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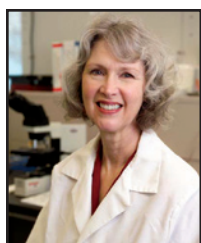
Rapid Results Pay Off for Patients
and Healthcare Systems

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The Decolonization Decision In A New Healthcare Paradigm

Converging pressures encourage rapid MRSA/SA testing



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Hospitals are experiencing a new paradigm in which they will receive no reimbursement for healthcare-associated infections (HAI) whether the patient is a carrier at admission or

not, and in which their rates of HAI will be available for public scrutiny without the opportunity to justify high rates based on risk factors among patient populations.

At the same time, an ever-increasing number of patients carry methicillin-resistant *Staphylococcus aureus* (MRSA). These patients not only have an increased risk of infection, but they may also transmit infection to others. In this new healthcare environment, economic considerations will drive the

implementation of the most effective infection prevention strategies.

As discussed in previous On-Demand issues, limiting the opportunity for transmission time by using the fastest test for MRSA and *S. aureus* colonization has been shown to dramatically

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Decolonization Decisions in the New

reduce transmission events and infection rates. Last year, Espinoza reported that one hospital saved an estimated \$576,000 per year by performing MRSA testing once a day, using a molecular test for patients in the ICU, followed by strict isolation for colonized patients.¹ The cost reduction was a result of decreased transmission and infections, even without invoking decolonization.

Decolonization: Early Days

As long ago as 1980, prescient physicians such as Victor Yu (Univ. of Pittsburgh) were experimenting with decolonization of hemodialysis patients carrying *Staphylococcus aureus* in their noses to prevent

published in the New England Journal of Medicine in 1986.

Three years later, Dr. Boelaert and colleagues from Belgium evaluated nasal mupirocin ointment versus placebo for decolonization in a cohort of hemodialysis patients. During the therapy period, only one of 16 patients receiving mupirocin over a nine-month period was colonized with *S. aureus*, whereas 10 out of 18 of the placebo group patients harbored *S. aureus* in their nares (highly significant difference).

Most impressively, the placebo group had six *S. aureus* infections and the mupirocin-treated group only had one (a different strain from the one

36% of patients carrying MRSA developed infection, in contrast to 19% of those carrying MSSA

subsequent *S. aureus* infections.² *S. aureus*-colonized patients were much more likely to develop an infection, and 93% of the infecting organisms were the same strain as the colonizer in the patient's nares. Hemodialysis patients were known to be at greatly increased risk of such infections, given the presence of a constantly manipulated permanent venous access shunt and their relatively compromised immune status.

Dr. Yu and colleagues did not have the benefit of topical preparations available today, so they used oral rifampin, the effects of which were usually only temporary. Despite the inefficient prophylactic regimen, patients given rifampin developed significantly fewer infections than did patients given a placebo. The results of their study were

originally colonizing that patient).³ The data were indisputable even then; but it has taken the healthcare community a long time to embrace the inevitable conclusion: prophylactic treatment of *Staphylococcus aureus*-colonized patients reduces morbidity and mortality.

Today: A Greater Challenge

Now, 23 years later, we have a more serious adversary, methicillin-resistant *S. aureus*, and the increased risk of infection among colonized patients is still a threat. In fact, patients carrying MRSA in their noses are even more likely to develop an infection with their own strain of *Staphylococcus* than those harboring the more benign methicillin-susceptible *S. aureus* (MSSA).

Healthcare Paradigm: Choices & Challenges

Keene and colleagues reported that critically ill *S. aureus*-colonized patients had a 27-fold higher risk of developing a *S. aureus* infection within 16–19 days after hospital admission than did non-colonized patients.⁴ To quantify the increased risk associated with MRSA, 36% of those carrying MRSA developed infection in contrast to 19% of those carrying MSSA. Only 2% of non-colonized patients subsequently developed a staphylococcal infection.

In another study, 204 liver transplant unit and ICU patients were tested to determine sites of *S. aureus* carriage.⁵ Of these patients, 26% carried *S. aureus* in the nares only, 3% were rectal carriers only, and 25% had the organism in both sites. A whopping 40% of those positive for both nasal and rectal carriage developed a *Staphylococcus aureus* infection, compared with only 18% among nasal carriers and none of the rectal-only carriers.

