Losing the MRSA Label
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There are some things you might want to be for life. A credit card holder. A frequent flyer. Someone who likes to work out. But no one says, “I want to be labeled as MRSA positive.”

Methicillin-resistant *Staphylococcus aureus* (MRSA)3 leads to 250,000 hospitalizations in the US per year, and some 10,000 deaths (http://wwwnc.cdc.gov/eid/article/13/12/07-0629_article.htm). Moreover, it is hard to shake; in adults, 50%–60% of patients who develop a MRSA colony can carry the bacteria forward for years, even without an apparent infection. Considering the fact that MRSA is spread most commonly through healthcare facilities, it has become the scourge of modern healthcare—something everyone is on guard against. For that reason, infection control units of hospitals have policies in place to identify and isolate MRSA patients.

“If you have ever been colonized with MRSA, you are branded for life a MRSA patient,” says Fred C. Tenover, vice president of scientific affairs at Cepheid, a molecular diagnostic company. Tenover has a history specializing in MRSA and other healthcare-associated infections.

As someone branded with MRSA history, you receive special treatment: room isolation, doctors wear gloves, gowns, and caps, and in some cases eye and mouth protection (http://www.cdc.gov/mrsa/healthcare/clinicians/precautions.html). Sources say that these contact precautions (CPs) can be disruptive to the quality of patient care and use up valuable physician time and hospital resources (1). “You see, the minute you go into isolation, the cost of your hospital bed could quadruple, depending on your hospital system,” says Tenover. “It is going to cost a lot more to be in that isolation room,” he says.

But what if you were no longer MRSA positive? What if your body cleared the colony, but your charts didn’t reflect that? This is not an uncommon scenario.

The only way to become unmarked as carrying MRSA is to undergo a series of steps that would allow for that, and those steps are tedious. Typically, it involves having 3 negative cultures over 3 days, and a treating physician with enough courage to declare a patient currently on CPs to be MRSA free.

Often, healthcare stays aren’t long enough to complete the series, or, by the time the results come back, a patient has already gone home. And if it turns out that the patient is no longer MRSA positive, CPs are still used during the hospital stay. Moreover, in most places, initiating these steps is voluntary, decided by the clinician and, without national guidelines, highly variable (2).

That, combined with the fact it can take years for a patient to decolonize, has allowed the label of MRSA-positive to stick for life. So the question becomes whether there is an easier way to prove that someone is decolonized, thus relieving hospitals of the burden of MRSA patients and also relieving these patients whose lives change once they receive this label. As a marked patient, the minute you check into a healthcare facility, you are subject to MRSA precautions that consume resources, time, and money.

Here we consider a study that suggests a practical screening method using PCR to detect MRSA patients who are no longer colonized and therefore may have their onerous CPs discontinued.

What Is It?

“Why does the protocol require 3 separate negative cultures?” Dr. Erica S. Shenoy, now the Assistant Chief of the Massachusetts General Hospital (MGH) Infection Control Unit and an instructor at Harvard Medical School, remembers asking during her residency 6 years ago.

At the time, Dr. Shenoy remembers considering the implications of the discontinu-
ation protocol after seeing someone with vancomycin-resistant enterococci (VRE) stuck at the hospital for an extra week because of her VRE-positive status, a diagnosis not unlike MRSA-positive.

Discontinuing someone from CPs was “the lowest of the low priority, due to too many other more pressing medical issues,” says Dr. Shenoy, and yet, it would have relieved time and resource burdens for both the patient and hospital.

Dr. Shenoy says she began wondering if there was an efficient way to determine a patient’s true colonization. Was there a faster, easier, and trustworthy way to discontinue CPs?

She surveyed hospitals to see what their procedures were, and found that across the country more than 64 different procedures for discontinuing contact precautions were employed. All long, all cumbersome (2).

So, she worked with Dr. David Hooper, chief of the MGH infection control unit, and they came up with the idea of using a commercially available PCR platform that could elicit results in just 1 day. “There was a PCR platform, not promoted for this purpose, [and] we said ‘why don’t we try it?’ ” Dr. Shenoy says, referring the Cepheid’s GeneXpert platform.

How Does It Work?

