Health Care Industry



# OR maskssafe practice or habit - operating room - Editorial

AORN Journal, Jan, 2003 by Nancy J. Girard

During the past few years, there has been much discussion about surgical masks and questions about whether wearing them is an effective practice or a habit that has no basis in fact. (1) Are face masks useful or not? Do they prevent infections or not? This issue has not been resolved clearly. The majority of ORs continue to mandate the wearing of surgical masks; however, a few surgery sites have opted not to use surgical masks. This usually is justified as a cost-containment move based on the findings of one study. Researched-based effectiveness, however, has not been proven.

MASK EFFECTIVENESS

Reaching a conclusion on mask effectiveness is difficult because the available information is murky at best. In an attempt to empirically answer the question of effectiveness, a Cochrane review of all randomized and controlled research of disposable surgical face masks was performed. (2) This comprehensive review included information from individuals, manufacturers, and distributors, as well as AORN members. Researchers found only two randomized controlled trials comparing individuals wearing surgical masks with those not wearing surgical masks.

In one trial, which had a small number of participants, wearing surgical masks was associated with fewer patient infections. In a larger trial, however, there was no difference in infection rates, so neither harm nor benefit could be determined clearly. As for evidence, it is very difficult to perform controlled research on the effects of wearing surgical masks on wound infections. Investigators, as well as institutional review boards, may be hesitant to approve such studies because of the potential harm to patients if a mask is not worn.

In an attempt to gather more information on this topic, I went to the literature. Evidenced-based practice is AORN's goal, so I thought I might find justification to wear surgical masks based on infection control.

## NOSOCOMIAL INFECTIONS

No one argues that surgical site infection rates must be held to a minimum. Hospital-acquired infections affect approximately two million people each year. (3) The Institute of Medicine says that 44,000 to 98,000 deaths occur from medical error annually at a cost of $17 to $29 billion. (4) The most common infection is caused by Staphylococcus aureus. In one reported case, life-threatening Staphylococcus aureus infections occurred after neurological surgery. (5) Within three months, three patients developed serious infections. The patients' nasal passages were cultured, as were those of surgical staff members. Six (ie, 40%) staff members were found to be Staphylococcus aureus carriers, and the microbes from one staff member were found to be identical to those of affected patients. Several breaks in recommended practices, including mask barriers, were cited as causes of the infections.

In another case, children developed infections after cardiothoracic surgery. (6) Three children carded the same Staphylococcus aureus strain. Fourteen (ie, 25%) staff members in the OR carried Staphylococcus aureus in their nares. Two of the carriers were a cardiothoracic surgeon and a perfusionist. The surgeon also carried Staphylococcus aureus on his hands and was not allowed to perform surgery until two hand cultures returned negative. Although these are only two of the case studies reported in the literature, one has to ask, did surgical masks serve as an effective barrier to prevent these infections? If they did, then why did patients get the infection? From where did they really get the infection? Did hospital staff members infect patients, or did patients infect staff members?

One of the national health objectives for 2000 was to reduce surgical site infections by 10%. The National Nosocomial Infections Surveillance System states that this goal has been met and surpassed; (7) however, surgical site infection rates, although reported by hospitals, may not represent all acquired infections because of short hospital stays and procedures being performed in ambulatory settings. Site infections usually show up four to seven days postoperatively, so patients often are at home when the infection begins. If the infection is serious enough for the patient to be readmitted to the hospital, the admitting diagnosis often does not reflect the original surgery, so these rates are not tracked. Additionally, patients often go to clinics for follow-up visits, and the presence of a site infection may not be reported back to the hospital.