Davis and colleagues reported that either MRSA colonization detected at hospital admission or acquisition in the healthcare institution resulted in a ten times higher incidence of MRSA infection than for patients colonized with MSSA or not colonized.⁶ Even long-term (>1 year) carriers of MRSA are at relatively higher risk of morbidity and mortality from a subsequent MRSA infection⁷. An 18 month follow up study of colonized patients after they leave the hospital⁸ revealed a 20–30% risk of serious infection following soft tissue or respiratory tract acquisition and a 40–50% risk of serious infection if the initial isolate came from bone, joint fluid, or nares (as detected on a surveillance test). Clearly, being a carrier of SA or MRSA is a significant risk factor—a sort of “horizontally acquired” genetic risk factor for developing an infection.

MRSA Rates Increasing in the U.S.

More people in the United States are colonized with MRSA now than ever before, and the rate is increasing despite the fact that overall *Staphylococcus aureus* colonization rates are dropping.⁹ Around 30% of the general U.S. population carries MSSA in their nares, but only around 1.5% carry MRSA (the MRSA rate has almost doubled since the previous survey).

Certain populations are at relatively much higher risk. In addition to hemodialysis patients, HIV/AIDS patients, men who have sex with men, intravenous drug users, obese patients, those with type 1 diabetes, those with conditions that damage the integrity of the skin, and even veterinarians¹⁰ harbor MRSA at rates much higher than the general population. Large animal veterinary personnel had a carriage rate of >15%, compared with around 4% for small animal personnel. The connection here is likely to be the fact that horses and pigs are potential reservoirs of MRSA.

In the healthcare setting, long-term care facility residents are often colonized with MSSA and MRSA. One study

found 62% of nursing home patients colonized with *S. aureus*; 40% overall were colonized with MRSA.¹¹ Interestingly, bacterial loads of nasal MRSA actually increase significantly when patients are treated with beta-lactams or fluoroquinolones for other medical conditions,¹² suggesting that elimination of other mucosal flora by these common antibiotics may put patients at increased risk for becoming carriers. Not surprisingly, the environment surrounding patients taking these antibiotics was more heavily contaminated with MRSA than the environment of control patients.

Consequences are additive and extend beyond the immediate patient. Patients can spread MRSA to their family members. Healthcare workers are more likely to transmit the strain to someone else if the environment is contaminated, and then pass it on to their families.¹³ Patients who enter a room previously occupied by an MRSA-colonized patient have a small but significant increased risk of acquiring the organism themselves.¹⁴



Aye, the ‘noes’ have it:
Around 30% of the general U.S. population carries MSSA in their nares

Decolonization Decisions

Preventing Infections in MSSA and MRSA-colonized Patients

With the advent of molecular methods for detection of MRSA, we are now armed with the optimal diagnostic tools for recognition of nasal carriers. We can now isolate patients quickly to prevent patient-to-patient transmission. But for individual patients who are carriers, can anything be done to prevent infections in MSSA and MRSA-colonized patients?

Newer studies are showing that indeed, case recognition followed by selective decolonization is highly beneficial to patients who are carriers. A study published several years ago showed a highly statistically significant reduction (67%) in post-surgical sternal wound infections in a group of 854 open heart surgery patients given intranasal mupirocin compared with the initial untreated cohort of 992 similar patients.¹⁵

Thoracic surgeons have jumped on these and other published results, even though the study was not blinded and randomized, and now recommend use of mupirocin prophylaxis for cardiac surgery unless a surveillance test has yielded a negative result for staphylococci.¹⁶ The American Thoracic Society (ATS) has classified the evidence for this recommendation as “A,” representing the best supported in the literature. However, a few skeptics have criticized these studies because they were not placebo-controlled, double-blinded interventional trials, and other factors (such as changes in infection control techniques) could have happened in the interim.

The skeptics are about to be proven wrong, however. Very recently, a group from the Netherlands¹⁷ randomized patients found to be colonized with *S. aureus* by a real-time PCR on hospital admission to receive either intranasal

mupirocin and chlorhexidine baths (decolonization treatment) or placebo. The patients who received placebo developed staphylococcal infections twice as often as did the patients who did not receive the decolonization treatment. In patients who developed deep surgical site infections, the difference was even more striking: infections occurred in 1.1% of the decolonization treatment patients and in 4.9% of those given placebo. This study is important for two reasons:

1. It showed benefit for patients whose decolonization regimens were started after admission, once the PCR test was positive
2. It showed benefit for both surgical and non-surgical patients.