The study took place at MGH (3). For the study, patients in the control group received standard of care, basically identifying someone as having MRSA history, which led to implementation of CPs and possible clinician-initiated screening for CP discontinuation.

In the intervention group, those with MRSA history were immediately entered into a proactive screening procedure that included 2 nasal swipes upon admittance—1 for standard culture, 1 for PCR—with swabs continuing through to obtain 3 results (in both culture and PCR) in as many individuals as possible (Fig. 1).

Overall, the experimenters were looking for discontinuation of CPs as well as completion of the series and frequency of clearance, indicates Dr. Shenoy [see (3) for the basis of this information].

To compute “decrease in CP days, frequency of observed discontinuation was multiplied by total length of stay minus specimen processing time,” the authors write in their paper.

As might be expected, in the intervention group, 259 of 259 study participants had the series of screenings initiated, but in the control group just 62 of 198 participants had screening initiated. Of those, 19 individuals completed the series, 9.6% of the total admitted compared to 73.7% of those in the intervention group who completed the active screening protocol.

The results of the study showed that, all told, the study participants in the intervention arm had discontinuation of CP 4.1 times more frequently than those under the standard protocol. The authors also reported that with the use of a set of 3 cultures as the gold standard, the PCR swab had a sensitivity of 93.9% and specificity of 92%.

“It turned out that a single [PCR] test had high negative predictive value compared to three cultures,” explains Dr. Shenoy in an e-mail to Clinical Chemistry.

And for the single PCR assay, the total time from swipe to results is 6 hours.

As far as how the groups compared, the authors write, “of those who completed the series of swabs, the number of subjects for whom all 3 culture swabs were negative did not differ significantly between the nonintervention (78.9%) and intervention (65.4%).”

Fig. 1. Screening for persistent MRSA as part of the MAPP.
When eligible patients arrive at pilot site locations, front-line clinical staff assess for recent antibiotic exposure. If none is present, the patient is screened. PCR-negative patients have contact precautions for MRSA discontinued; PCR-positive patients remain on CP. Analysis of the impact of the program on clinical outcomes as well as operational outcomes, including time to bed assignment and hospital capacity, are ongoing.
An accompanying commentary in the journal explains that a “single PCR resulted in a >50% reduction in total MRSA contact isolation days and potential annual cost avoidance of >$1 million compared to the no MRSA discontinuation strategy” (1).

In their report, Shenoy’s team suggests, “discontinuation of CPs based on a single negative PCR may offer a reasonable and streamlined strategy to address the growing pool of those designated as MRSA-colonized.”

How Can We Use It?

Dr. Shenoy’s team is already building off the findings of their clinical trial. They have begun a pilot program implementing the rapid cycle testing approach, combined with an electronic alert system, at 3 “high-volume” sites at MGH—the emergency room, the pre-admission testing area, and a large community healthcare facility nearby.

On arrival at the MGH Emergency Department and 2 other outpatient sites, the real-time electronic alert system notes a patient with MRSA history, cross-checks the patient’s microbiological history across multiple partner institutions, and if they are a candidate notifies providers at the point of care that the patient should be screened.

“If we did not have [the electronic system], I’m not certain that using PCR for this purpose would be as effective because you’d have to rely on humans reviewing the microbiology and not making errors in interpretation,” says Dr. Shenoy, who explains that across facilities, “there is no standardized way to address MRSA,” making comparing and compiling data less than simple.

“We are currently in the process of analyzing the impact of the pilot on hospital capacity constraints,” says Dr. Shenoy, but, all told, “we’re seeing CP discontinuation rates close to 70%. That is, 70% of the patients screened are negative and have MRSA CP discontinued.”

Something hospitals will want to consider with the rapid cycle testing is the cost. According to estimates, a single PCR assay will run you $40 to $45; for a culture series, you’re looking at only about $10.00 per patient, for all 3 swabs.

But, cutting down on hospital time and resources might be worth it. And there’s a potentially underreported side effect: MRSA history is shown to influence antibiotic choices.

In the end, Dr. Shenoy’s pursuit of MRSA control comes from wondering if it’s not time to reevaluate our ways of establishing and evaluating infection control practices.

“Infection control influences many aspects of care delivery,” she says. “And thus a renewed focus on building the evidence base for best interventions should pay dividends in terms of better patient care and outcomes.”

References


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