOMIAL LEGIONELLOSIS DUE TO AN INEFFECTIVE WARM WATER SYSTEM

P.J. Cassar, M.S. Tenthof van Noorden, F.H. Ploegstra, T.T. Jilissen-Hofstra, J.H. van Zeijl, D. Veenendaal, D. de Vries, Th.H.E.P. Franssen and G.T. Noordhoek

Medical Center Leeuwarden and Laboratory of Public Health, Leeuwarden, the Netherlands

We report a case of nosocomial *Legionella pneumophila* (LP) due to *Legionella pneumophila* serogroup 1 in two patients admitted in one of our hospital locations (MCL-N).
 In a 60 year old woman (patient A) with COPD and use of corticosteroids, was admitted to the Internal-Pulmonology ward (IPW) of MCL-N in August 1997. 17 Days after admission she developed pneumonia. Sputum and BAL culture yielded *L. pneumophila* SG 1. Patient B, a 63 year old man, was also admitted to the same ward in August 1997. He was transferred to the other hospital location (MCL-Z) where he developed pneumonia; sputum and BAL culture yielded *L. pneumophila* SG 1. The temperature of tap points (showers, tap water) of MCL-N was measured and also environmental cultures were collected from these points.
 The warm water temperature of a shower, and tap water in patientrooms located on the end of the IPW was < 60°C and so at risk for *Legionella*. The temperature of warm water from a Pulmonology ward (PW), which was located directly above the end of the IPW, was also < 60°C. Showers and patient rooms on the IPW and PW were promptly shut down.
 The only cultures in which *Legionella* was detected came from the shower and the taps in patientrooms located on the end of the IPW and PW where the warm water temperature didn't reach 60°C. PCR confirmed the 2 patients and isolates from shower and tap water were identical.
 Technical measures were directly taken by heating up and flushing the warm water system, and removing bottle-necks in distributing warm water to the IPW and PW. These measures were controlled by measuring the temperature and collecting samples from tap points. None of these showed an temperature below 60°C or positive cultures for *Legionella*.
 As one of the first hospitals in the Netherlands, our hospital organization established a 'Water Committee' which has to analyse all possible riskfactors in the water distributing system. Till now on in both of our hospital locations nosocomial Legionellosis didn't show up.

ANALYSIS OF OCCUPATIONAL BLOOD EXPOSURES (OBEs) IN A DUTCH HOSPITAL.

P.J. Ceeser and L. Schoep
Medical Center Leeuwarden, Leeuwarden, the Netherlands.

Background: Health Care Workers (HCW) are at serious risk of percutaneous or mucutaneous occupational exposure of blood. These exposures are assessed for risk of transmission of Hepatitis B (HBV), Hepatitis C (HCV) and HIV. Under-reporting of occupational blood exposures (OBEs) is a well-known phenomenon. In our hospital HCWs must report all cases of OBEs to an external healthcare physician for HCWs.

Method: For a five year period (January 1, 1993 - January 1, 1998) all reported cases of OBE were reviewed. Data was entered in Epi Info 6.0.

Results: There was a total of 441 OBEs (percutaneous=433, mucutaneous=8). The highest number of OBEs occurred in nurses (59%), OR-workers (13%), housekeepers (6%), medical students (6%) and MDs (4%). Most of these OBEs occurred during recapping of needles (27%), followed by placing in a sharp container (12%), handling sharp instruments on the OR (7%) and during the transit of waste (7%). In 33% of all cases, no cause was reported, and in almost 6% no function of the HCW was reported. In at least 144 reported (33%) cases HCWs were not vaccinated against Hepatitis B. All of these HCWs were offered vaccination against HBV, and 111 of these were vaccinated (HB VAX DNA®) after report of their OBE. Based on serological data of source patients or unknown source, 33 HCWs received immunoglobulins against HBV. Based on a restrictive index of risk-groups of patients, no HCW was in serious danger for acquiring HCV or HIV. Our reported percutaneous injuries/100 beds/year (9.7) are below other reported data (15.2-27); also are our reported mucutaneous injuries, 0.2 (2.2-5.2).

Intervention: A hospital-wide campaign to promote the appropriate use and disposal of sharps, and to report all OBEs, was introduced in 1996. The number of reports increased to 34.2% (1996) and 42.5% (1997). In 1997 we started a campaign for additional vaccination against HBV among several risk-groups of HCWs (e.g. housekeepers, technologists). Since 1998 all OBEs are directly reported to the Infection Control Practitioner (ICP).

Conclusion: Much HCWs were not aware of the risks of transmission of bloodborne pathogens by OBEs, followed by a low degree of vaccination against HBV, and an under-reporting of OBEs. Hospital-wide attention for this problem resulted in a higher rate of reported OBEs. Our on-going prospective study of OBEs will evaluate intervention strategies such as directly reporting OBEs to an ICP.

METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS BACTEREMIA: THE TIP OF THE ICEBERG

D. Pittet, S. Harbarth, Y. Martin, P. Rohner, N. Henry, R. Auckenthaler; University Hospitals of Geneva, Switzerland

Context: Optimal surveillance strategy of methicillin-resistant *Staphylococcus aureus* (MRSA) and the relation between the MRSA reservoir and the incidence of severe MRSA infections is controversial.

Objectives: To describe the containment of a hospital-wide MRSA outbreak after 4 years without MRSA control, compare MRSA surveillance indicators, and evaluate the relation between the hospital reservoir of MRSA patients and the attack rate of MRSA bacteremia.

Design and setting: Nine-year prospective cohort study of all MRSA-positive patients in a Swiss tertiary care center including a 4-year period with laboratory-based MRSA surveillance only, and a 5-year period with vigorous infection control measures and on-site surveillance.

Patients: All (n=1,771) patients with newly detected MRSA colonization and infection.

Main outcome measures: MRSA prevalence, incidence and number of bacteremic patients.

Results: In 1989, the rate of newly recognized MRSA patients increased from 0.05 cases per 100 admissions to 0.60 cases in 1994 and decreased to 0.24 cases in 1997. In contrast, the prevalence of methicillin-resistance among all *S. aureus* isolates in the clinical microbiology laboratory remained stable since 1993 (range, 19% to 24%). The number of patients with MRSA bacteremia strongly correlated with the hospital-wide prevalence of MRSA patients (R²=0.60; P<0.01) and the rate of newly recognized MRSA patients (R²=0.97; P<0.001).

Conclusions: Laboratory-based MRSA surveillance does not accurately reflect the true dynamics of MRSA epidemiology after introduction of a screening policy. The initiated interventions had a substantial impact on both the MRSA reservoir and the attack rate of MRSA bacteremia, the tip of the hidden MRSA iceberg.

DECREASING MRSA RATES IN BELGIAN HOSPITALS: RESULTS FROM THE NATIONAL SURVEILLANCE NETWORK AFTER INTRODUCTION OF NATIONAL GUIDELINES

B. Jans, C. Suetens, J. Scientific Institute of Public Health, Brussels, Belgium
M. Struelens, ULB - Erasmus Hospital, Brussels, Belgium
Belgian Study Group for Prevention of Nosocomial Infections, Belgium

Objectives: To study time trends in MRSA incidence and resistance rates in the national surveillance of MRSA in Belgian hospitals from July 1994 to December 1998.

Methods: Every six months, Belgian hospitals provide on a voluntary basis local MRSA data (number of patients with SA and MRSA isolates from clinical- and screening samples, new nosocomial MRSA cases, number of admissions, number of patient-days) to the Institute of Public Health in Brussels for analysis and national benchmarking. Duplicate isolates could be excluded. Analysis for time trends was carried out using linear regression for repeated observations. Trends for year were examined adjusting for semester.

Population: Since 1994, 152 hospitals (78% of total) participated at least once to the national surveillance. Thirteen hospitals registered continuously since 1994 ("94 cohort") and 32 hospitals since 1996 ("96 cohort"). Two third of the hospitals (n=103) participated at least three times and were thus eligible for trend analysis.

Results: In hospitals with at least three participations, the mean MRSA resistance ratio (%MRSA/SA) decreased from 23.4% in 1994 to 14.3% in the last semester of 1998, with a decreasing trend of 1.8 (+/-0.4) % per year (p<0.001). Similar trends were observed in the 96 cohort (1.9%, p=0.007 per year) and the 94 cohort (1.7%, p=0.012 per year). The mean incidence of nosocomial MRSA acquisition in hospitals with >=3 participations was 3.7 per 1000 admissions in 1994 and decreased to 2.1 per 1000 admissions in 1998 (p=0.012). Again, this trend was confirmed for both the 96 and 94 cohort.

