Medical News

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Efficacy of Antibacterial-Impregnated Central Venous Catheters

Central venous catheters (CVCs) impregnated with chlorhexidine and silver sulfadiazine have been introduced recently for the prevention of catheter-related infections. However, there remains some uncertainty regarding the efficacy of these catheters because of conflicting reports in the literature.

Veenstra and coinvestigators recently conducted a meta-analysis to evaluate the efficacy of chlorhexidine-silver sulfadiazine-impregnated CVCs in the prevention of catheter-related bloodstream infection (CR BSI). Studies were identified from a computerized search of the MEDLINE database from January 1966 to January 1998, reference lists of identified articles, and queries of principal investigators and the catheter manufacturer. Randomized trials comparing chlorhexidine-silver sulfadiazine-impregnated CVCs with nonimpregnated catheters were included. The outcomes assessed were catheter colonization and CR BSI confirmed by catheter culture. Twelve studies involving 2,611 catheters met the inclusion criteria for catheter colonization. Eleven studies with a total of 2,603 catheters met the inclusion criteria for CR BSI. Most patients in these studies were from groups considered to be at high risk for catheter-related infections.

The summary odds ratio for catheter colonization was 0.44 (CI_{95}, 0.36-0.54; $P<.001$), indicating a significant decrease in catheter colonization with impregnated catheters. The studies examining the outcome of primary interest, CR BSI, had a summary odds ratio of 0.56 (CI_{95}, 0.37-0.84; $P=.005$).

This review indicated that CVCs impregnated with a combination of chlorhexidine and silver sulfadiazine appeared to be effective in reducing the incidence of both catheter colonization and CR BSI in patients at high risk for catheter-related infections.

FROM: Veenstra DL, Saint S, Saha S, Lumley T, Sullivan SD. Efficacy of antiseptic-impregnated central venous catheters in preventing catheter-related bloodstream infection. *JAMA* 1999;281:261-267.

Pyrogenic Reactions Related to Hemodialysis Waste Handling

Although the science and art of hemodialysis has seen some spectacular advances in the past 20 years, there seems to be an endless number of problems with the equipment used for dialysis. Jochimsen and coinvestigators from the CDC's Hospital Infections Program report on infections associated with the waste-handling system of the dialysis machine.

From June 17 through November 15, 1995, 10 episodes of *Enterobacter cloacae* bloodstream infection and three pyrogenic reactions occurred in patients at a hospital-based hemodialysis center. In a case-control study limited to events occurring during October 1-31, 1995, seven dialysis sessions resulting in *E cloacae* bacteremia or pyrogenic reaction without bacteremia were compared with 241 randomly selected control sessions. Dialysis machines were examined, cultures were obtained of dialysis fluid and equipment, and *E cloacae* isolates were genotyped by pulsed-field gel electrophoresis. Each dialysis machine had a waste-handling option (WHO) through which dialyzer priming fluid was discarded before each dialysis session; in 7 of 11 machines, one-way check valves designed to prevent backflow from the WHO into patient bloodlines were dysfunctional.

In the case-control study, case sessions were more frequent when machines with ≥ 1 dysfunctional check valves were used. *E cloacae* with identical pulsed-field gel electrophoresis patterns were isolated from case patients, dialysis fluid, station drains, and WHO units.

This investigation showed that bloodstream infections and pyrogenic reactions were caused by backflow from contaminated dialysis machine WHO units into patient bloodlines. The outbreak was terminated when WHO use was discontinued, check valves were replaced, and dialysis machine disinfection was enhanced.

FROM: Jochimsen EM, Frenette C, Delorme M, Arduino M, Aguero S, Carson L, et al. A cluster of bloodstream infections and pyrogenic reactions among hemodialysis patients traced to dialysis machine waste-handling option units. *Am J Nephrol* 1998;18:485-489.

Reducing Vancomycin Use With Computer Guidelines

Shojania and colleagues from the Brigham and Women's Hospital in Boston, Massachusetts, conducted a study to determine whether a structured ordering intervention using computer-guided physician order entry could reduce intravenous vancomycin use. Their randomized, controlled trial assessed frequency and duration of vancomycin therapy by 396 physicians treating 1,798

patients in a tertiary-care teaching hospital. A computer screen displayed, at the time of physician order entry, an adaptation of the CDC guidelines for appropriate vancomycin use. The main outcome measures were the frequency of initiation and renewal of vancomycin therapy, as well as the duration of therapy prescribed on a per prescriber basis.

