SHEA Abstracts

The July through December issues of *Infection Control and Hospital Epidemiology* will include reprints of poster and presentation abstracts from the 1992 SHEA Annual Scientific Meeting, April 12-14, 1992, held in Baltimore, Maryland.

ABSTRACT #1

Reduction in Nosocomial Clostridium difficile-*Associated Diarrhea by Identification and Control of* Clindamycin *Usage*

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An outbreak of ***Clostridium*** *difficile*-associated diarrhea (CDAD) occurred at the Tuscon VAMC producing 103 cases between June 1990 and July 1991. Restriction endonuclease analysis identified a predominant organism type J7 for 58% of isolates examined. Pharmacy records of hospital antibiotic use during the first 8 months of the epidemic disclosed that 7% of patients receiving clindamycin developed CDAD, and chi square tests demonstrated this to be significantly more frequent than for 7 other commonly used antimicrobials. Further, regression analysis showed a positive association between clindamycin usage per month and frequency of CDAD ($p<.002$). Because of these findings, clindamycin was removed from the formulary by August 1, reducing for the next 5 months the average monthly inpatient usage from 281 g to 21 g. Concurrently, the median number of new cases per month of CDAD decreased from 8 to 2 ($p<.002$, Mann-Whitney U test). Since a recent survey by the College of American Pathologists ranked clindamycin usage at our institution in the 99th percentile of 220 teaching hospitals, the effect of cliidamycin restriction on CDAD frequency may be most pertinent to situations where clindamycin is in common use.

ABSTRACT #2

Nosocomial Clostridium difficile *Diarrhea: Risk Factors, Complications, and Costs*

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A large outbreak of ***Clostridium*** *difficile* (CD) toxin-mediated diarrhea at a 300-bed teaching hospital provided us an opportunity to examine the risk factors and outcomes associated with this nosocomial infection. The male:female ratio was 1:1.25, and distribution of medical and surgical patients hospitalized during the outbreak was 76.1 versus 57.8 years ($p = .02$). A case-control study was performed comparing 63 patients with CD diarrhea regarding age, gender, and medical service matched controls who were hospitalized during the outbreak for at least as long as each case prior to onset of diarrhea. Risk factors associated with CD diarrhea included: narcotic analgesics ($p = .04$), transfers from a nursing home ($p = .02$), prior use of any antibiotic ($p = .0001$), extended spectrum penicillins ($p = .009$), and third generation cephalosporins ($p = .00004$). Despite similar admitting diagnoses and severity of illness indices, cases were more likely to have other nosocomial infections (urine, wound, and blood [$p = .000007$]) and an extended length of stay (34.9 ± versus 23.8 days, $p = .006$). The overall mortality rate was 25% in cases and 13% in controls ($p = .055$).

The hospital costs incurred in cases with CD diarrhea were striking. Estimated hospital costs exceeded DRG reimbursements by $7,916 for each case and $1,205 for each control ($p = .003$). The estimated loss for all 63 cases was $422,793. The outbreak resolved with enforcement of enteric control measures and efforts to limit the use of broad spectrum antibiotics. This study demonstrates the considerable cost and the excess morbidity associated with CD diarrhea and the importance of control measures to prevent the dissemination of this nosocomial pathogen.

ABSTRACT #3

Postoperative Gram-Negative Bacteremia Due to Environmental Contamination, Washington

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Bacteremia following surgery is a life-threatening complication. In September 1991, a large hospital in Washington (Hospital A) reported a cluster of 9 patients who had gram-negative bacteremia (GNB) following open-heart surgery (OHS). Organisms isolated included ***Pseudomonas aeruginosa*** (5), ***Enterobacter*** *cloacae (6),* ***and*** *Klebsiella pneumoniae* (3). We defined a case as any Hospital A OHS patient who had GNB between July 15 and September 15, 1991, the epidemic period. We conducted a case/control study (controls randomly selected from OHS patients not meeting the case definition), observed five OHS procedures, conducted an environmental survey of the operating rooms, and administered questionnaires to surgical personnel to

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find a source of contamination. Case and control patients were similar in age, race, gender, underlying disease, and surgeon. Case patients were more likely to have had OHS as first procedure of the day (odds ratio = 10, $p = .02$). First OHS procedures use pressure-monitoring equipment (PME) assembled the day before and left covered overnight in the operating room (OR). The OR is cleaned at night by spraying a mixture of disinfectant and water through a hose, which is connected to an automatic diluting system. This allows the mixture to contact PME. Water samples from the hose contained no measurable disinfectant and grew *P aeruginosa.* Preassembled PME inadvertently contaminated by water without germicide caused this outbreak. Such equipment, used in all OHS procedures, should be assembled immediately before surgery and protected from contamination.