Conclusions: Since 1994, the MRSA resistance- and incidence rate decreased significantly in acute Belgian hospitals. Besides surveillance, the implementation of well-balanced guidelines (GDEPIH/GOSPZ consensus conference, 1993), standardisation of laboratory techniques for MRSA detection and evaluation of control measures by epidemic strain-typing techniques are contributing to a slow reduction of the MRSA-problem in Belgium.

ANTIBIOTIC (AB) EXPENDITURES IN 60 FRENCH ICU.

R. Gauzit, P. Montravers, A. Lepage, B. Garnigues, J.L. Pourriat and the CIAR Study Group, ICARE, ACE, and Bristol-Myers Squibb Lab.
CHU J. Verdier, 93143 Bondy Cedex, France.

Introduction: Variations of AB consumption, expressed as costs, in 60 ICU were assessed in order to investigate the explanatory variables for this expenditure.

Methods: The analysis was based on 1997 activity data (for a total of 28,000 admissions, 183,960 hospitalization-days (HD)) and pharmaceutical expenditure. A list of "second-line ABs" (SLAB) was arbitrarily defined: piperacillin/tazobactam, imipenem, ceftazidime, cefepime, cefpirome, amikacin, isepamicin, glycopeptides. Results are presented as mean ± SD.

Results: A surveillance of nosocomial infections (NI), an AB institutional review board and a list of AB subject to controlled prescription were available in 95%, 67% and 78% of cases, respectively. The ICU size corresponded to a 10-bed unit (range: 6-24), with an activity of 468±184 admissions/year, 3,066±1,454 HD, length of stay (LOS) of 6.9±2.7 d., and work load score (omega-score) of 114±61. Patients admitted to ICU had a mean age of 56.5±4.7 years, a SAPS II of 35±7, were ventilated >48h in 29±16% of cases and presented a mortality rate of 17±7.4%. 369±323 strains (IS) were isolated per ICU: *Staphylococcus* sp. 30% (25% MRSA), *enterobacteriaceae* 30% (14% cefotaxime-R), *Pseudomonas* sp. 14% (40% ticarcillin-R), others 26%. Pharmaceutical and disposable supply costs were \$140±61 per HD, including \$89±46 for drug supplies. AB accounted for 32% of drug expenditure (\$22±9.5 per HD). 83% of AB expenditure corresponded to 10 molecules, while 47% was related to SLAB. The highest expenditure for one AB was \$4.5 per HD (mean of all ICU), followed by \$3 and \$2.3, while the 10th highest expenditure was \$0.5. AB expenditure was correlated with bed capacity (r=.73), HD (r=.77), LOS (r=.73), omega score (r=.51), ventilation >48h (r=.49), mortality rate (r=.47), number of IS (r=.61), NI rate (r=.61). SLAB expenditure was correlated with NI rate (r=.42) and number of R-strains (r=.5). AB against MRSA and ticarcillin-R *Pseudomonas* sp. accounted for 7% (7.5% of IS) and 20% (4.6% of IS) of AB expenditure.

Conclusions: Differences in AB expenditure were observed in these 60 ICU with no marked variability. 83% of AB expenditure was due to 10 molecules. AB against ticarcillin-R *Pseudomonas* sp. had a major financial impact.

Prospective Study of Infectious Diseases and Use of Antibiotics in 35 Long Term Geriatric Institutions in the French Part of Switzerland.

C. Petignat, J. Galeazzi, G. Ghilardi, S. Cattelod, C. Büla, P. Francioli, Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland

Objective: To determine, frequency, distribution and risk factors of infections in a long term geriatric units and to gather informations about antibiotic use.

Method: Longitudinal prospective study of >65-year old residents of 35 long term geriatric institutions during a 6-month period. Data collected for each resident were demographic data, dependence score, medication, risk factors such as vaccination, bladder catheter, skin ulcer. Infections were diagnosed according to predetermined criteria and using CDC modified definitions. Antibiotic treatment and outcome were recorded.

Results: From 01.09.1998 to 28.02.1999 a total of 1500 residents (1149 women and 351 men) were followed for a total 248'843 residents days. The mean age was 86.5 for women and 83 for men. Influenza and pneumococcal vaccination was noted in 74% and 14% of the residents, respectively. Dependence score was heavy in 15%, moderate in 44% and light in 41%. Bladder catheter was present in 7% of women and 18% of men. Infection prevalence at the beginning of the study was 5.7%. A total of 1111 infections were observed in 719 residents (48%) during the study period, representing an incidence of 14.8 infections/100 residents/month. Crude mortality was 14.5% and infection related mortality was estimated to be 3.7%. Respiratory tract infections, urogenital and skin infections represented 39%, 35% and 10% of infections, respectively. Systemic antibiotics were given in 75% of infections. Quinolones were used in 75% of the urinary tract infections and more than 50% of the respiratory tract infections were treated with a beta-lactam.

Conclusion: The prevalence and the incidence of infections in these long term geriatric care institutions were similar to those reported in the literature. Given the extreme frequency of the problem and the impact on antibiotic prescription, special efforts should be directed towards prevention in order to reduce morbidity, antibiotic use and potential emergence of resistance.

GENOTYPIC AND PHENOTYPIC CHARACTERIZATION OF SALMONELLA STRAINS ISOLATED FROM PATIENTS IN A PEDIATRIC EGYPTIAN HOSPITAL.

F. Mattes, N. Boutros, M. Thibault, Laboratoire de Bactériologie, Hôpital René Dubos, Pontoise, France M.K. Abdel-Khalek, J.A. Boutros, A.A. El Kholy, New Children Hospital, Cairo University, Cairo, Egypt

Objective: Analysis of an outbreak of extraintestinal salmonellosis in a pediatric hospital in Cairo.

Method and population: 13 clinical extraintestinal isolates (blood, cerebrospinal fluid, urine and sputum) were recovered from 13 patients aged between 4 days and 15 years during the period from March to September 1998 and hospitalized in the ICU and internal medicine units. Strains were characterized using biotyping, serotyping, antibiotyping, conjugation, analytical isoelectric focusing and pulsed field gel electrophoresis (PFGE). Clinical epidemiological investigations were also performed.

Results: Biotyping and serotyping identify 6 *S. worthington*, 3 *S. enteritidis*, 1 *S. typhimurium*, 1 *S. infantis*. Ten strains produced an extended spectrum beta lactamase (ESBL), while the 3 remaining strains were susceptible to all antibiotics tested. PFGE permitted the resolution of XbaI macrorestriction fragments into 6 distinct types (A, B, C, D, E and F). The A cluster consisted of the 6 *S. worthington*, the B cluster of the 3 *S. enteritidis* and the remaining isolates each presented a different profile. Isoelectric focusing of the ten ESBL permitted the distinction of 2 beta lactamases SHV-2 and SHV-5. Conjugation was obtained for 8 of the 10 strains.

Conclusions: The previous analysis shows that this outbreak was caused by at least 2 *Salmonella* strains, which due to their multidrug resistance, were fatal in all cases studied.

STAPHYLOCOCCUS AUREUS METHICILLIN-RESISTANT AND GLYCOPEPTIDES USE IN A 400-BEDS GENERAL HOSPITAL: A ONE-YEAR PROSPECTIVE STUDY

S. Leflot, M. Aka, P. Baune, A. Mangel, F. Fauvelle

Objective: To investigate the relationship between the incidence of methicillin-resistant *Staphylococcus aureus* (MRSA) and the prescribing patterns of parenteral glycopeptides (GP) in medical, surgical and intensive care units of an acute hospital.

Method and population: All data concerning new MRSA cases (MRSA isolated from a clinical specimen) and GP-use (number of Defined Daily Administrations "DDA") were prospectively collected between October 1998 and September 1999 from pharmacy and hospital microbiology records. Duplicate isolates from the same patient were excluded.

Results: The overall incidence of MRSA cases was 0.77/1000 hospitalization days. We found a strong correlation between incidence of MRSA and MRSA-related GP-DDA (Pearson, $r=0.99$, $P<0.001$). Ratio of MRSA-related GP-DDA / total GP-DDA were respectively 28%, 42% and 54% in surgical, intensive care and medical units ($P<0.001$), with an average of 40%.

Conclusions: About 60% of GP-DDA were not related to MRSA-documented infections. Inappropriate GP-use has persisted despite hospital guidelines. The empirical use of GP must be reevaluate as the use of vancomycin for surgical prophylaxis, specially in orthopaedic surgery.

