A new study in the *New England Journal of Medicine* finds that treating patients who are *Staphylococcus aureus* nasal carriers with mupirocin nasal ointment and chlorhexidine gluconate soap for 5 days reduces hospital-associated postoperative *S aureus* infection by 60%.

“This well-designed, well-executed study contributes more to our knowledge that screening is effective,” says Stephen Streed, MS, CIC, system director for epidemiology for Lee Memorial Health System in Fort Myers, Florida. “Several other studies have shown reduced infection rates, but some had equivocal results, so this study adds strength for doing nasal screening.”

Nasal carriers of *S aureus* are at higher risk for infection, so a preoperative screening program makes sense. But which patients should be screened, and how does such a program fit into the complicated world of surgery schedules?

**Whom to screen?**

Shannon Oriola, RN, CIC, COHN, the lead infection control practitioner at the Sharp Metropolitan Medical Campus in San Diego, says the hospital has developed protocols to screen selected patients undergoing elective procedures such as major orthopedic, neurological (particularly spinal fusions), and cardiac (bypass, valve replacement or heart transplant) surgery patients for *S aureus*. “You want to avoid infections in all patients, but efforts typically are directed toward the higher risk surgeries that include implants to avoid devastating complications after surgery,” she says.

The approach fits with the recommendation by Richard Wenzel, MD, in a *New England Journal of Medicine* editorial: “The use of intranasal mupirocin and chlorhexidine baths for carriers of *S aureus* who have been identified preoperatively by means of a real-time polymerase-chain-reaction [PCR] assay could be reserved primarily for patients who are undergoing cardiac surgery, all patients receiving an implant, and all immunosuppressed surgical candidates.” *S aureus* causes about 20% to 30% of surgical site infections, with more than half from endogenous flora, according to Dr Wenzel.

Experts say it’s important to test patients for both methicillin-resistant *S aureus* (MRSA) and methicillin-sensitive *S aureus* (MSSA). “Staph aureus is more common than MRSA,” says Streed. “Hospitals need to screen for both.”

Nasal screening should be part of a larger campaign to prevent *S aureus* infection.

**A step-wise approach**

New England Baptist Hospital in Boston has had a MRSA/MSSA eradication program that includes nasal screening for inpatient surgery since 2006, according to the infection control manager, Maureen Spencer, RN,
MEd, CIC. The hospital performs 10,000 cases a year, including 4,500 total joint procedures.

Spencer says a MRSA coordinating technician collects a nasal culture from the patient in the preadmission screening unit, ideally at least 2 weeks before the scheduled surgery. Two swabs are used in each nostril: one is for PCR and the other for a standard culture. Patients receive a brochure about the MRSA/MSSA eradication program and what to do if the test comes back positive, says Spencer. Patients also receive a hand hygiene brochure that emphasizes hand washing and suggests patients ask their providers if they have washed their hands.

A positive result

If the screening test is positive for either MRSA or MSSA, the technician notifies the patient by phone and reviews the instructions in the brochure. The patient applies 2% mupirocin nasally for 5 days and baths with chlorhexidine for 5 days, in addition to the 2 days before surgery.

If MSSA is the culprit, no additional screening or precautions are needed.

In the case of MRSA, a second nasal screen is obtained before surgery, and vancomycin is used as the prophylactic antibiotic.

Patients have to be off of their 5-day treatment for 1 day before the second screen. They either return to the hospital for screening, or the test is obtained on the day of surgery.

“We want to see if the treatment eradicates the MRSA,” says Spencer, noting the eradication rate is about 80%.

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Source: New England Baptist Hospital. Used with permission.
Contact precautions

If the second screen is positive, contact precautions are used in the OR and during the patient’s entire hospitalization. The patient’s condition is flagged in the computer, and the MRSA coordinating technician notifies the surgeon. Spencer’s administrative assistant also checks the OR schedule and emails a list of patients who are MRSA positive to the OR.