In-hospital decolonization after admission would benefit all surgery patients

While the ATS recommendation was targeted to elective surgeries in which there was time to decolonize patients before hospital admission, the Netherlands study showed that in-hospital decolonization after admission would benefit all surgery patients, including those having emergency or non-elective surgery.

Testing and Decolonization Works: Three Examples

Similar findings are being reported elsewhere in other healthcare settings. A recently reported interventional trial in an Israeli hospital targeted returning patients and residents of long term healthcare facilities for surveillance at admission, contact isolation, and decolonization of MRSA-carrying patients.¹⁸ Following the intervention,

MRSA bacteremia rates dropped from 32.7% to 10.3% over 3 years.

Surveillance cultures for intensive care unit patients at admission and weekly thereafter followed by contact isolation and decolonization procedures for the patients found to be colonized resulted in an amazing 67% hospital-wide reduction in MRSA infections in a prestigious East coast hospital.¹⁹

Importantly, these authors had evaluated previous interventions, such as barrier precautions during central venous catheter placement, introduction of alcohol gel hand rubs, a house-wide hand hygiene campaign, as well as the MRSA detection and decolonization protocol. None of these other strategies had an impact. The drop in MRSA infections is directly a

result of the surveillance and decolonization of MRSA carriers, as proved by the fact that MSSA infection prevalence remained stable throughout the implementation.

Robicsek and colleagues were among the first in the U.S. to adopt a modification of the Search and Destroy strategy used in Europe. As reported last year, they lowered their hospital-associated MRSA disease prevalence by more than a third (from an already low level) using rapid PCR-based initial screening of patients and then isolating and decolonizing MRSA positive patients with nasal mupirocin and chlorhexidine body washes.²⁰

Recognition is Spreading

Finally, another physician specialty, Ear, Nose and Throat (otolaryngologists) is

just discovering the benefits of identifying and treating *Staphylococcus* carriers in order to reduce their risk of infections. In an article published just this year, researchers at the Massachusetts Ear & Eye Infirmary were the first otolaryngologists to evaluate pre-operative treatment for its effects on post-surgical infections, for patients found positive during pre-screening. Pre-screening was performed using a real-time PCR method (Gene-Ohm, Becton-Dickinson) for MRSA, and cultures for MSSA.²¹

Of 420 adult patients evaluated who were undergoing head and neck invasive procedures for cancer or other reason, 241 received surgery before screening was initiated. Of 179 patients presenting for surgery after implementation of the assay, 97 patients were pre-screened. *S. aureus*, was carried

by 25%, but only two strains (2%) were MRSA. The patients colonized with MRSA were treated with 5 days of mupirocin ointment and chlorhexidine baths every other day over 6 days.

Before screening was initiated, 3 of 241 patients developed staphylococcal infections, two of which were MRSA. After screening and intervention, there were no MRSA infections. The study also points out the issues involved in assuring that all eligible patients actually do get screened within an appropriate timeframe, and suggested that the ideal time for screening would be at the pre-operative visit in the doctor's office.


Convergence of Pressure and Technology

Clearly, there is a strong and growing collection of studies demonstrating

the effectiveness of rapid identification and intervention strategies for MRSA and *Staphylococcus aureus* colonization. There are also pressures encouraging the adoption of these strategies:

- Increasing number of people colonized with MRSA
- Hospitals bearing costs for HAI
- Public scrutiny of hospitals' HAI rates

In this demanding healthcare environment, on-demand molecular testing is proving essential, with economic considerations driving the implementation of the most effective tests and interventions.

The next article in this issue will highlight the benefits of using a rapid test for diagnostic purposes, which also cuts costs while enhancing patient care. 

Rapid Results Pay Off for Patients and Healthcare Systems

Ellen Jo Baron, Ph.D.

Dr. Graeme Forrest was a man with a mission. Now practicing Infectious Diseases at the Portland VA, and Oregon Health & Science University in Portland, Dr. Forrest has been interested in the patient care and economic impacts of improving results delivery for several years. Back in 2004 at the University of Maryland, he pioneered the use of a computerized clinical decision support system to improve antibiotic utilization. No surprise, the system saved time and money.