COST EFFECTIVENESS STUDY COMPARING TWO TREATMENTS OF NOSOCOMIAL URINARY TRACT INFECTION

A. Fromajoux, Pharmacie Michallon, Grenoble, France
F. Salord, Emergency unit, Lyon, France
S. Ferry, Pharmacy - hospital neuro-cardiologie, Lyon, France

Objective: To compare two treatments of nosocomial urinary tract infection in patients with chronic indwelling urethral catheters in terms of clinical effectiveness, toxicity, length of hospitalization and cost.

Method and population: A cost effectiveness, prospective, controlled, randomized, open study. 22 hospitalized patients with nosocomial urinary tract infection were randomized to received either oral antibiotic furandantoin (group I) during 10 days or parenteral antibiotic gentamycin (group 2).

Main outcomes measures are clinical response, toxicity, and length of hospitalization. Treatments costs were included drug acquisition, preparation and administration, laboratory evaluations, treatment of adverse events, and additional hospital days.

Results: The measured of outcomes are expressed in terms of cost per unit of success.

No significant difference was found among the two treatments in terms of clinical effectiveness ($p=0.05$).

Conclusions: The treatment 1 can be considered as the most cost-effective but the result must be moderate on account of the small of patients randomized.

AN INSURANCE QUALITY PROGRAM. PREVENTION OF NOSOCOMIAL IN VAGINAL DELIVERY

E. Tissot Guérin, Edouard Herriot Hospital, Lyon, France

An incidence survey of nosocomial infection has been realized since 1987 in this university maternity ward (n deliveries/year = 3300). The incidence of nosocomial endometritis was too high, if compared with the other maternity wards in Lyon (incidence survey concerning 100,000 deliveries) and we decided to observe quality of medical techniques during 3 months (September, November 1997).

After one year, the decrease of nosocomial endometritis is important, thanks to a better compliance of hand washings.

Frequency of multi-drug resistant bacteria colonization in intensive care unit's patients.

S. Ledru, J.P. Canonne.
Laboratoire de Microbiologie, C.H. Dr Schaffner, 62 300 Lens, France

Background: Evaluation of the frequency of multi-drug resistant bacteria (MDR) infections and/or colonization of patients at time of admission and during their hospitalization.

Patients and method: For each patient admitted in 1998 in the intensive care unit (ICU) of the Lens hospital, three samplings were made by way of swabbing (anal, perineal and nasal) to look for MDR colonization. Three days after, the same samplings were made and then repeated once a week. *S. aureus* resistant to methicillin (SARM), extended broad spectrum lactamase enterobacteriaceae (EBSE), *A. baumannii*, *S. maltophilia*, and *P. aeruginosa* resistant to ticarcilline (Ticar R) were considered as MDR.

Results: During this year, 382 patients were admitted in the ICU and 164 (42.93%) were colonized during their hospitalization by at least one MDR. The incidence density was of 35.73 for one thousand patients-days. 289 MDR were discovered, 1.76 MDR for each colonized patient. MDR repartition was: 89 SARM (30.80%), 75 *P. aeruginosa* Ticar R (25.95%), 53 *A. baumannii* (18.34%), 49 EBSE (16.96%) and 23 *S. maltophilia* (7.95%). The average MDR onset was 16.48 days but 50.5% of the patients were colonized during the first 10 days. Colonization onset varied with each MDR ($p=0.001$). Patients were colonized with SARM within 10 days after their admission but were colonized by other germs between 18.6 to 21 days after admission. Over a quarter of the SARM carrier patients were colonized at admission. 37 out of 164 patients developed at least one MDR infection (22.56%). 57 infectious episodes were recorded: 36 pulmonary infections, 10 urinary infections, 7 catheter infections and 4 septicemia. Incidence density was 12.42 for one thousand patients-days. Among the 57 infectious episodes, 8 were multi-microbian and 65 germs were responsible for nosocomial infections: 20 *P. aeruginosa* Ticar R, (30.67%), 15 *A. baumannii* (23.08%), 15 EBSE (23.08%), 9 SARM (13.85%) and 6 *S. maltophilia* (9.23%).

Conclusion: survey of MDR colonization in ICU gives us a better understanding of their ecology. Moreover, MDR detection can be made earlier with routine peripheral samplings. It allows, if infection is suspected, for a better probabilistic therapy suited to the germ involved.

"BACTERIO" an epidemiology and microbiology multipurpose software.

S. Ledru, J.P. Canonne.
Laboratoire de Microbiologie, C.H. Dr Schaffner, 62 300 Lens, France

Due to its important role in hospital, the microbiology laboratory takes an important part in microbial ecology follow up and in nosocomial infections detection. It is also involved in early epidemic detection especially when several wards are concerned.

"Bacterio" software (InfoPartner, Nancy) was developed to face all these issues. This precious tool is composed with different modules:

- 1) "Analysis" module enables an intake and display of quality of microbiological results. It is entirely customisable. When a sample is positively tested for a particular germ, the software displays the previous antibiograms obtained for this germ in the same sample or in another one. It makes biological validation of records easier. Medical history of patients is also available for consultation.
- 2) "nosocomial infection/ multi-drug resistant bacteria" module allows:
 - a) a targeted germ detection adapted to each ward and sample.
 - b) real-time detection and reporting of possible nosocomial infections. The software eliminates duplicated data, manages ward answers and makes up follow up letters for unanswered records.
 - c) Epidemic episodes detection by statistical comparison between the number of nosocomial germs for a period and the number of germs in the "n" previous periods.
- 3) "Database reporting" module: records can be sorted thanks to a competitive multi-criteria selection tool. Lists and statistical reports can be created by a state generator. Graphical exploration of data is also possible. This module allows survey of wards microbial ecology, germ resistance evolution and infection etiologies. Data are kept in files exportable to DBF format.

Conclusion: "BACTERIO" is a powerful and user-friendly software. Microbiologists can use it to analyse and follow hospital ecology. CLIN profitably uses it in its fight against nosocomial infections.

PREVENTION OF NOSOCOMIAL INFECTIONS: IMPACT OF A PROMOTION CAMPAIGN IN PEDIATRICS ?

K. Pósfay Barba, S. Hugonnet, S. Touveneau, D. Pittet
Hôpitaux Universitaires de Genève, Geneva, Switzerland

Background: Hand hygiene (HH) prevents nosocomial infection. Cross-transmission can be facilitated in Pediatrics where infectious diseases are frequent and « dirty » and « clean » sites are close. Compliance to HH in pediatric settings has not been properly assessed. We investigated risk factors for non-compliance and studied the impact of a promotion campaign.

Method: Biannual hospital-wide surveys were conducted from 1994 onwards. Health care workers (HCWs) were observed while providing routine patient care. A HH promoting campaign was started after baseline survey. The main outcome measure was compliance to HH, whether hand washing or hand disinfection.

Findings: We observed 1909 opportunities for HH, totaling 93 hours of observation. Overall compliance to HH was 60%, but increased from 57% to 75% ($p=0.032$) over the study period. If hand washing compliance decreased from 50 to 44% ($p=0.024$), hand disinfection increased dramatically from 7.3 to 32% ($p<0.001$). Compliance increased among nurses ($p<0.001$), physicians ($p=0.055$) and other HCWs ($p=0.015$), but remained stable among nursing assistants ($p=0.31$). Compliance among activities with low risk of cross-transmission increased ($p=0.006$), but remained unchanged for high-risk activities ($p=0.9$). Independent risk factors for non-compliance was: to be a physician (OR 1.02, $p<0.001$) or a HCW other than a nurse (OR 2.67, $p=0.008$), high-risk activities (OR 2.67, $p<0.001$) and conditions associated with high numbers of opportunities for HH per hour of care (OR 1.02, $p<0.001$). Even after adjustment for these variables, compliance increased over time ($p=0.049$).

Conclusion: Our HH promoting campaign had a marked impact on compliance, attributable to the increased use of hand disinfection. Interestingly, even physicians improved their compliance. However, there is room for improvement and for new targeted interventions.