ABSTRACT #4

Nosocomial Transmission of Multidrug-Resistant Tuberculosis

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Tuberculosis (TB) has had a resurgence in the wake of the human immunodeficiency virus (HIV) epidemic. Of particular concern is the emergence of multidrug-resistant TB (MD-RTB). During a 15-month period, a cluster of patients at one New York City hospital developed MD-RTB. Nineteen died within a median of 4 weeks of diagnosis. To assess risk factors for MD-RTB and investigate possible nosocomial transmission, we compared patients with TB whose isolates were resistant to at least isoniazid and rifampin during January 1990 through March 1991 (cases) with 23 patients with drug-susceptible TB during the same period (controls). A tuberculin skin-test survey of healthcare workers also was conducted. All available case patient isolates were typed by restriction fragment length polymorphism (RFLP) analysis. Twenty-three patients met the case definition. The proportion of TB patients with MD-RTB during the epidemic period was greater than in the preceding year (23/71 versus 0/50, p= .OOl). Risk factors for MD-RTB were younger age (36.4 versus 48.3 years, $p = .006$), HIV-seropositivity (21/23 versus 11/23, $p = .002$), and prior admission to this hospital (19/23 versus 5/23, $p < .001$), particularly on one ward (12/23 versus 0/23, p= .002), at the same time as another patient with MD-RTB. Furthermore, healthcare workers assigned on case patients' wards were more likely to be tuberculin skin-test converters than healthcare workers on other wards (33% versus 0%, $p = .001$). Six (26%) case patients were placed in private rooms during their admission with TB; however, no rooms at this hospital had negative air pressure. Of 15 available MD-RTB isolates, 14 had identical RFLP patterns. These data suggest nosocomial transmission of MD-RTB to patients and healthcare workers and underscore the need for effective acid-fast bacilli isolation facilities in healthcare institutions.

ABSTRACT #5

Anaphylactic Reactions During General Anesthesia

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Anaphylactic reactions (ARs) are a life-threatening complication. Since January 1990, 29 US children's hospitals have reported intraoperative ARs in patients. At one hospital (Hospital A), several patients, most with a meningomyelocele, experienced ARs while receiving general anesthesia (GA) prior to surgery. We defined an AR as a ≥30 mm Hg fall in systolic blood pressure and rash, angioedema, bronchospasm, stridor, and/or wheezing in a patient undergoing GA at Hospital A from January 1990 through January 1991 (epidemic period). To assess risk factors for ARs, we compared case patients with all meningomyelocele patients administered GA at Hospital A from January 1990-January 1991. To identify the inciting allergen, we performed immunologic evaluation on all available case and control patients. Eleven patients met the case definition; 10 had a meningomyelocele, and all had ARs during anesthesia induction. No patient died, but 9 required intensive supportive care. The rate of ARs during the epidemic period was greater than for the previous year (12/7836 versus 0/5925, $p = .003$). Case patients were more likely than controls to have a history of allergy (7/11 versus 17/64, $p = .03$), asthma (3/11 versus 3/64, $p = .037$), and more GA procedures (mean 6.8 versus 4.2, $p = .04$). Serologic and skin-prick testing revealed that none of the case patients were reactive to commonly used anesthetic agents; however, case patients were significantly more sensitive to latex than were controls (11/11 versus 33/49, $p = .027$). Certain meningomyelocele patients, especially those with a history of allergies, asthma, and multiple surgical procedures, are at increased risk of developing latex-related ARs during GA procedures. Because latex-containing devices, particularly gloves, are commonly used in the operating room, precautions should be taken to minimize latex exposures by substituting vinyl or plastic items during GA and operative procedures on these patients.

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