Two Treatments Curbed Surgical Site Infections

BY MARY ANN MOON

Two unrelated preoperative treatments sharply reduced the number of surgical site infections in patients at facilities in the United States and the Netherlands, according to the results of two randomized trials.

In one study, preoperative cleansing of patients' skin with chlorhexidine-alcohol instead of standard povidone-iodine cut the risk of surgical site infection (SSI) by any organism by 41% and the risk of surgical site staph infection by 50%.

In the other study, rapid identification of surgical patients who are nasal carriers of *Staphylococcus aureus*, followed by immediate treatment with nasal mupirocin ointment, reduced the risk of hospital-acquired *S. aureus* infections by nearly 60%.

Dr. Rabih O. Darouiche of Baylor College of Medicine, Houston, and his associates performed what they described as the first prospective, randomized trial that directly compared the efficacy of two skin antiseptics in preventing SSIs.

The study included 813 patients treated at six university-affiliated U.S. hospitals who were undergoing clean-contaminated surgery—colorectal, small intestinal, gastroesophageal, biliary, thoracic, gynecologic, or urologic procedures—performed under controlled conditions without substantial spillage or unusual contamination.

The patients were randomly assigned to undergo either the standard preoperative scrubbing followed by painting with an aqueous solution of 10% povidone-iodine (422 patients) or preoperative scrubbing with applicators containing 2% chlorhexidine gluconate and 70% isopropyl alcohol (391 patients). All subjects also received systemic prophylactic antibiotics preoperatively.

The overall rate of SSI was markedly lower with chlorhexidine (9.5%) than with povidone-iodine (16.1%). The chlorhexidine preparation reduced the rates of both superficial and deep incisional infections, regardless of the type of surgery.

Dr. Darouiche and his colleagues estimated that the number of patients who needed to undergo skin preparation with chlorhexidine-alcohol instead of povidone-iodine in order to prevent one case of SSI was 17.

The proportion of patients infected with an identifiable microorganism was similar between the two groups. There also were no significant differences in the types of microorganisms causing the infections, except that streptococcal infections were less common in patients who received chlorhexidine-alcohol than in those who received povidone-iodine.

The number of adverse events and serious adverse events also was similar between the two groups. Three patients in each group developed pruritus, erythema, or both around the surgical wound, outcomes that were considered to be possibly related to the antiseptic preparations.

"The superior clinical protection provided by chlorhexidine-alcohol is probably related to its more rapid action, persistent activity despite exposure to bodily fluids, and residual effect," Dr. Darouiche and his associates wrote (N. Engl. J. Med. 2010;362:18-26).

Mupirocin nasal ointment had previously been shown to reduce hospital-associated staph infection, but the authors of the second study said that final proof would be needed from a prospective, randomized clinical trial.

In the study by Dr. Lonneke G.M. Bode of Erasmus University Medical Center, Rotterdam, the Netherlands, and her associates, more than 6,000 surgical patients at three academic and two general hospitals in the Netherlands initially were screened for nasal carriage of *S. aureus* at hospital admission using a real-time polymerase chain reaction assay. The 917 patients who tested positive were randomly assigned to receive mupirocin nasal ointment plus chlorhexidine gluconate soap for their skin (504 study subjects) or placebo ointment plus placebo soap (413 subjects) before undergoing surgery. The skin treatment was added because nasal carriers of the organism often have both skin and nasal colonization.

The patients, who underwent cardiothoracic, vascular, orthopedic, gastrointestinal, or general procedures, were treated for 5 days regardless of the timing of any interventions, and were followed for staphylococcal SSI for 6 weeks.

A total of 49 patients developed *S. aureus* infections at the surgical site. The rate was more than twice as high among placebo patients (7.7%) as among those who received active treatment (3.4%).

The treatment benefit was most pronounced in reducing the risk that patients would develop deep SSIs. The rate of such staph infections was 0.9% in patients who received mupirocin vs. 4.4% in those who received placebo.

Mean hospital stay also was significantly reduced—by nearly 2 days—with active treatment, compared with placebo. The only adverse effect of active treatment was local irritation, which resolved after mupirocin treatment was discontinued.