INCIDENCE OF NOSOCOMIAL INFECTIONS IN AN INTENSIVE CARE UNIT: A THREE YEARS-PROSPECTIVE STUDY AMONG 815 PATIENTS

I. Jaisson-Hot, C. Haond, M. E. Reverdy, B. Bui-Xuan, J. M. Vedrinne, S. Duperré, I. Mohammedi, I. Bobineau, P. Petit, P. Bouleureau, F. Tissot Guerraz
Hôpital Edouard Herriot, Lyon, France

Objective: The purpose of this study was to analyse the incidence rate of nosocomial infection trends during three years

Method and population: An incidence study about nosocomial infection has been carried out in one of the intensive care unit (ICU) in Lyon Edouard Herriot hospital for a three years period (95 to 97). A total of 815 patients admitted to the ICU for at least 48 hours were included in this study. These patients were surveyed from the day of ICU admission until ICU discharge, for respiratory tract infections, urinary tract infections, bacteriemia, and colonization of central venous or arterial catheter. Standardized Centers for Disease Control (CDC) definitions of nosocomial infection were used.

Results: We report an incidence rate of 29.2 nosocomial infections per 1000 patient days: 14.5 respiratory tract infections per 1000 ventilator days; 11.6 urinary tract infections per 1000 indwelling urinary catheter days; 4.8 bacteriemia per 1000 patient days; 2.2 colonization of central venous or arterial catheters per 1000 catheter days

Conclusions: The most important result is the decrease of the incidence of the urinary tract infections during these three years. We must continue this epidemiological survey in order to reduce the rates of others nosocomial infections and obtain quality indicators

TEN PREVALENCE STUDIES FROM 1985 UNTIL 1998

E. Martin, M. Perraud, C. Haond, G. Perrin, C. Chemorin, F. Tissot Guerraz. Hôpital E. Herriot, Lyon, France

Objective: Description of the results of the ten prevalence studies realized from 1985 until 1998.

Methods and population: We collected all nosocomial infections (NI) which existed on a given day, in all units of the hospital E. Herriot. We noted if NI concerned patients whose stay was at least 48 hours, or not. We have also compared our prevalence results according to the units: intensive care, surgery, gynaecology-obstetrics, surgery specialties.

Results

Year	1985	1989	1990	1991	1992	1993	1994	1995	1996	1998
Number of beds	1475	1310	1258	1248	1222	1190	1157	1155	1055	1055
Number of hospitalized	1289	1154	1055	1053	1002	900	873	969	878	725
Bed-occupation ratio	87%	91%	84%	84%	82%	75%	75%	84%	83%	69%
Hospitalized > 48 hours	883*	807	782	733	614	609	713	613	514	514
Number of NI	145	87	95	70	84	43	63	65	73	53
Nb NI/ Nb hospitalized	11.3%	7.6%	9.1%	6.6%	8.3%	4.7%	7.2%	6.7%	8.3%	7.3%
Nb NI/ Nb hospitalized >48h	8.9%	11.8%	9.2%	11.4%	7%	7.2%	8.4%	8.1%	10.3%	10.3%
Number patients with NI (p.NI)	111	77	77	61	78	39	59	51	58	37
p.NI / nb hospitalized	8.6%	6.7%	7.3%	5.8%	7.5%	4.3%	6.7%	5.2%	6.8%	5.1%
p.NI / Nb hospitalized >48h	8.7%	9.5%	8%	10.8%	6.4%	8.9%	7.2%	7.1%	7.1%	7.1%

* In 1985, we have included patients who stayed at least 24 hours and not 48 hours.

Conclusions: The prevalence survey which allows an inventory of features, is not representative of the whole year. Nevertheless, the method can be used in all units as a teaching method. The prevalence study frequently could be discussed.

SURVEILLANCE OF METHICILLIN RESISTANCE IN STAPHYLOCOCCUS AUREUS ISOLATES FROM BLOOD CULTURES AND CEREBROSPINAL FLUID

M. Mari, Public Health Laboratory Service (Wales), Cardiff, United Kingdom
R. Salomon, CDSC (Wales), D. Evans-Williams, North West Wales NHS Trust, I. Hosen, Cardiff PHL, D.N. Looker, Rhyl PHL

Objective: To examine the change in resistance to methicillin in *S. aureus* isolates from blood cultures and cerebrospinal fluid (CSF) in Wales over time.

Method and population: Since 1993, data on all new isolates of *S. aureus* from blood cultures and CSF, identified in medical microbiology laboratories in Wales, have been collected via a set of inter-connected database modules. Patient demographic data and isolate resistance to methicillin are recorded. In 1998, data collected via this electronic method was audited against the data held on the laboratories' local information systems.

Results: Data from 1993 to 1997 showed a steep rise in methicillin resistance from 4% of isolates where susceptibility was recorded, to 43%. Over this period methicillin resistant isolates partially replaced sensitive isolates, but also occurred in addition to them, increasing the overall burden of patients with serious staphylococcal sepsis. Results also showed that patients with methicillin resistant *S. aureus* (MRSA) were significantly older and more likely to be male than patients with methicillin sensitive strains (MSSA) (Mean age (95% CI): MSSA - 58 (56-59) years, MRSA - 66 (64-67) years, $p < 0.001$; male sex OR (95% CI) = 1.4 (1.1-1.8), $p = 0.003$). Results from 1998 showed that the percentage methicillin resistance stayed at 43%. The audited data showed quite a lot of variation by laboratory compared with the electronically collected data, but the overall percentage methicillin resistance was very similar at 42%. Resistance in the reporting laboratories varied from 17 to 55%. Results received so far from 1999 show that overall methicillin resistance is 44%.

Conclusions: Methicillin resistance in *S. aureus* isolated from blood cultures and CSF rose steeply over a five year period, but appears to have stabilised over the last two years. Resistance rates are very variable between laboratories. Audit of the electronic data collection system showed that overall the collection method is presenting an accurate picture of the methicillin resistance situation in Wales.

INCIDENCE OF NOSOCOMIAL INFECTION IN A BURN UNIT: A TWO YEAR SURVEILLANCE.

C. Haond, Ph. Bolron, J. Latarjet, MO. Baume, F. Tissot Guerraz - St Joseph St Luke Hospital - Lyon - FRANCE -

Objective: estimation of nosocomial infection (N.I.) in 318 patients hospitalized in 1996 and 1997.

Methods: a continuous survey has been performed for 11 years in this burn unit, including all types of N.I.: respiratory tract infections (R.T.I.), urinary tract infections (U.T.I.), arterial catheter related infections (A.C.R.I.), central venous catheter related infections (C.V.C.R.I.), bacteriemia and skin infections.

Total incidence and specific device-related incidence have been calculated.

Incidence of different types of nosocomial infections in 1996-1997

	R.T.I.*	U.T.I.	A.C.R.I.	C.V.C.R.I.	Bact.	Skin inf.	TOTAL
- Number of NI (%)	16 (18.6)	13 (15.3)	4 (4.7)	5 (5.9)	8 (9.4)	39 (45.9)	85 (100)
- Specific incidence	44.1	23.1	16	15.6	2.5	12.3	113.6
- Total incidence	5	4.1	1.3	1.6	2.5	12.3	26.7
- Specific incidence density	24.2	11.9	6.5	7.7	1.3	6.3	57.9
- Total incidence density	2.6	2.1	0.6	0.8	1.3	6.3	13.7

*R.T.I. = respiratory tract infections A.C.R.I. = arterial catheter related infections

U.T.I. = urinary tract infections C.V.C.R.I. = central venous catheter related infections

Our results are good if compared with those of other studies and our work would be continued because it means a better prevention.

RISK FACTORS FOR MORTALITY FROM COAGULASE-NEGATIVE STAPHYLOCOCCI NOSOCOMIAL BACTEREMIA

S. Hugonnet, L. Correa, V. Sauvan, D. Pittet, University of Geneva Hospitals, Geneva, Switzerland

Objective: Analysis of risk factors for death in coagulase-negative staphylococci (CNS) primary nosocomial bacteremia

Design: Prospective cohort study in a teaching hospital

Methods and population: All blood cultures that yielded CNS identified between April 1, 1995 and April 30, 1998 were reviewed for clinical significance. CNS primary bacteremia defined a patient older than 18 years with any species of CNS isolated in one or more blood culture set (blood culture set=pair of bottles, anaerobic and aerobic) associated with clinical signs of infection, and in the absence of CNS body site infection. Death was associated with CNS bacteremia if there was clinical evidence of persistent infection or a strong association between bacteremia and death, i.e., the bacteremia caused failure or further compromise of an organ system.

Results: A total of 234 patients were analyzed. Crude mortality was 24% (57/234); mortality was directly associated with bloodstream infection in 30 patients (12.8%). We compared patients who died from CNS bacteremia with those who survived. By univariate analysis, no differences were found regarding gender, primary diagnosis, presence of neutropenia, appropriateness of antibiotic therapy, ICU stay prior to bacteremia or number of positive blood culture sets. Multivariate analysis identified two variables that were independently associated with mortality: age (OR 1.03 per year; CI95 1.01-1.07), and rapidly fatal disease (OR 11.5; CI95 3.0-45). The number of positive blood culture sets was not an independent predictor of death due to CNS infection ($p = 0.39$).