## STAPHYLOCOCCUS AUREUS

If the majority of surgical site infections are caused by Staphylococcus aureus, would decreasing the microbial load affect infection rates as well as a mask? I recently read an article in The New England Journal of Medicine that started me thinking about this topic of surgical masks and patient safety in the OR. (8) The article summarized a four-year study that looked at nosocomial infections caused by Staphylococcus aureus. The investigator cultured nasal passages of 3,864 surgical patients, and Staphylococcus aureus was detected in 891 patients. Investigators divided the participants into two groups. Patients in ode group received intranasal applications of mupirocin two times per day for up to five days before surgery. Patients in the other group received a placebo nasal ointment. Of the patients carrying the microbe, only 4% of those who received the mupirocin developed a Staphylococcus aureus infection compared to 7.7% of patients in the placebo group. Using nasal mupirocin was not presented as an alternative to wearing facial masks, nor was the relationship of barriers to postoperative infections discussed.

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In a similar study, the use of mupirocin nasal ointment was investigated as a preventive for Staphylococcus aureus surgical site infections. (9) Patients in this two-group, randomized, double-blind study were given either mupirocin or a placebo preoperatively. For patients in the mupirocin group, endogenous Staphylococcus aureus was five times lower than for patients in the placebo group; however, the use of mupirocin nasal ointment did not reduce the surgical site infection rate. Obviously, nasal ointment for all is not the answer either.

CONCLUSION

In the article that started this reflection, mupirocin nasal administration appeared to decrease infections from Staphylococcus aureus, but it would be impossible for surgical personnel to use this in place of surgical masks. As with any medication, there has been confirmed microbe resistance to mupirocin. If the nose is a major body area for colonization of Staphylococcus aureus and the major method of transmission is air droplets, surgical masks should continue to be worn correctly. Wearing a mask under the nose, wearing one mask all day long, or wearing a wet mask is useless for preventing cross contamination.

There is no clear research evidence on mask effectiveness, but there is a clear clinical practice and experiential evidence that wearing surgical masks is beneficial. In evidence-based practice, all evidence is considered, so my interpretation is that we must continue to wear surgical masks correctly for patients', as well as surgical staff members', protection. Perhaps surgical masks also should be standard wear for patients. Until someone proves differently, knowing whether wearing a mask is an effective practice or just a habit is a moot point, and it would be a mistake to discontinue the wearing of masks anywhere that surgery is performed.

NOTES

(1.) H M M Taylor, "Surgical face masks revisited again: Do we have an answer yet?" ACORN Journal 15 (Winter 2002) 30-33; L Emsley, "Why wear surgical face masks?" Nursing Times 96

(July 6-12, 2000) 38-39.

(2.) A Lipp, P Edwards, "Disposable surgical face masks for preventing surgical wound infection in clean surgery," in Cochrane Database of Systematic Reviews: electronic database (Oxford, England: The Cochrane Library, 2002)

(3.) "Monitoring hospital-acquired infections to promote patient safety--United States, 1990-1999," Morbidity & Mortality Weekly Report 49 (March 03, 2000) 149-153.

(4.) Institute of Medicine, To Err is Human: Building a Safer Health System (Washington, DC: National Academy Press, 2000).

(5.) M Hilton et al, "Deoxyribonucleic acid fingerprinting in an outbreak of Staphylococcus aureus intracranial infection after neurotologic surgery," Otology & Neurotology 23 (July 2002) 550-554.

(6.) S Weber et al, "An outbreak of Staphylococcus aureus in a pediatric cardiothoracic surgery unit," Infection Control and Hospital Epidemiology 23 (February 2002) 77-81.

(7.) "National Nosocomial Infections Surveillance (NNIS) System report, data summary from January 1990-May 1999, issued June 1999," American Journal of Infection Control 27 (December 1999) 520-532.

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(8.) T M Perl et al, "Intranasal mupirocin to prevent postoperative Staphylococcus aureus infections," The New England Journal of Medicine 346 (June 13, 2002) 1871-1877.

(9.) M D Kalmeijer et al, "Surgical site infections in orthopedic surgery: The effect of mupirocin nasal ointment in a double-blind, randomized, placebo-controlled study," Clinical Infectious Diseases 35 (Aug 15, 2002) 353-358.