"The results of our trial provide solid evidence of the preventive effect of *S. aureus* decolonization and a good estimate of the size of this effect: The risk of hospital-associated *S. aureus* infections was reduced by nearly 60%," Dr. Bode and her colleagues wrote (N. Engl. J. Med. 2010;362:9-17). "It is plausible that this strategy would also be effective in carriers of methicillin-resistant strains of *S. aureus* that are susceptible to mupirocin." ■

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MY TAKE

Chlorhexidine Prep Clearly Superior

These are both high-quality studies, but I believe that the findings reported by Dr. Darouiche and colleagues will have more immediate impact. They convincingly demonstrate that a chlorhexidine-alcohol prep is superior to the traditional povidone-iodine solution. Chlorhexidine previously has been shown to be clearly superior to povidone-iodine when used as a skin prep for central venous catheter insertion.

The authors found that the chlorhexidine-alcohol product showed relatively greater superiority in the prevention of superficial incisional surgical site infections and relatively less in preventing more serious infections. Still, the overall benefit associated with the chlorhexidine solution suggests that hospitals not already using it as a surgical prep should begin doing so.

The study by Dr. Bode and colleagues is intriguing, showing that real-time PCR screening of primarily surgical patients on or before admission, coupled with a 5-day course of intranasal mupirocin and chlorhexidine baths, significantly decreased the incidence of nosocomial *Staphylococcus aureus* infections. This was particularly true of deep surgical site infections, a sometimes devastating complication.

However, the study has limitations that I believe will prevent the results from being immediately embraced in this country. None of the *S. aureus* isolates in the study were methicillin resistant, yet in the United States, a high percentage of colonizing isolates are community-associated MRSA, and an increasing percentage of those are mupirocin resistant. Also, a recent large Swiss study employing a similar "search and destroy" strategy for MRSA colonization before surgery failed to show benefit (JAMA 2008;299:1149-57).

But I agree with Dr. Wenzel's suggestion in the editorial (N. Engl. J. Med. 2010;362:75-7) that real-time PCR screening and decolonization is probably appropriate for surgical patients where the stakes are especially high (e.g., cardiothoracic procedures and total joint replacements).

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Comorbidity, Obesity Linked to H1N1 Influenza Hospitalizations

More than half of the adults hospitalized in the early days of the 2009 influenza A (H1N1) pandemic in New York City were obese, and 92% of the obese patients had underlying medical conditions, according a recent review.

To quickly assess the severity of illness and identify those at greatest risk from the emerging virus, researchers at the New York City Department of Health and Mental Hygiene reviewed data from the first 99 patients with confirmed H1N1 influenza admitted to any hospital in New York City. The study population included 19 patients aged 0-4 years, 39 patients aged 5-17 years, 32 patients aged 18-49 years, 8 patients aged 50-64 years, and 1 patient aged 65 or older. The patients with H1N1 influenza were disproportionately younger compared with the general population (MMWR 2010;58:1436-40).

A total of 95 (96%) patients had fevers at admission, and 89 (90%) complained of cough. Also, 37 children (younger than 18 years) and 36 adults (aged 18 years and older) had at least one underlying medical condition known to increase the risk of flu complications, and 7 children and 10 adults had more than one such condition. Asthma, the most common underlying medical condition, was noted in 29 children (50%) and 19 adults (46%). Chronic metabolic disorders, including diabetes, were reported in 11 patients (11%).

Body mass index data were available for 28 children and 20 adults. Four of the five obese children and 11 of the 12 obese adults had underlying medical conditions, including asthma and Down syndrome. Three of the four patients who died were obese; their underlying medical conditions included asthma and Down syndrome.

Of the 76 patients treated with oseltamivir, 36 (47%) were treated within 2 days of symptom onset, but the median time to treatment from the onset of illness was 3 days. Hospital stays were shorter for patients who started antiviral therapy within 2 days.

The study was limited by several factors including the potential underreporting of cases and the difference in reporting protocol later in the pandemic, when data were collected from sentinel hospitals only.

The findings confirm that patients at high risk should be encouraged to get vaccinated, the researchers said.

—Heidi Splete