Conclusions: Age and severity of underlying disease were the main risk factors for death attributable to CNS bacteremia. The number of positive blood culture sets did not influence outcome.

THE CLINICAL SIGNIFICANCE OF SINGLE POSITIVE BLOOD CULTURE IN COAGULASE-NEGATIVE STAPHYLOCOCCI BACTEREMIA

S. Hugonnet, L. Correa, D. Pittet, University of Geneva Hospitals, Geneva, Switzerland

Objective: To assess the importance on patient outcome of the number of positive blood culture sets in CNS primary nosocomial bacteremia.

Method and population: All blood cultures that yielded CNS identified over 3 years were reviewed for clinical significance. A case of CNS primary bacteremia was defined in an adult patient with any species of CNS isolated in one or more blood culture set (blood culture set=pair of bottles, anaerobic and aerobic) associated with clinical signs of infection, and in the absence of CNS body site infection.

Results: A total of 234 patients (median age, 58 y) with CNS primary bacteremia met the inclusion criteria. At time of CNS bacteremia patients with growth in one set of blood culture ($n = 163$): had higher median duration of hospitalization prior to the CNS bacteremia (11 vs 15 days, $p = 0.025$); had longer median time for growth of CNS (3 vs 2 days, $p = 0.001$); stayed more frequently in ICU prior to bacteremia (97/163 vs 27/71, $p = 0.002$); and received less frequently adequate antibiotic therapy (53/163 vs 58/71, $p < 0.001$) than patients with growth in two or more blood culture sets ($n = 71$). There were no differences between the two groups with regard to primary diagnosis, McCabe classification, presence of neutropenia or age. Crude mortality was higher (although not statistically significant) among patients in group 1 than in group 2: 15.3 vs 7% at day 14 ($p = 0.08$), and 21 vs 11% at day 28 ($p = 0.08$). The attributable mortality was similar in two groups (14 vs 10%, respectively, $p = 0.303$).

Conclusion: In presence of clinical signs of infection, single positive CNS bacteremia has similar clinical significance, and similar crude and attributable mortality than multiple blood culture positive bacteremia.

INCIDENCE OF NOSOCOMIAL INFECTIONS IN A PAEDIATRIC INTENSIVE CARE

E. Martin, Y. Gillet, D. Floret, A. Ateba, F. Tissot Guerraz, Hôpital Edouard Herriot, Lyon, France

Objective: Description of the epidemiology of nosocomial infection (NI) in a paediatric polyvalent intensive care unit (ICU).

Method and population: A discontinuous survey has been realized since 1996 in the paediatric ICU, not neonatal (10 beds). Data were collected between August, 1998 and March, 1999. We have included all the children whose stay was at least 48 hours.

Results: Data about 195 children (median age: 2 years) were analyzed. The majority were admitted for medical pathology (72.3%), the others for post-surgery (19.5%) and 8.2% for traumatology. 23 children were immunodeficient. We found 32 NI (16.4%) for 21 children (10.8%). 5 were immunodeficient and presented 10 NI. 10 NI were urinary tract infections (UTI), 8 were bloodstream infections, and only 2 pneumoniae. We found 3.6 IN pneumoniae for 1000 days of ventilation, 19.7 UTI for 1000 days of urinary catheter and 12.5 primary bloodstream for 1000 days central lines. The median length of stay was 4 days for children without NI versus 13 days for the others ($p < 0.0005$). Methicillin-resistant *Staphylococcus aureus* is the most frequently detected micro-organism. Gram positive micro-organisms represent 48.7% and Gram negative 45.9%, *Candida* 5.4%; no viruses were detected. Median of the Paediatric Risk Score of Mortality (PRISM) of children with NI and without are 9 versus 5 ($p = 0.004$).

Conclusions: In our paediatric ICU unlike in other paediatric ICU, urinary tract infections were the most common NI instead of bloodstream infections. The survey must be continued to improve care -quality.

METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS AT A SWISS TERTIARY CARE CENTER: "UNDECLARED GOODS" BY INTERNATIONAL TRAVEL?

H. Sax, University of Geneva Hospitals, Geneva, Switzerland
C. Colombo, H. Giger, C. Ruef, University of Zurich Hospitals, Zurich, Switzerland

OBJECTIVE: To study the clinical and epidemiological characteristics of patients with methicillin-resistant *Staphylococcus aureus* (MRSA) at the University of Zurich Hospital (UZH) with prior contact to health care institutions abroad.

METHODS: Descriptive analysis of prospectively registered MRSA cases at a tertiary care hospital in a five-year time period (Oct 1992 – July 1998). Case definition: persons with in-patient or outpatient treatment abroad within one year prior to hospitalization at UZH and from whom MRSA was isolated at UZH. All strains underwent typing by pulsed field gel electrophoresis.

RESULTS: 36 cases of MRSA met the case definition (27% of a total of 131 MRSA cases). Mean age was 42.4 years \pm 16.9 SD. Patients were transferred from Italy (10), Yugoslavia (7), Greece (4), Egypt and Germany (2 each), Albania, Australia, Brazil, France, Great Britain, Japan, Poland, Singapore, Spain, Thailand, USA (one each). 72% were living in Switzerland. Eight (22%) were hospitalized in another Swiss institution before being transferred to this hospital. Diagnosis comprised trauma in 26 cases (71%), cardiovascular disease in 3 cases, neurological, gastrointestinal disease in 2 cases each, and dermatological, respiratory disease, and ear infection in one case each. MRSA was found because of known colonization, by screening, or accidentally in 3 (8%), 5 (14%), and 28 (78%) cases, respectively. Median latency from admission to detection of MRSA was 1 day (range, 0-47). MRSA infection was found in 15 cases (44%). Genotypes of all recovered strains proved markedly different from those endemic at UZH. Two secondary cases were noted.

CONCLUSIONS: A sizable proportion of all MRSA strains was imported from abroad and was found by chance. The patients were mostly young, male, and admitted to surgical units and ICU following trauma during international travel. These data help to tailor preventive measures against further intra- and inter-hospital spread.

INTERHOSPITAL DIFFERENCES IN NOSOCOMIAL INFECTION RATES - THE SECOND SWISS NOSOCOMIAL INFECTION PREVALENCE STUDY

H. Sax, SwissNOSO Network, University of Geneva Hospitals, Geneva, Switzerland

BACKGROUND: Nosocomial infection (NI) prevalence was assessed in 4 Swiss hospitals for the first time in 1996 (Pittet, ICHE 1999;20:37). We repeated the survey in 1999 including additional hospitals and investigated the possible relation between NI rates and infection control (IC) programs and hospital characteristics.

METHODS: A period-prevalence study conducted in April 1999 including the 5 teaching and 13 additional representative Swiss hospitals. Hospitals were classified according to their size: <200 beds (9); 200-500 beds (4); >500 beds (5) and further characterized using a microbiology diagnostic index, average length of stay (LOS) at time of study, and IC program characteristics. All adult acute care wards were included except dermatology, ophthalmology, ENT, gynecology-obstetrics, bone marrow transplant and burn units. NIs were defined according to Centers for Disease Control and Prevention (CDC) criteria. Variables used for case-mix adjustment included LOS, admission diagnosis, co-morbidities (Charlson and McCabe indexes), exposure to antimicrobials, invasive devices, and procedures. Data collection was standardized and completed by local IC personnel trained and coached by experienced IC staff, before and during the study. Extensive data check was performed.

RESULTS: Overall, out of 4077 patients, 424 had at least one NI (prevalence 10.4%). NI prevalence varied significantly by hospital size (<200 beds: 7.6% [CI95 6.1-9.5]; 200-500 beds: 11.3% [CI95 9.5-13.3]; >500 beds: 11.3% [CI95 10.0-12.8]; $p = 0.0043$). Evidence for the possible impact of case mix, IC and hospital characteristics on NI rates will be presented.

CONCLUSIONS: We found significantly higher unadjusted NI prevalence rates in large and medium size compared to small hospitals. Case-mix adjustment using different confounding variables is necessary before conducting comparison of infection rates.