Compared with the control group, intervention physicians wrote 32% fewer orders (11.3 vs 16.7 orders per physician; P=.04) and had 28% fewer patients for whom they either initiated or renewed an order for vancomycin (7.4 vs 10.3 orders per physician; P=.02). In addition, the duration of vancomycin therapy attributable to physicians in the intervention group was 36% less than that of control physicians (26.5 vs 41.2 days; P=.05). Analysis of pharmacy data confirmed a decrease in the overall hospital use of intravenous vancomycin during the study period.

The authors concluded that implementation of computer-guided physician order entry decreased vancomycin use. Computerized guidelines represent a promising tool for changing prescribing practices.

FROM: Shojania KG, Yokoe D, Platt R, Fiskio J, Ma'luf N, Bates DW. Reducing vancomycin use utilizing a computer guideline: results of a randomized controlled trial. *J Am Med Inform Assoc* 1998;5:554-562.

MRSA Bloodstream Infection and Mortality

Moreira and coinvestigators from the Universidade Federal de São Paulo, Brazil, have reported a study to identify the attributed mortality rate of bloodstream hospital infection by methicillin-resistant *Staphylococcus aureus* (MRSA) and its effect on length of hospital stay. In a case-control study conducted in a 660-bed, tertiary-care teaching hospital in São Paulo, Brazil, 71 adult patients with hospital-acquired MRSA bacteremia diagnosed between January 1, 1991, and September 30, 1992, and 71 MRSA-free controls were matched on age, gender, underlying disease, surgical procedure, same risk time, and admission date.

MRSA accounted for 73% of hospital bloodstream infections involving *Staphylococcus aureus*. Mortality rates were 56% (40/71) for cases and 11%(8/71) for controls. The attributable mortality rate was 45% (OR=17.0; CI_{95}, 3.58-202.26; P=.000001). The median length of hospital stay was 32.6 days for the cases and 29.8 for the controls (P=.32).

The authors concluded that a high proportion of *Staphylococcus aureus* bacteremia involved MRSA. Nosocomial bloodstream infection with MRSA provides a high level of mortality independently from the patients' base disease, without increasing their hospital length of stay.

FROM: Moreira M, Medeiros EA, Pignatari AC, Wey SB, Cardo DM. The effect of nosocomial bloodstream infection by *Staphylococcus aureus* resistant to oxacillin on the mortality and the length of hospitalization. *Rev Assoc Med Bras* 1998;44:263-268.

New Assay for Rapid Detection of MRSA

A multiplex polymerase chain reaction (PCR), involving detection of the *mec*A and *fem*B genes, was combined with a novel immunoassay system capable of detecting specific PCR products. The resulting PCR-immunoassay was evaluated in comparison with conventional microbiological techniques used in the routine diagnostic laboratory for the rapid identification of methicillin-resistant *Staphylococcus aureus* (MRSA), either in pure culture or in overnight broth cultures obtained following enrichment of patient screening swabs. Among the 480 purified isolates of staphylococci and 246 enrichment broths examined, only one false-negative result was obtained by PCR, compared with 18 false-negative results obtained by conventional methodology and demonstrated by further conventional examination. Five demonstrable false-positive results were obtained by conventional methodology, compared with a possible 10 by the PCR-immunoassay, although it was not certain that these 10 PCR results were true false positives, as, by definition, MRSA could not be isolated by conventional methodology.

The results indicated that the routine diagnostic laboratory was encountering difficulties in identifying MRSA correctly and that the conventional microbiological techniques lacked sensitivity. Overall, the PCR technique was more accurate and sensitive than conventional methodology in detecting MRSA, and results were available within 24 hours of screening swabs arriving in the laboratory, compared with a minimum of 48 to 72 hours by conventional techniques. The immunoassay system added to the usefulness of the method by allowing the detection of specific PCR products within 5 minutes of completing the PCR, without the normal additional step of agarose gel electrophoresis.

FROM: Towner KJ, Talbot DC, Curran R, Webster CA, Humphreys H. Development and evaluation of a PCR-based immunoassay for the rapid detection of methicillin-resistant *Staphylococcus aureus*. *J Med Microbiol* 1998; 47:607-613.