At about that same time, Dr. Forrest heard about a new rapid protein-nucleic acid fluorescence in situ hybridization

(PNA FISH) assay being developed by AdvanDx (Woburn, MA, now distributed by bioMerieux) to rapidly identify *Staphylococcus aureus* in blood cultures positive for gram-positive cocci in clusters. He immediately recognized the impact this information would have on early choice of appropriate therapy and more importantly, on physicians' decisions whether even to begin therapy. As evidenced by many publications including a College of American Pathologists Q-Probe, most microbiology laboratories recover many more coagulase-negative staphylococci in blood cultures than *S. aureus*.¹ In fact, fully half of all positive blood cultures

may yield coagulase-negative staphylococci, many of which are procurement contaminants. Physicians often treat these "false positive" blood cultures, which costs the system money.²

Others have shown that rapid results delivery improves patient care and the bottom line,³⁻⁴ often by shortening overall length of stay. Barenfanger's study showed \$4 million on variable cost savings over a year with rapid reporting of identification and susceptibility results for all types of cultures. The PNA FISH dramatically shortened time to results over these earlier studies. As the University of Maryland's

Rapid Results Pay Off

laboratory under the direction of Dr. Richard Venezia implemented the technology, Dr. Forrest campaigned assertively to create a results-delivery system that would really make a difference on clinician behavior and then he went one step further: he measured the outcomes.⁵

The University of Maryland utilized their unique antimicrobial team, consisting of a dedicated clinical pharmacist, an infectious diseases attending, and infectious diseases fellows, to deliver the results of the PNA FISH assay. These assays have sensitivities and specificities that are virtually the same as culture,⁶ but the results are available within two hours if the tests are set up as soon as the gram stain from the bottle is shown to harbor gram-positive cocci in clusters.

In most laboratories, the PNA FISH is set up once or twice a day, as in Venezia's laboratory. The test is high-complexity, and requires a skilled clinical laboratory scientist to read the results on a fluorescent microscope. Because of several sample-handling steps, batch processing usually improves workflow. Even with results delivery occurring only daily, the hospital saw reduced utilization of vancomycin and projected cost savings of around \$4000 per patient.

According to Dr. Forrest, a key factor responsible for the success of this effort was that results were delivered by phone or face-to-face by a member of the trusted antimicrobial team. Ly and colleagues directly explored this possibility by randomizing which patients' PNA FISH results would be called to clinicians.⁷ Their conclusions

supported the hypothesis: the patients whose results were directly communicated to the clinician had reduced mortality (8% vs 17%) and showed a trend toward shorter hospital stays and reduced costs.⁷

Graeme Forrest, MBBS



Assistant Professor of Medicine, Portland VA Medical Center; Director of the Antimicrobial Program Oregon Health & Science University Portland, Oregon

Cepheid's GeneXpert® system MRSA/SA assay for blood culture broths (Xpert™ MRSA/SA BC) further reduces the time to results for blood cultures and has the essential added benefit of detecting not only *Staphylococcus aureus*, as the PNA FISH does, but also methicillin-resistant *S. aureus* (MRSA), which other current tests cannot do quickly and certainly not on a random access basis. In addition, Xpert MRSA/SA BC is the only molecular test with the FDA moderate complexity category.

Laboratories using this system have

The hospital saw
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savings of
around \$4000
per patient.

the option of setting up each assay on a real-time basis as soon as the Gram stain has been read, perhaps by calling

a laboratory assistant over to inoculate the cartridge and place it into the instrument. With only 1–2 minutes of hands-on time, the results are delivered to the screen in less than an hour. The screen result reads unambiguously “SA positive” (in red) or “SA negative” (in green) and “MRSA positive” (red) or “MRSA negative” (green).

Wolk and colleagues recently published a six-center trial of this groundbreaking and accessible molecular assay.⁸ The sensitivity was 100% for *S. aureus* and 98.3% for MRSA in blood cultures for 406 blood cultures showing gram-positive cocci in clusters. In the near future, these results will interface easily with the laboratory's LIS. We anticipate even more impressive patient care results and bottom line improvements with the use of this rapid and reliable new technology, even in laboratories strapped for personnel and whether they have the expertise to perform other molecular tests or not.

Although MRSA is on the rise nationally, the percentage of blood cultures containing *S. aureus* that are resistant to the best anti-staphylococcal drugs (nafcillin, oxacillin, etc.) and actually require vancomycin, linezolid, clindamycin, or other antimicrobial agents active against MRSA is usually low. Of the blood cultures with staphylococci in the six-center study⁸, only 14% yielded MRSA.