NOSOCOMIAL INFECTION PREVALENCE IN ACUTE, INTERMEDIATE- AND LONG-TERM CARE: A HOSPITAL-WIDE SURVEY

H. Sax, S. Hugonnet, P. Herrault, D. Pittet, University of Geneva Hospitals, Geneva, Switzerland
S. Harbarth, The Children's Hospital, Harvard Medical School, Boston, MA, United States

OBJECTIVE: To measure the prevalence of nosocomial infection (NI) and assess differences between hospital sectors.

METHODS AND POPULATION: A 7-day period-prevalence survey conducted in May 1998 in a large tertiary care center in Geneva, Switzerland, including all patients in acute (AC), intermediate-term (ITC), and long-term care (LTC) sectors. NI was defined according to modified criteria of the Centers for Disease Control and Prevention. Variables included demographic characteristics, exposure to invasive devices and antibiotics, surgical history, and patients' movement through the institution.

RESULTS: The study population consisted of 1,928 patients. Overall prevalence of NI was 11% (AC, 8.4%; ITC, 11%; LTC, 16%) and ranged from 0% in ophthalmology to 22% in intensive care units. Odds ratios [OR] of infection in ITC and LTC sectors were significantly higher than in the AC sector even after adjustment for case-mix (OR, 2.59; 95% confidence interval [CI95] 1.53-4.41; and OR, 2.34; CI95 1.38-3.95, respectively). In 21% of patients the place of acquisition and detection differed, thus reflecting the migration of infected patients between services and sectors. As a distinct group, geriatric patients showed an important proportion of urinary (39%) and respiratory (21%) tract infections, contrasting with a relatively low exposure to urinary catheters (6.1%) and orotracheal intubation (0%).

CONCLUSION: Intermediate- and long-term care sectors are associated with high infection rates even after case-mix adjustment. Prevalence studies used as an easy surveillance tool can be exploited further by analyzing data according to hospital services and sectors to identify high risk areas.

DECLARATION OF RISK FOR NOSOCOMIAL INFECTION: A TOOL FOR QUALITY IMPROVEMENT

MF Dumay, A. Chalfine, A. Laurin Izan, J. Gonot, J. Carlet, Hôpital St Joseph, Paris, France

Objective: To analyze the benefit of a hospital-wide risk management program in the prevention of nosocomial infections (NI).

Method and population: From January 1998, all categories of health care workers (HCW) were asked to declare to the risk manager every abnormal event or situation at risk including the field of hygiene and NI. A situation at risk of NI (SARNI) is defined as an event or a dysfunction able to induce a NI, independent of its occurrence. The program used a behavioral approach and was based on voluntary reports through a standardized form collecting the following data: identification of the HCW, identification and type of risk, corrective measures undertaken.

Results: In a 22-month period, 42 SARNI were reported. The cases were reported by 31 (73%) nurses, 7 (17%) laboratory technicians, 3 (7%) maintenance services workers and 1 (2%) physician. Type of risk was distributed in four categories: lack or failure of equipment (6), improper execution of procedures due to human error (22), architectural problems (4), unsanitary conditions (10). All the 42 forms were redirected by the risk management unit to the infection control team. HCWs took the initiative to: (1) notify the department able to solve the problem, (2) immediately review the guidelines, (3) take the necessary steps to insure the guidelines are met.

Conclusions: The true number of SARNI is probably underestimated in this study. Nevertheless, this program uses a decision making tool, based on established facts and not on subjective information. At risk situation reporting can be used as an evidence based prevention system to avoid NI before their occurrence. A precise evaluation of the program in NI rate is needed.

PREDICTIVE FACTORS OF MORTALITY OF POST-OPERATIVE PNEUMONIA (POP).

H. Dupont¹, J.L. Pourriat², C. Martin³, G. Bonneliey⁴ and the CIAR.
¹CHU Bichat, ²CHU Bondy, ³CHU Marseille Nord, ⁴Sofres Medical, France.

Introduction: Prognosis factors of mortality of ventilator-associated pneumonia are well described but epidemiological data concerning POP are scarce.

Methods: Multicenter (n=200), prospective study during 9 months (1997-98). POP diagnosis was assessed on both clinical criteria, biological criteria, chest X-ray modification and microbiological criteria when possible (tracheal aspiration $\geq 10^6$ cfu/ml, telescopic plugged catheter or PSB $\geq 10^6$ cfu/ml, BAL $\geq 10^6$ cfu/ml). All the included patients (pts) received an antimicrobial therapy for the POP diagnosed. Survivors (S) were compared with non-survivors (NS). An univariate analysis was performed first, then a multivariate logistic regression to assess independent factors of mortality during POP. Odds-ratio and 95%CI were calculated.

Results: 556 POP were diagnosed as defined. 126 pts were NS (22.7%). Death occurred 27 days after admission and 15 days after POP diagnosis. Delay of POP was longer in NS (5.2 \pm 3.5days vs 4.5 \pm 3.6, $p < 0.05$). NS pts were older ($p < 0.01$) and had more frequently an underlying disease ($p < 0.01$). NS pts had an higher ASA score ($p < 0.0001$) and were more frequently operate from septic surgery ($p < 0.01$). NS patients had more organ failure than S pts: acute respiratory failure requiring mechanical ventilation ($p < 0.01$), alteration in PaO₂/FIO₂ ratio ($p < 0.01$), hypotension ($p < 0.01$), cutaneous vasoconstriction (CV) ($p < 0.01$) and alteration in consciousness ($p < 0.01$). In the multivariate analysis, the following parameters were independently associated with mortality: ASA grade ≥ 3 (OR=3.8, CI95%=[2.2-6.8], $p < 0.001$), age ≥ 63 year-old (OR=2.2, CI95%=[1.3-3.6], $p < 0.01$), delay of POP ≥ 3.3 days (OR=1.9, 95%CI=[1.2-3.1], $p < 0.01$), CV (OR=1.8, 95%CI=[1.1-3.1], $p < 0.05$) and hypotension (OR=1.8, 95%CI=[1.1-3.0], $p < 0.05$).

Conclusions: Overall mortality of POP in this study (22.7%) is largely lower than mortality of nosocomial pneumonia in ICU. Five independent predictive factors of mortality were found. They could help us to improve quickly the patients' care.

THE INCIDENCE OF NOSOCOMIAL INFECTIONS, A PARAMETER FOR THE COMPARISON OF SURGICAL DEPARTMENTS?

Y.v.Dijk, Th. v.Dalen, S.v. Ruth, P. Leguit, R.J.A. Diepersloot, Diaconessen Hospital Utrecht, the Netherlands

Objective: To determine the applicability of registered nosocomial infections as a parameter for comparison of surgical departments.

Method and population: Between July 1st 1997 and July 1st 1998 postoperative complications occurring in patients admitted to the surgical department of a district hospital were registered. The nosocomial infections were determined according to the CDC-standards. 2004 Patients were admitted 2172 times to the surgical wards. The precision of registration, the implications of the registered nosocomial infections and the share of this complications in the overall postoperative morbidity were analysed.

Results: Postoperative course was complicated in 506 patients (23% of admission). Airway- and woundinfections were the most frequently registered complications (in 4.4% and 4.3% of the admissions respectively). 45% Of the wound infections were recorded after discharge. 88% Fully recovered by conservative means. 94% Of the airway infections were recorded during the admission. Two patients with an airway infection died (2%). 94% Of the urinary-tract infections was recorded during the hospital stay. All urinary-tract infections recovered by conservative means. There were no cases of bacteraemia.

Conclusions: The contribution of wound infections to overall postoperative morbidity and the severity of these infections is low and vary with the reason of admission. The morbidity and the severity of airway infections is more serious. Considering the difficulty in diagnosing airway infections this is not an ideal parameter for comparison the quality of hospitals. We suggest that dependent on the reason of admission the most important postoperative complication (infectious or other complications) must be used as a parameter for the comparison of surgical departments

TAZOCIN (PIPERACILLIN+TAZOBACTAM SODIUM) IN TREATMENT OF SEVERE ACUTE PANCREATITIS - FIRST OR SECOND CHOICE MEDICATION?

