Medical News

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Cephalosporin-Resistant Gram-Negative Bacilli in ICUs

D'Agata and coworkers from Beth Israel Deaconess Medical Center and Harvard Medical School in Boston conducted a study to define the epidemiology of broad-spectrum cephalosporin-resistant gram-negative bacilli in ICUs during a non-outbreak period, including prevalence, risk factors for colonization, frequency of acquisition, and rate of infection.

In this prospective cohort study, subjects were consecutive patients admitted to two surgical ICUs. The outcome measurements were serial patient surveillance cultures screened for ceftazidime (CAZ) resistance, antibiotic and hospital exposure, and infections.

The results showed that, of the 333 patients enrolled, 60 (18%) were colonized with CAZ-resistant gram-negative bacilli (CAZ-RGN) at admission. Clinical cultures detected CAZ-RGN in only 5% (3/60) of these patients. By using logistic regression, CAZ-RGN colonization was associated with duration of exposure to cefazolin and to broad-spectrum cephalosporins/penicillins, Acute Physiology and Chronic Health Evaluation III score, and previous hospitalization. Of the 100 patients who remained in the surgical ICU for >3 days, 26% acquired a CAZ-RGN. Of the 14 infections caused by CAZ-RGN, 11 (79%) were attributable to the same species present in surveillance cultures at admission to the surgical ICU.

The authors concluded that colonization with CAZ-RGN was common and usually was not recognized by clinical cultures. Most patients colonized or infected with CAZ-RGN had positive surveillance cultures at the time of admission to the surgical ICU, suggesting that acquisition frequently occurred in other wards and institutions. Patients exposed to first-generation cephalosporins, as well as broad-spectrum cephalosporins/penicillins, were at high risk of colonization with CAZ-RGN. They suggested that empirical treatment of nosocomial gram-negative infections with broad-spectrum cephalosporins, especially in the critically ill patient, should be reconsidered.

FROM: D'Agata EM, Venkataraman L, DeGirolami P, Burke P, Eliopoulos GM, Karchmer AW, et al. Colonization with broad-spectrum cephalosporin-resistant gram-negative bacilli in intensive care units during a nonoutbreak period: prevalence, risk factors, and rate of infection. *Crit Care Med* 1999;27:1090-1095.

Isolation of *Acinetobacter baumannii* From Vegetables and Implications for Hospital-Acquired Infections

Acinetobacter baumannii is rarely recovered from the skin of patients or healthy European subjects, but it is a significant nosocomial pathogen. The natural reservoir of this organism is uncertain. Berlau and colleagues from the Laboratory of Hospital Infection, Central Public Health Laboratory, London, determined the isolation rates of *Acinetobacter* species from vegetables (as an indicator of the natural environment) using a selective technique and classified the genospecies by amplified ribosomal DNA restriction analysis.

Of the 177 samples of vegetables examined, 30 yielded *Acinetobacter,* with genospecies 2 and 11 being the most common, each with a frequency of 27%. Minimum inhibitory concentration assays showed that strains of genospecies 1, 2, 3, and 13TU (the *Acinetobacter calcoaceticus-A baumannii* complex) were significantly more resistant than other genospecies to ciprofloxacin and gentamicin. Vegetables may therefore be a natural habitat of *A baumannii* and provide a route by which these bacteria are introduced into hospitals, with implications for infection control. Patients with immune deficiency or reduction probably should not be exposed to these vegetables to prevent colonization and subsequent infection.

FROM: Berlau J, Aucken HM, Houang E, Pitt TL. Isolation of *Acinetobacter* spp including *A baumannii* from vegetables: implications for hospital-acquired infections. *J Hosp Infect* 1999;42:201-204.

VRE Colonization in ICUs

Ostrowsky and colleagues from Beth Israel Deaconess Medical Center and Harvard Medical School, Boston, Massachusetts, conducted a study to define the epidemiological associations of vancomycin-resistant enterococci (VRE) in ICUs during a non-outbreak period by examining prevalence, risk factors for colonization, frequency of acquisition, and molecular strain types. A prospective cohort design was followed. Consecutive patient admissions to two surgical ICUs at a tertiary-care hospital were enrolled. The main outcome measures

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were results of serial surveillance cultures screened for VRE.

The results showed that, of 290 patients enrolled, 35 (12%) had colonization with VRE on admission. The VRE colonization or infection had been previously detected by clinical cultures in only 4 of these patients. Using logistic regression, VRE colonization at the time of ICU admission was associated with second- and third-generation cephalosporins, length of stay prior to surgical ICU admission, more than one prior ICU stay, and a history of solid-organ transplantation. Eleven (12.8%) of 78 patients with follow-up cultures acquired VRE. By pulsed-field gel electrophoresis, two strains predominated, one of which was associated with an overt outbreak on a non-ICU ward near the end of the study period.