Results documenting the presence of MRSA or SA within one hour could dramatically and significantly reduce over-utilization of vancomycin and allow rapid placement of the most effective anti-staphylococcal antibiotic for each patient. Cost utilization

REFERENCES

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- Espinoza C, Fisher V, Jean W, Gaines B, Davis K, Wanger A, Schaeffer M, Ostrosky-Zeichner L. A Pilot Study of Active Surveillance for MRSA by PCR on Admission to ICUs at a Tertiary Care Center. Abstr. K-3367. *Abstracts of the 48th annual Interscience Conference on Antimicrobial Agents and Chemotherapy and the Infectious Diseases Society of America 46th annual meeting*. ASM & IDSA, Washington, DC. 2008;518.
- Yu VL, et al. *Staphylococcus aureus* nasal carriage and infection in patients on hemodialysis. Efficacy of antibiotic prophylaxis. *New England Journal of Medicine*. 1986; 315:91–96.
- Boelaert JR, et al. The Influence of Calcium Mupirocin Nasal Ointment on the Incidence of *Staphylococcus aureus* Infections in Haemodialysis Patients. *Nephrology Dialysis Transplantation*. 1989; 4:278–281.
- Keene A, et al. *Staphylococcus aureus* colonization and the risk of infection in critically ill patients. *Infection Control and Hospital Epidemiology*. 2005; 26:622–28.
- Squier C, et al. *Staphylococcus aureus* rectal carriage and its association with infections in patients in a surgical intensive care unit and a liver transplant unit. *Infection Control and Hospital Epidemiology*. 2002; 23:495–501.
- Davis KA, et al. Methicillin-Resistant *Staphylococcus aureus* (MRSA) Nares Colonization at Hospital Admission and Its Effect on Subsequent MRSA Infection. *Clinical Infectious Diseases*. 2004; 39:776–82.
- Datta R, Huang S. Risk of Infection and Death due to Methicillin-Resistant *Staphylococcus aureus* in Long Term Carriers. *Clinical Infectious Diseases*. 2008; 47(2):176–181.
- Huang S, Platt R. Risk of Methicillin-Resistant *Staphylococcus aureus* Infection after Previous Infection or Colonization. *Clinical Infectious Diseases*. 2003; 36:281–5.
- Gorwitz R, et al. Changes in the Prevalence of Nasal Colonization with *Staphylococcus aureus* in the United States, 2001–2004. *Journal of Infectious Diseases*. 2008; 197:1226–34.
- Hanselman SA, et al. Methicillin-resistant *Staphylococcus aureus* Colonization in Veterinary Personnel. *Emerging Infectious Diseases*. 2006; 12:1933–38.
- Mody L, et al. Epidemiology of *Staphylococcus aureus* Colonization in Nursing Home Residents. *Clinical Infectious Diseases*. 2008; 46:1368–73.
- Cheng VC, et al. Effect of antibiotics on the bacterial load of methicillin-resistant *Staphylococcus aureus* colonization in anterior nares. *Journal of Hospital Infection*. 2008; 70:27–34.
- Lu, P-L, et al. Methicillin-resistant *Staphylococcus aureus* carriage, infection and transmission in dialysis patients, healthcare workers and their family members. *Nephrology Dialysis Transplantation*. 2008; 23:1659–1665.
- Huang S, et al. Risk of Acquiring Antibiotic-Resistant Bacteria From Prior Room Occupants. *Archives of Internal Medicine*. 2006; 166:1945–1951.
- Cimochowski GE, et al. Intranasal Mupirocin Reduces Sternal Wound Infection After Open Heart Surgery in Diabetics and Nondiabetics. *Annals of Thoracic Surgery*. 2001; 71(5):1572–8.
- Engelman R, et al. The Society of Thoracic Surgeons Practice Guideline Series: Antibiotic Prophylaxis in Cardiac Surgery, Part II: Antibiotic Choice. *Annals of Thoracic Surgery*. 2007; 83:1569–76.
- Bode LGM, et al. A randomized trial of admission screening and decolonization of *Staphylococcus aureus* carriers to prevent nosocomial *S. aureus* infections. Abstr. K-1711. *Abstracts of the 48th annual Interscience Conference on Antimicrobial Agents and Chemotherapy and the Infectious Diseases Society of America 46th annual meeting*. ASM & IDSA, Washington, DC. 2008;512.
- Chazan B, et al. Active surveillance and decolonization of MRSA carriers as a tool for MRSA bacteremia reduction. Abstr. K-3365. *Abstracts of the 48th annual Interscience Conference on Antimicrobial Agents and Chemotherapy and the Infectious Diseases Society of America 46th annual meeting*. ASM & IDSA, Washington, DC. 2008;518.
- Huang S, Yokoe, et al. Impact of Routine Intensive Care Unit Surveillance Cultures and Resultant Barrier Precautions on Hospital-Wide Methicillin-Resistant *Staphylococcus aureus* Bacteremia. *Clinical Infectious Diseases*. 2006; 43:971–8.
- Robicsek A, et al. Universal surveillance for methicillin-resistant *Staphylococcus aureus* in 3 affiliated hospitals. *Annals of Internal Medicine*. 2008; 148:409–418.
- Richer SL, Wenig BL. The efficacy of preoperative screening and the treatment of methicillin-resistant *Staphylococcus aureus* in an otolaryngology surgical practice. *Otolaryngology–Head and Neck Surgery*. 2009; 140, 29–32.

