

## Medical News

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### Surgical-Site Infections: Reanalysis of Risk Factors

Surgical-site infections (SSIs) are the most common nosocomial infection in surgical patients, accounting for 38% of all such infections, and are a significant source of postoperative morbidity resulting in increased hospital length of stay and increased cost. From 1986 to 1996, the National Nosocomial Infections Surveillance system of the Centers for Disease Control and Prevention reported 15,523 SSIs following 593,344 operations (2.6%). Previous studies have documented patient characteristics associated with an increased risk of SSI, including diabetes, tobacco or steroid use, obesity, malnutrition, and perioperative blood transfusion.

Malone and colleagues from the Department of Surgery, Veterans Administration Maryland Health Care System, Baltimore, conducted a study to reevaluate risk factors for SSI in a large cohort of noncardiac surgical patients. Prospective data (NSQIP) were collected on 5,031 noncardiac surgical patients at the Veterans Administration Maryland Healthcare System from 1995 to 2000. All preoperative risk factors were evaluated as independent predictors of SSI.

The mean age of the study cohort was 61 ( $\pm$  13) years. SSIs occurred in 162 patients, comprising 3.2% of the study cohort. Gram-positive organisms were the most common bacterial etiology. Multiple logistic regression analysis documented that diabetes (insulin-dependent and non-insulin-dependent), low postoperative hematocrit, weight loss (within 6 months), and ascites were significantly associated with increased risk of SSI. Tobacco use, steroid use, and chronic obstructive pulmonary disease (COPD) were not predictors for SSI.

This study confirms that diabetes and malnutrition (defined as significant weight loss 6 months prior to surgery) are significant preoperative risk factors for SSI. Postoperative anemia is a significant risk factor for SSI. In contrast to prior analyses, this study showed that tobacco use, steroid use, and COPD were not independent predictors of SSI.

FROM: Malone DL, Genuit T, Tracy JK, Gannon C, Napolitano LM Surgical site infections: reanalysis of risk factors. *J Surg Res* 2002;103:89-95.

### Risk Factors Associated With Pediatric Parapneumonic Empyema

Byington and colleagues from the Department of Pediatrics, University of Utah, Salt Lake City, investigated

the increasing incidence of pediatric empyema during the 1990s at Primary Children's Medical Center in Salt Lake City. Of 540 children hospitalized with community-acquired bacterial pneumonia (CAP) who were discharged from July 1, 1993, through July 1, 1999, 153 (28.3%) had empyema. The annual population incidence of empyema increased during the study period from 1 to 5 cases per 100,000 population 19 years or younger. *Streptococcus pneumoniae* was identified as the most common cause of CAP with or without empyema; serotype 1 accounted for 50% of the cases of pneumococcal empyema.

Patients with empyema were more likely to be older than 3 years, to have 7 or more days of fever, to have varicella, and to have received antibiotics and ibuprofen before admission to the hospital, compared with patients without empyema ( $P < .0001$  for each factor). The increasing incidence of empyema was associated with infection due to *S. pneumoniae* serotype 1, outpatient treatment with certain antibiotics, use of ibuprofen, and varicella.

FROM: Byington CL, Spencer LY, Johnson TA, et al. An epidemiological investigation of a sustained high rate of pediatric parapneumonic empyema: risk factors and microbiological associations. *Clin Infect Dis* 2002;34:434-440.

### Antibiotic Resistance of Fecal Enterococci in Poultry, Poultry Farmers, and Poultry Slaughterers

van Den Bogaard and colleagues from the University of Maastricht and the National Institute of Public Health and the Environment, Bilthoven, The Netherlands, conducted a study to determine the prevalence of resistance in enterococci to antibiotics, commonly used for therapy in poultry or as antimicrobial growth promoters (AMGPs). Fecal samples were collected from two chicken populations: broilers, for which antibiotic and AMGPs use is common; and laying-hens, for which antibiotic use is low. In addition, fecal samples were obtained from three human populations: broiler farmers, laying-hen farmers, and poultry slaughterers. Minimum inhibitory concentrations of an extended panel of antibiotics for a randomly chosen gentamicin- or vancomycin-resistant enterococcal isolate from each fecal specimen were determined.