M. Smietanski, M. Łukiański, M.I. Pireki, Z. Śledziński; I Department of Surgery, Medical University Of Gdańsk, Poland

Objective: Evaluation of Tazocin efficiency as primary or secondary antibiotic therapy in severe acute pancreatitis (SAP)

Method population and results: In the years 1997-1998, 82 patients were treated for AP. 29 were qualified as SAP. Qualification was based on general condition, biochemical tests, CT and ultrasound (using Ranson and APACHE II scores). In group I (15 patients) Tazocin was administered as the second choice drug after unsuccessful routine antibiotic therapy. In second group (14 patients) Tazocin was given as first choice treatment [both groups 3x4.5 i.v.]. Time of drug administration- gr. I 7-10 days, gr.II 7-20 days. 10 patients in group I were subjected to repeated laparotomy (4-10 times, every other day) due to infected pancreatic necrosis confirmed by CT. 7 patients died because of multiorgan failure. Hospital stay in this group was 5 weeks to 6 months (av. 68 days). In group II 6 patients were operated: 4 repeated laparotomies (2-4 times every other day) and 2 continuous lavages were done. Hospital stay was 18 days to 5 months (av. 36 days). 2 patients died because of multiorgan failure. Most commonly isolated bacteria in both groups were: *E. Coli*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii*. Secondary MRSA (3 in gr.I and 2 in gr.II) and *Candida albicans* (4 vs.2) infections were observed.

Conclusions: Tazocin in primary medication successfully controlled the infection rate in group II. 2 Fewer laparotomies were necessary in the second group. 3. Mean hospital stay was nearly two times shorter in group II.

EPIDEMIOLOGY OF VENTRICULOSTOMY-RELATED INFECTIONS IN NEUROSURGICAL PATIENTS

E. Kergrohen, E. Girou, P. Wallock, C. Leguerinet, P. Legrand, E. Melon, Hôpital Henri-Mondor, Service d'Anesthésie-Réanimation, Créteil, France

Objective: To assess the epidemiology of meningitis related to external ventricular CSF drainage in neurosurgical patients.

Method and population: From 01/01/97 to 31/07/99, 159 patients undergoing ventricular catheterization (VC) were surveyed in the 26-bed ICU of the neurosurgery ward. The following data were prospectively collected: diagnosis, age, comorbidities, Glasgow Coma Score (GCS) and Simplified Acute Physiology Score II (SAPS II) on admission, duration of stay, Omega Score and outcome. All patients were managed in a standardized way for nursing, daily bacteriological and chemical CSF examination with removal of VC in case of infection. VC-related meningitis was defined by either a CSF positive direct examination or culture, or CSF pleocytosis and low glucose level.

Results: Meningitis was diagnosed in 24 patients (15.1%). Five cases were not documented (20.8%) and other cases were due principally to Gram positive cocci (84%). The median delay of onset was 7 days. No significant difference was found between infected and noninfected patients in terms of age, SAPS II, presence of comorbidity, and mortality. But, median Omega score (233 vs 186 pts), GCS (11 vs 7), duration of stay (30 vs 19 d) and duration of VC (21 vs 11 d) were significantly higher in infected patients than in noninfected patients.

Conclusion: The proportion of VC-related meningitis without bacteriological documentation appears not negligible and these nosocomial infections seem to have an impact on morbidity but not on mortality rates.

ANALYSIS OF SURGICALLY TREATED TUBOOVARIAN ABSCESS IN TWO PERIODS

M. Petrovic, S. Vrzic, V. Boskovic, I. Likić-Ladjevic, A. Stefanovic, I. Stojnic, D. Bratic, Clinical Centre of Serbia, Institute of Obstetrics and Gynaecology, Belgrade, Yugoslavia

Objective: The purpose of this study was to determine the differences in surgical treatment of tubovarian abscess between two periods: I 1988-1992, and II 1993-1998. Method and population: The analysis involved: incidence (calculated by total number of gynecological operations during the analyzed period), clinical manifestations, microbiological findings and type of antibiotics used prior and after the surgery in 86 patients in I and 126 in II analyzed period. Students t-test was used for comparison of the obtained data.

Results: Between two periods statistically significant difference was not found regarding the incidence (I period 0.39, II 0.31, $t=1.61$, $p>0.05$), clinical manifestations (most common were pain in lower abdomen, elevated body temperature, vaginal bleeding, urinary tract problems, nausea, purulent vaginal discharge) and microbiological findings (most frequent pathogens were *E. coli*, *Staphylococcus epidermidis*, *Enterococcus* and *Staphylococcus alpha-haemolyticus*). The use Ceftriaxon, Cefotaxim and Ofloxacin was significantly higher in I than in II period, but Gentamycin was significantly more often administered in II period.

Conclusion: In II period, while our country was under economic sanctions and diminished ability of using expensive antibiotics, with early diagnosis and adequate conservative treatment we achieved to even cut down the incidence of surgically treated severe forms of pelvic inflammatory diseases.

MONOTHERAPY (MT) VERSUS ANTIBIOTIC (AB) COMBINATION (CT) FOR INITIAL THERAPY OF POST-OPERATIVE PNEUMONIA (POP) IN THE EOLE STUDY.

Ph. Montayre, B. Veber, G. Bonnelie and the CIAR/EOLE Study Group, SOFRES Medical, and Hoechst-Marion-Roussel France, CHU Amiens 80054 Amiens Cedex, France.

Objective: To describe the AB therapy (MT or CT) prescribed at the time of diagnosis of POP and its consequence on the outcome of the patients (pts).

Method and population: A multicenter prospective evaluation of POP conducted during a 9 months period (Oct-97-June 98) involved 230 physicians in 200 private, teaching and general institutions. POP was assessed clinically, on chest x-ray and microbiologically when possible. Antibiotic selection was under the direction of the attending physicians. Charts were reviewed by an independent committee. Results are expressed as means or proportions. $p<0.01$ significant.

Results: 833 surgical (n=574) or post-trauma (n=259) pts (74% males, aged 60 y) were included. 82% of them had received an antibioprophylaxis. The mean delay for onset of POP was 5 days. At the time of diagnosis, 60% of the pts were hospitalised in ICU and 47% of them had ventilator-associated pneumonia. 255 pts (40%) had a microbiological diagnosis with at least one pathogen cultured. MT was administered in 250 pts while 583 pts received CT (443 bitherapy). No significant difference was observed in the demographic parameters between MT and CT. Clinical signs of severity (hypotension, degradation in PaO₂/FiO₂ ratio, intubation for acute respiratory failure) were more frequently observed in CT pts ($p<0.01$ in every case). Betalactams (BL) represented 89% of MT ("Second line" molecules in 12%). Bitherapies consisted in combination of BL with aminoglycosides (AG) in 52% of the cases and with fluoroquinolones (FQ) in 32%.

Other CT consisted in associations of BL+AG with glycopeptides (31%), or nitroimidazoles (41%) or BL+AG with glycopeptides (16%), or nitroimidazoles (12%). A change in therapy occurred in 115 pts receiving MT (due to clinical failure (n=50, 43%) or resistant organisms (n=49, 43%)) and in 402 CT (clinical failure (n=120, 30%) or resistant organisms (n=127, 32%); $p<0.01$ vs MT in both criteria). Death occurred in 34 MT pts (14%) and in 144 CT pts (25%) ($p<0.001$ vs MT) attributed to a complication of POP in 7 MT pts (3%) and in 46 CT pts (8%) ($p<0.01$ vs MT).

Conclusions: A more severe condition explained a large prescription of CT. However, a large proportion of therapeutic failure or organisms resistant to initial AB was observed. An improved adequation of initial AB therapy might improve the prognosis of POP. A large use of "second line" AB for the initial therapy of POP might be proposed.

RISK FACTOR FOR WOUND INFECTION (WIs) IN BREAST CANCER SURGERY : THE EFFECT OF PREVIOUS ANTICANCER CHEMOTHERAPY.

LEFEBVRE D, PENEL N, ROUSSEL-DELVALLEE M, BEAL J, DEBERLES M-F, FOURNIER Ch. Oscar Lambret Cancer Center, Lille, France

Background

Patients from the Oscar Lambret cancer Center, who were undergoing surgery for breast cancer were prospectively studied to determine incidence and predictors of postoperative WIs.

Patients and methods

From August 1996 through April 1997, a total of 542 patients underwent clean procedures were evaluated. WIs were defined as the presence of purulent drainage from the wound. Any WI which occurred perioperatively or in the first 30 days postoperatively was recorded. More than 15 preoperative and operative parameters were collected: age, weight, body mass index, TNM stage, prior surgery, previous radiotherapy and chemotherapy, operative time, identification of surgeon, surgical procedure (tumorectomy, partial or total mastectomy, breast reconstruction), associated axillary dissection...

Results

According to Atteimer classification, the overall rate of WI was 3.63% (19/542). In 10 cases, we obtained bacteriological analysis; cultures were positive for *Staphylococcus aureus* in 8 cases (methicillin-resistant in 3 cases), for *Clostridium perfringens* in 1 case, for *E. coli* in 1 case, and for *Streptococcus agalactiae* in 1 case. In the 30 days postoperatively, 72.2% of these WIs were cured.