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- Bekeris LG, Tworek JA, Walsh MK, Valenstein PN. Trends in Blood Culture Contamination: A College of American Pathologists Q-Tracks Study of 356 Institutions. *Archives of Pathology and Laboratory Medicine*. 2005; 29(10): 1222–1225.
- Gander RM, Byrd L, Decrescenzo M, Hirany S, Bowen M, Baughman J. Impact of Phlebotomy-Drawn Blood Cultures on Contamination Rates and Health Care Costs in a Hospital Emergency Department. *Journal of Clinical Microbiology*. 2009; Jan 26. [Epub ahead of print]
- Beekmann SE, Diekema DJ, Chapin KC, Doern GV. Effects of rapid detection of bloodstream infections on length of hospitalization and hospital charges. *Journal of Clinical Microbiology*. 2003; 41(7):3119–25.
- Barenfanger J, Drake C, Kacich G. Clinical and financial benefits of rapid bacterial identification and antimicrobial susceptibility testing. *Journal of Clinical Microbiology*. 1999; 37(5):1415–8.
- Forrest GN, Mehta S, Weekes E, Lincalis DP, Johnson JK, Venezia RA. Impact of rapid *in situ* hybridization testing on coagulase-negative staphylococci positive blood cultures. *Journal of Antimicrobial Chemotherapy*. 2006; 58:154–158.
- Chapin K, Musgnug M. Evaluation of three rapid methods for the direct identification of *Staphylococcus aureus* from positive blood cultures. *Journal of Clinical Microbiology*. 2003; 41(9):4324–7.
- Ly T, Gulia J, Pyrgos V, Waga M, Shoham S. Impact upon clinical outcomes of translation of PNA FISH-generated laboratory data from the clinical microbiology bench to bedside in real time. *Ther Clin Risk Manag*. 2008; Jun;4(3):637–40.
- Wolk DM, Struelens M, Pancholi P, Davis T, Della-Latta P, Fuller D, Picton E, Dickenson R, Denis O, Johnson D, Chapin K. Rapid Detection of *Staphylococcus aureus* and Methicillin-Resistant *Staphylococcus aureus* from Wound Specimens and Blood Cultures: A Multicenter Pre-Clinical Evaluation of the Cepheid Xpert™ MRSA/SA SSTI and BC Assays. *Journal of Clinical Microbiology*. 2009; Jan 14. [Epub ahead of print]
- Forrest GN, Mankes K, Jabra-Rizk MA, Weekes E, Johnson JK, Lincalis DP, Venezia RA. Peptide nucleic acid fluorescence *in situ* hybridization-based identification of *Candida albicans* and its impact on mortality and antifungal therapy costs. *Journal of Clinical Microbiology*. 2006; 44(9):3381–3.


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studies for Xpert MRSA/SA BC are currently in progress.

AdvanDx has now moved beyond *Staphylococcus* species into PNA FISH supported identification of yeast species and even gram-negative rods, such as *E. coli*, *Acinetobacter* and *Pseudomonas aeruginosa*. Dr. Graeme Forrest has already reported on savings associated with use of the PNA FISH yeast assay.⁹

The University of Maryland hospital showed >\$1700 average savings per patient with candidemia associated with lower caspofungin utilization when *C. albicans* was identified quickly and the results included in patient care decisions with the consultation of a member of their antimicrobial team. An added benefit of the PNA FISH *C. albicans* test was that *C. dubliniensis*, otherwise very

difficult to distinguish from *C. albicans*, did not hybridize to the *C. albicans* probe and was therefore identified correctly.

AdvanDx is to be commended for an early and effective translation of a research tool to a clinical diagnostic assay. The company continues to forge ahead with unique new products that respond to clinical needs not currently being met by other products on the market. 



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