Medical News

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Latex Sensitization Among Healthcare Workers

Although there are several reports of the prevalence of latex sensitization among healthcare workers, the incidence of sensitization is unknown. Dr. Gordon Sussman and colleagues from the University of Toronto, Ontario, Canada, reported a study of sensitization among latex-glove users at a hospital in Hamilton, Ontario. Workers with negative results to a latex skin-prick test (SPT) at baseline were followed prospectively over 1 year, some wearing powdered gloves and others using powder-free gloves. Workers then completed a questionnaire and were evaluated for SPT sensitivity to latex reagents, three common inhalants, and six foods. A conversion was defined as a (new) latex SPT with wheal diameter at least 4 mm greater than saline control. Glove extracts were assayed for antigenic protein, and air samples were obtained to estimate exposure to airborne latex protein.

During powdered-glove use, personal exposures ranged from 5- to 616-ng/m^3, whereas during powder-free glove use, all but two results for air samples were below the limit of detection (approximately 0.1 ng/m^3). During the study period, the protein concentration in the powdered gloves, initially mean 557 µg/g of sample, declined at a rate of 295 µg/g per year ($P<.0001$). Of the 1,075 SPT-negative participants at baseline, 479 were working in eligible wards; of these, 435 (91%) participated in follow-up, 227 using powder-free gloves and 208 using powdered gloves. There were 4 conversions, 2 (1%) in the powdered-glove group and two (0.9%) in the powder-free group. The 2 participants using powdered gloves were the only converters who were symptomatic. The significance of skin-test conversions identified in the powder-free group, both of whom were asymptomatic, was unclear.

The authors believe that this study represents the first reported estimated (approximately 1%) of the incidence of sensitization in hospital personnel using latex gloves. They also point out that the limitations of the study, including the decline in latex protein concentration and the possibility of information (observer) bias. This study has important implications in light of the increased emphasis on the more expensive powder-free latex gloves that are believed to reduce sensitization to latex.

FROM: Sussman GL, Liss GM, Deal K, Brown S, Cividino M, Siu S, et al Incidence of latex sensitization among latex glove users. *J Allergy Clin Immunol* 1998;101(2 pt 1):171-178.

Sporicidal Activity of Low-Temperature Sterilization Technologies

William Rutala and colleagues from the Division of Infectious Diseases, University of North Carolina–Chapel Hill, conducted a study to evaluate the efficacy of four new low-temperature sterilization technologies: ethylene oxide with hydrochlorofluorocarbons, a liquid peracetic acid immersion system (Steris System 1 Processor, Steris, Mentor, OH), and two plasma sterilization processes that use vaporized hydrogen peroxide (STERRAD 100 and the STERRAD 100S, Advanced Sterilization Products, Irvine, CA). The STERRAD 100S system potentially improves sterilizer efficacy by using two cycles of a diffusion stage and a plasma stage per sterilization cycle. Flat stainless-steel carriers were inoculated with approximately 10^6 *Bacillus stearothermophilus* spores. These carriers were placed aseptically in the middle of 40-cm-long hollow stainless-steel tubes. Two types of tubes were used: (1) a lumen test unit with a removable 5-cm center piece (1.2-cm diameter) of stainless steel sealed to the narrower steel tubing by hard rubber septa and (2) a straight lumen. Three different diameters of the lumen test unit (1-, 2-, and 3-mm) and a single diameter of the straight lumen (3-mm) were studied. At least 40 replicates were performed for each type of lumen and sterilization method. After inoculation, the test unit was placed in one of the low-temperature sterilization systems. After sterilization, the carriers were incubated in trypticase soy broth for 14 days at 55ºC and assessed for growth of *B stearothermophilus* spores.

The results demonstrated that ethylene oxide with hydrochlorofluorocarbons, the STERRAD 100S, and the STERRAD 100S half cycle were highly effective in killing approximately 10^6 *B stearothermophilus* spores present in the center of narrow-lumen stainless-steel tubes. As the lumen diameter decreased, the STERRAD 100 demonstrated reduced ability to kill all *B stearothermophilus* spores present on the carrier. This was especially true for the smallest and most challenging diameter tested (1-mm).The Steris System 1 was not effective in completely eliminating the 10^6 inoculum under test conditions.

It was concluded that the cycle parameters of the STERRAD 100S were superior to the STERRAD 100 system and equivalent to ethylene oxide with hydrochlorofluorocarbons. Introduction of this new STERRAD 100S system should improve the margin of safety and reduce processing costs by its use of a shorter cycle time. The Steris System 1 is limited by diffusion of the chemical sterilant into the interior of the lumen test unit.

From: Rutala WA, Gergen MF, Weber DJ. Comparative evaluation of the sporicidal activity of new low-temperature sterilization technologies: ethylene oxide, 2 plasma sterilization systems, and liquid peracetic acid. *Am J Infect Control* 1998;26:393-398.

VRE Colonization of Pediatric Oncology Patients

Colonization with multidrug-resistant vancomycin-resistant enterococci (VRE) can become a serious problem, because there is no proven therapy in case of an infection, and there is the risk of transfer of glycopeptide resistance to other organisms. Schuster and coworkers from the Department of Pediatric Hematology and Oncology, University of Munich, reported a study of VRE colonization among pediatric oncology patients.