“If a patient with MRSA is scheduled for an incision and drainage, we make it the last case of the day (in the OR),” Spencer says.

After the program was implemented, MRSA infection rates decreased 60%, and MSSA infections fell by half, says Spencer.

Some infection control experts worry that wide use of mupirocin will cause antibiotic-resistant organisms to develop. Streed agrees resistance might be a consideration outside the US, where mupirocin is more commonly used, but adds, “If I am a patient, I want a safe environment right now. I’m less concerned about 5-year trends.”

Ambulatory and emergent patients

Timing makes a nasal screening program for ambulatory surgery and emergency patients more complicated, but it is still possible.

“The challenge is the emergent patients,” says Oriola. If screening tests are ordered, both PCR and culture tests are done. “Depending on how you batch tests, you can get results in just a couple of hours to 12 to 24 hours.”

If the patient is positive for MRSA, the antibiotic may need to be changed to vancomycin.

At Lee Memorial Health System, a PCR assay is used for emergent patients preoperatively. If the test is positive, the antibiotic in the OR is switched to vancomycin.

Setting up a program

To get buy-in, Oriola recommends surgeons and epidemiology staff meet to discuss benefits of a screening program.

“Look at your surgical site infections and let the surgeons know how many could have been prevented if Staph aureus had been identified before surgery,” she says.

Once the decision is made about whom to screen and how to do so, Oriola recommends integrating the program into preoperative order sets. Spencer developed a detailed procedure and an algorithm (chart).

Screening by service line

Implementing a screening program is easier for some service lines than others, notes Oriola. “Orthopedic and many cardiac patients come in ahead of time for testing, and someone is holding their hand throughout the process. That doesn’t happen consistently in other service lines or general surgery patients.”

At Sharp, a nares specimen is collected when the patient comes in a week ahead of surgery for a joint replacement class. A physician assistant or nurse practitioner orders the screening tests for the cardiac surgical patient preoperatively when the patient is in the hospital. Oriola is currently working with other surgeons to get them on board to determine a screening process for their patients.
**Bottom line**

Spencer says the MRSA/MSSA eradication program cost about $400,000 in its first year, including the cost for the PCR equipment and hiring the MRSA coordinating technician as well as an additional microbiologist.

Spencer adds there is a CPT code for a MRSA preoperative nasal screen, and many insurance companies give at least partial reimbursement. The primary pay-off, says Spencer, is preventing surgical infections. Medicare does not reimburse for added costs for treating surgical site infections after several types of surgery, and many insurance companies have followed suit.

A budget analysis published in *Infection Control and Hospital Epidemiology* supports that perspective. The researchers wrote that preadmission testing for *S. aureus* and decolonization for carriers would have saved US hospitals a mean of $231.5 million annually. Another study in *PLoS ONE* (Public Library of Science) found a single case of MRSA surgical site infection resulted in $60,000 in additional charges compared with uninfected controls.

**Partnership pays off**

Spencer says the collaboration between the OR and infection preventionists is key to a successful program. She works with OR and perioperative screening staff and surgeons and finds the program rewarding.

“I have evidence-based data that this program can reduce your rate of infections,” she says. 

——Cynthia Saver, RN, MS

*Cynthia Saver is a freelance writer in Columbia, Maryland.*

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**References**

**S aureus screening**

Two tests are used to screen for *Staphylococcus aureus*:

**Polymerase chain reaction (PCR)**

This molecular assay uses a technique where a section of DNA is copied thousands of times to produce enough DNA to be tested for a virus or bacteria. Results are available within 1 to 2 hours. Current PCR tests can only test for MRSA, but the manufacturer is working on a PCR test for both MRSA and MSSA. One drawback is that the PCR does not tell what the organism is sensitive to.

**Chromogenic media (eg, CHROMagar)**

The media are specific for MRSA and can be used to identify antibiotic sensitivity. The test costs about one-fourth of the PCR's cost.