It was concluded that VRE colonization was common and usually not recognized by clinical culture. Most patients who had colonization with VRE and were on the surgical ICU acquired VRE prior to surgical ICU entry. Exposure to second- and third-generation cephalosporins, but not vancomycin, was an independent risk factor for colonization. Prospective surveillance of hospitalized patients may yield useful insights about the dissemination of nosocomial VRE beyond what is appreciated by clinical cultures alone.

FROM: Ostrowsky BE, Venkataraman L, D'Agata EM, Gold HS, DeGirolami PC, Samore MH. Vancomycin-resistant enterococci in intensive care units: high frequency of stool carriage during a non-outbreak period. *Arch Intern Med* 1999;159:1467-1472.

Evaluation of Disinfection of Reusable Angioscopes with the Duck Hepatitis B Model

Transmission of hepatitis B virus (HBV) infection in hospital settings is well known, and there has been a continuing interest to determine the efficacy of disinfection and sterilization procedures on instruments, especially those devices considered difficult to clean. Since HBV has not been cultured, other surrogate hepatitis viruses have been used for studies. Chaufour and coworkers have employed the duck HBV (DHBV), which has similar biological and structural characteristics to HBV and has been adopted as a suitable model for disinfectant testing.

Angioscopic examination of the external jugular vein was performed on DHBV-infected ducks. After use, the instrument was air dried for 3 minutes. Samples were obtained by flushing the channel with 5 mL of phosphate buffered saline solution. The samples were collected immediately after drying (control); after flushing with 5 mL of water; after glutaraldehyde disinfection for 5, 10, and 20 minutes; and after ethylene oxide gas sterilization. Angioscopes were either precleaned or uncleaned before disinfection and sterilization. Residual infectivity was assessed with inoculation of samples into the peritoneal cavity of day-old ducks (n=231).

DNA analysis results of liver samples showed that all 38 control ducks became infected. The frequency of DHBV infection was reduced to 93% (14/15) by flushing the angioscope with 5 mL of sterile water. No transmission occurred after the use of any of the properly precleaned, disinfected, and sterilized angioscopes. However, after the use of the uncleaned angioscopes, the transmission rate was 90% (9/10) and 70% (7/10) after 5 and 10 minutes of contact time, respectively, in 2% glutaraldehyde. Even after the recommended 20 minutes of contact time, there was still 6% (2/35) transmission. After ethylene oxide sterilization, two of the recipient ducklings (2/35) were infected with DHBV.

It was concluded that there was no disease transmission after reuse of disposable angioscopes adequately cleaned before disinfection or sterilization. However, if the angioscopes are inadequately cleaned, DHBV can survive despite glutaraldehyde disinfection or ethylene oxide sterilization. This contrasts with previous in vitro and in vivo data with solid surgical instruments. It is postulated that the presence of a narrow lumen or residual protein shielding within the lumen may compromise effective inactivation of hepadnaviruses on angioscopes, with the potential risk for patient-to-patient transmission.

FROM: Chaufour X, Deva AK, Vickery K, Zou J, Kumaradeva P, White GH, et al. Evaluation of disinfection and sterilization of reusable angioscopes with the duck hepatitis B model. *J Vasc Surg* 1999;30:277-282.

Microbial Contamination of Surgical Instruments After Washing

Surgical instruments exposed to sterile body sites should be contaminated with relatively low levels of microbial contamination or bioburden; however, few studies in the literature have determined the quantitative level and types of contamination. Nancy Chu and colleagues from Advanced Sterilization Products, Johnson & Johnson, Irvine, CA, performed a study conducted at two clinical sites to determine the level of microbial contamination of surgical instruments after clinical use and after washing. Quantitative assays showed that bioburden levels were in the range of 0 to 4,415 colony-forming units per instrument after clinical use, and 88% of the instruments had bioburden levels lower than 1,000.

As expected, a reduction in counts occurred after washing; however, in some cases, higher counts were found on the instruments after the washing process. Although the washing procedure is effective in reducing the microbial levels deposited on the surgical instruments during use, a recontamination process occurs that results in increased counts after washing. The low bioburden level after washing consists of predominantly vegetative microorganisms that present a relatively low challenge to sterilization and disinfection systems.

FROM: Chu NS, Chan-Myers H, Ghazanfari N, Antonoplos P. Levels of naturally occurring microorganisms on surgical instruments after clinical use and after washing. *Am J Infect Control* 1999;27:315-319.

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