Stool samples were taken from all patients of the pediatric oncology unit from March 1996 until June 1997. Barrier isolation was introduced in May 1996 and prudent use of glycopeptide antibiotics in July 1996. The results indicated that 24 (50%) of the 48 patients were colonized with VRE. Eleven (46%) of these 24 patients were VRE carriers at the time of their first examination; 9 patients (37%) acquired VRE during their therapy, and 4 patients (17%) had come from other hospitals and already were VRE-positive when they entered the unit.

In March 1997, 1 year after the outbreak, only four patients still were VRE-positive; by June 1997, all were VRE-negative. The average time of colonization was 12.5 weeks. Seventeen (70%) of the 24 colonized patients had received glycopeptide antibiotics, 16 of them within 2 months before the appearance of VRE in their stool. Five colonized patients died, four of their oncological illness and one because of sepsis without proof of VRE in his blood. In the end, none of the patients suffered from a VRE infection, and the transfer of glycopeptide resistance to other organisms was not observed. It was concluded that, with barrier isolation and a very restrictive use of glycopeptide antibiotics, VRE colonization can be decreased and even stopped. In spite of the high number of colonized patients, no VRE disease occurred.

From: Schuster F, Graubner UB, Schmid I, Weiss M, Belohradsky BH. Vancomycin resistant enterococci—colonization of 24 patients on a pediatric oncology unit. *Klin Padiatr* 1998;210:261-263.

Risk Factors for Ventilator-Associated Pneumonia

Understanding the risk factors for ventilator-associated pneumonia (VAP) can help to assess prognosis and devise and test preventive strategies. Cook and coinvestigators from McMaster University, Hamilton, Ontario, Canada, conducted a study to examine the baseline and time-dependent risk factors for VAP and to determine the conditional probability and cumulative risk over the duration of stay in the intensive-care unit (ICU).

The study design was a prospective cohort study in 16 ICUs in Canada. There were 1,014 mechanically ventilated patients. Demographic and time-dependent variables reflecting illness severity, ventilation, nutrition, and drug exposure were determined. Pneumonia was classified by using five methods: adjudication committee, bedside clinician's diagnosis, Centers for Disease Control and Prevention definition, Clinical Pulmonary Infection score, and positive culture from bronchoalveolar lavage or protected specimen brush.

The results showed that 177 of 1,014 patients (17.5%) developed VAP 9.0±5.9 days (median, 7 days; interquartile range, 5-10 days) after admission to the ICU. Although the cumulative risk increased over time, the daily hazard rate decreased after day 5 (3.3% at day 5, 2.3% at day 10, and 1.3% at day 15). Independent predictors of VAP in multivariable analysis were a primary admitting diagnosis of burns (risk ratio [RR], 5.09; 95% confidence interval [CI_{95}], 1.52-17.03), trauma (RR, 5.00; CI_{95}, 1.91-13.11), central nervous system disease (RR, 3.40; CI_{95}, 1.31-8.81), respiratory disease (RR, 2.79; CI_{95}, 1.04-7.51), cardiac disease (RR, 2.72; CI_{95}, 1.05-7.01), mechanical ventilation in the previous 24 hours (RR, 2.28; CI_{95}, 1.11-4.68), witnessed aspiration (RR, 3.25; CI_{95}, 1.62-6.50), and paralytic agents (RR, 1.57; CI_{95}, 1.03-2.39). Exposure to antibiotics conferred protection (RR, 0.37; CI_{95}, 0.27-0.51). Independent risk factors were the same regardless of the pneumonia definition used.

It was concluded that the daily risk for pneumonia decreases with increasing duration of stay in the ICU. Observed aspiration and exposure to paralytic agents are potentially modifiable independent risk factors. Exposure to antibiotics was associated with low rates of early VAP, but this effect attenuated over time.

From: Cook DJ, Walter SD, Cook RJ, Griffith LE, Guyatt GH, Leasa D, et al. Incidence of and risk factors for ventilator-associated pneumonia in critically ill patients. *Ann Intern Med* 1998;129:433-440.

VRE and End-Stage Renal Disease

The percentage of nosocomial enterococci that are vancomycin-resistant (VRE) has been increasing rapidly in the United States, resulting in recommendations to reserve vancomycin use for cases with proven resistance to other antimicrobials. The use of vancomycin is common in the hemodialysis setting. Brady and coinvestigators from Munster, Indiana, prospectively investigated the incidence of VRE in their dialysis population and compared it with a control group of 40 clinic patients with chronic renal insufficiency (CRI) who had a serum creatinine level greater than 1.5 mg/dL but were not undergoing dialysis. The incidence of VRE on their campus is almost 10%, which is similar to US data. They studied 50 chronic hemodialysis (HD) patients and 50 peritoneal dialysis (PD) patients. Each patient had a rectal swab performed for the presence of enterococci. Antimicrobial exposures over the 6 months before the initial swab test were reviewed in each patient. At least one repeated swab test was performed in 30 CRI,