The prevalence of resistance for all antibiotics tested was higher in broilers than in laying-hens. Resistance was higher for nearly all antibiotics in the fecal enterococci of broiler farmers than it was in that of laying-hen farmers and poultry slaughterers. The overall resistance in broilers was correlated with the resistance in broiler farmers and in

poultry slaughterers. No correlation was found between the results obtained in the laying-hens and those obtained in the other populations. The 27 gentamicin-resistant isolates all showed high-level resistance to gentamicin and two of these isolates, both *Enterococcus faecium*, were resistant to all antibiotics tested, except vancomycin. The 73 vancomycin-resistant enterococci (VRE) isolates from the five populations belonged to four different species and in all isolates the *vanA* gene cluster was detected by blot hybridization. The pulsed-field gel electrophoresis (PFGE) patterns of these VRE were quite heterogeneous, but *E. hirae* isolates with the same or a closely related PFGE pattern were isolated at two farms from the broiler farmer and from broilers.

Molecular characterization of *vanA*-containing transposons of these isolates showed that similar transposon types, predominantly found in poultry, were present. Moreover, similar *vanA* elements were found not only in isolates with the same PFGE pattern, but also in other VRE isolated from both humans and chickens.

The results of this study suggest transmission of resistance in enterococci from animals to humans. For VRE this might be clonal transmission of animal strains, but transposon transfer seems to occur more commonly.

FROM: van Den Bogaard AE, Willems R, London N, Top J, Stobberingh EE. Antibiotic resistance of faecal enterococci in poultry, poultry farmers and poultry slaughterers. *J Antimicrob Chemother* 2002;49:497-505.

## Targeted Educational Program Reduces Catheter-Related Bloodstream Infections

Coopersmith and colleagues from the Washington University School of Medicine, St. Louis, reported the results of a study to determine whether an education initiative aimed at improving central venous catheter insertion and care could decrease the rate of primary bloodstream infections.

This was a preintervention and postintervention observational study conducted in an 18-bed surgical-burn-trauma intensive care unit (ICU) in an urban teaching hospital. A total of 4,283 patients were admitted to the ICU between January 1, 1998, and December 31, 2000. A program primarily directed toward registered nurses was developed by a multidisciplinary task force to highlight correct practice for central venous catheter insertion and maintenance. The program consisted of a 10-page self-study module on risk factors and practice modifications involved in catheter-related infections, as well as a verbal in-service at staff meetings. Each participant was required to take a pretest before taking the study module and an identical test after its completion. Fact sheets and posters reinforcing the information in the study module were also posted throughout the ICU.

Seventy-four primary bloodstream infections occurred in 6,874 catheter-days (10.8 per 1,000 catheter-days) in the 18 months before the intervention. After the implementation of the education module, the number of primary bloodstream infections fell to 26 in 7,044 catheter-

days (3.7 per 1,000 catheter-days), a decrease of 66% ( $P < .0001$ ). The estimated cost savings secondary to the decreased infection rate for the 18 months after the intervention was between \$185,000 and \$2.808 million.

The authors concluded that a focused intervention primarily directed at the ICU nursing staff can lead to a dramatic decrease in the incidence of primary bloodstream infections. Educational programs may lead to a substantial decrease in cost, morbidity, and mortality attributable to central venous catheterization.

FROM: Coopersmith CM, Rebmann TL, Zack JE, et al. Effect of an education program on decreasing catheter-related bloodstream infections in the surgical intensive care unit. *Crit Care Med* 2002;30:59-64.

## CDC Links Infections to Contaminated Allografts

According to the Centers for Disease Control and Prevention (CDC), as of March 1, 2002, 26 cases of bacterial infections associated with musculoskeletal tissue allografts, including one fatal case, had been reported. Of the 26 cases, 13 patients were infected with *Clostridium sordellii*, with 11 of these patients receiving tissue from the same tissue processor. None of the tissue transplants in these 26 cases had undergone sterilization. Most tissue transplants only undergo aseptic processing, which does not render them sterile. One reason is that some sterilization technologies can weaken tissue. The CDC also noted that the extended intervals between death and tissue harvesting from the donors likely contributed to the contamination.

The CDC recommended that a method that can kill bacterial spores should be used to process tissue. Unless a sporicidal method is used, aseptically processed tissue should not be considered sterile and healthcare providers should be informed of the possible risk for bacterial infection. If a sporicidal method is unavailable, then tissues should undergo culture and be discarded if *Clostridium* species or other bacteria normally found in bowel flora are detected. Cultures should also be validated to eliminate false-negatives.

The Food and Drug Administration also updated its industry guidance procedures for processing tissue transplants.

FROM: Centers for Disease Control and Prevention. Update: allograft-associated bacterial infections—United States, 2002. *MMWR* 2002;51:207-210.

## Three-Year Study on *Aspergillus* in a Hospital Water System

Nosocomial aspergillosis, a life-threatening infection in immunocompromised patients, is thought to be caused primarily by *Aspergillus* organisms in the air. Anaissie and colleagues from the University of Arkansas for Medical Sciences, Little Rock, conducted a 3-year prospective study