Univariate analysis identified only one factor to significantly alter the incidence of WIs: previous chemotherapy ($p=0.01$). In these cases, the overall rate of WIs was 9.1% (7/77).

Conclusion

Prospective studies are needed to evaluate the usefulness of antibiotic prophylaxis in breast cancer surgery with previous chemotherapy.

RISK FACTORS FOR WOUND INFECTION IN HEAD AND NECK SURGICAL PROCEDURES WITH OPENING OF MUCOSA: A PROSPECTIVE STUDY

N. PENEL, C. POURNIER, L. LEBEVRE JL, J. SARINI, KARA A, BEAL J., D. LEBEVRE.

Oscar Lambret Cancer Center, Lille, France.

Background

A prospective analysis of patients undergoing surgical resection of squamous cell carcinoma of the upper aerodigestive tract with opening of mucosa was performed in order to identify the risk factor for wound infection (WI).

Patients and methods

One hundred sixty five patients who underwent clean-contaminated procedures, all of whom received clindamycin and netromycin as antibiotic prophylaxis for 24 hours postoperatively, were studied over a 2 years period (1997- 1999). Fifty variables were recorded for each patient. Their ages averaged 57 years [36-83]. Of these patients, 152 were males, 92 had T3 or T4 disease, 65 had cervical nodes metastasis, 67 had recurrent disease, 59 had undergone previous irradiation, 25 had previous chemotherapy and 82 had flap reconstruction. The anatomic localizations were as follows: 87 oral cavity or oropharynx, 34 larynx and 42 hypopharynx. The durations of surgery procedure averaged 3 hours 38 [0 h 52-9 h 30].

Results

The overall rate of WI (oro-pharyngo-cutaneous fistula or purulent drainage) was 41.8% and rate of pneumonia was 14.5%. WI was strongly correlated with prolonged postoperative hospital stay (18 versus 34 days, $p=0.00002$).

Univariate analysis identified the following factors to significantly after the incidence of WI: tumor stage ($p=0.044$), previous chemotherapy ($p=0.008$), duration of preoperative hospital stay ($p=0.022$), tracheostomy ($p=0.00008$) and hypopharyngeal and laryngeal cancer ($p=0.008$). Two parameters were statistically correlated with previous chemotherapy: duration of preoperative hospital stay and laryngeal or hypopharyngeal cancers (chemotherapy for larynx preservation).

Conclusion

This information could be useful in the preoperative care of these patients.

CONCORDANCE BETWEEN TWO SURGEONS IN THE ASSESSMENT OF SURGICAL CLASSES OF CONTAMINATION (SCC)

A. Chalfine, W. C. Lin, N. Calvo-Verjat, P. Mariani, J. Gonot, F. Dazza, J. Carlet, Saint Joseph Hospital, D. Cauët, EpiConcept, Paris, France

Objective: Comparisons between surgical site infection rates are possible if they are stratified by NNIS (National Nosocomial Infection Surveillance) score. The NNIS score is obtained by combining three indicators: duration of surgery, ASA score and SCC. The aim of this study was to evaluate the concordance between two surgeons in the assessment of SCC.

Method: The study was conducted in the gastro-intestinal and general surgery department. We randomly selected 68 surgical reports for operations carried out by a particular surgeon in 1998. The reports were given to two other surgeons in this department who were required to independently assign the class of contamination for each operation: clean, clean contaminated, contaminated or dirty. A kappa coefficient was calculated.

Results: The distribution of the interventions was: 49 gastro-intestinal procedures (hernia repair, 16; cholecystectomy, 9; colectomy, 8; bile duct/liver/pancreatic surgery, 6; gastric surgery, 8; proctologic surgery, 2), 15 thyroidectomies, 3 mastectomies, 1 ovariectomy. Kappa coefficient between the two surgeons was 0.97. The assignment of SCC was discordant in only one case: the ovariectomy has been classified as clean by one surgeon and clean-contaminated by the other.

Conclusion: In this heterogeneous group of surgical procedures, we observed an excellent concordance ($\kappa=0.97$) between two observers from the same service, in the assessment of SCC. This concordance is important to establish valid comparison of surgical rates between two surgeons. (PHRC grant n°IDF 95002)

FACILITATING THE COLLECTION OF RISK FACTORS FOR SURGICAL SITE INFECTION USING A SURGICAL MANAGEMENT DATABASE

J. Gonot, A. Chalfine, W. C. Lin, D. Cauët, J. Carlet, Saint Joseph Hospital, Paris, France

Objective: To evaluate a management database for surgical procedures in the ability to provide information about the NNIS (National Nosocomial Infection Surveillance) score collected during operations. In this study we analyze the response rate of the data.

Method and population: From January 1998, the following data were routinely collected for all surgical procedures performed and entered into a database by the operating room nurses: patient identification, type of surgical procedure, risk factors included in the NNIS score (ASA score, class of surgical contamination (SCC), duration of surgery). The ASA score and the SCC were systematically validated by the anesthesiologist and the surgeon in charge of the patient. We compare the response rate of the data between two six month periods: January-June 1998 (implementation of the database) and January-June 1999. Between the two periods, training sessions were provided by the infection control team to the medical staff.

Results: In the first period, there was a total of 551 procedures; in the second, 592 procedures. Comparing the level of missing information between the periods 1 and 2: ASA - 102 (18.5%) vs. 60 (10.1%), $p=0.000$; SCC - 214 (38.8%) vs. 1 (0.2%), $p=0.000$; duration - 9 (1.6%) vs. 1 (0.2%), $p=0.007$. The response rates increased significantly in the second period.

Conclusions: The level of information provided by the database is markedly improved after the training sessions. This allows us to determine a NNIS score in 90% of the surgical procedures. (PHRC grant n°IDF 95002)

A. Michalopoulos, S. Geroulanos, Onassis Cardiac Surgery Center, Athens, Greece

Objective: To examine predisposing factors of systemic candidiasis in cardiac surgery patients

Methods: We prospectively collected various preoperative, operative, and postoperative variables in a cohort of patients undergoing open heart surgery.

Results: Of the 9740 consecutive patients (mean [SD] age of 61.2 [7.4] years old) undergoing open heart surgery over a 6-year period (1993-1999), 29 patients (0.3%) developed systemic candidiasis during their hospitalization. Univariate statistical analysis showed that of 25 variables examined, 21 found to be determinants of systemic candidiasis. A multivariate stepwise regression analysis showed that prolonged mechanical ventilation (>10 days), low cardiac syndrome during the first postoperative day, development of nosocomial infection, urgent surgery, and reoperation because of bleeding were the most important determinants of systemic candidiasis. A final model, including only duration of mechanical ventilation and low cardiac output syndrome, accurately predicts the development of systemic candidiasis.

Conclusions: We conclude that the analysis of simple variables enhances our ability to accurately predict the development of systemic candidiasis in cardiac surgery patients. Duration of mechanical ventilation support and low cardiac output syndrome were the most important independent determinants of systemic candidiasis.

PRE-EMPTIVE THERAPY OF SYSTEMIC CANDIDIASIS IN CARDIAC SURGERY PATIENTS

A. Michalopoulos, S. Geroulanos, Onassis Cardiac Surgery Center, Athens, Greece

Objective: To examine the impact of pre-emptive therapy of systemic candidiasis in cardiac surgery patients.

Methods: Of the 9740 consecutive patients (mean [SD] age of 61.2 [7.4] years old) undergoing open heart surgery over a 6-year period (1993-1999), 171 patients (1.7%) remained in the ICU for more than 10 days. Of these, 126 patients (73.7%) were considered high risk for development of systemic candidiasis based on our previous study.

Results: We administered fluconazole (400 mg/d, IV) as pre-emptive therapy in 72 high-risk cardiac surgical patients. Of the 72 patients who received fluconazole only 3 patients developed systemic candidiasis during their hospitalization (4.2%). On the contrary, out of 54 patients who did not receive fluconazole, 11 patients (20.4%) developed systemic candidiasis. Administration of fluconazole was associated with no side effects.

Conclusions: We conclude that the administration of fluconazole as pre-emptive therapy in high risk cardiac surgery patients prevents the development of systemic candidiasis in the majority of them. Fluconazole seems to be an effective antifungal agent with few side effects.

1. Michalopoulos A, Kriaras I, Geroulanos S. Eur J Cardiothor Surg 1997;11:728