HOSPITAL INFECTION CONTROL & PREVENTION

THE TRUSTED SOURCE FOR THE INFECTION PREVENTIONIST FOR MORE THAN FOUR DECADES

## INSIDE



RELIAS
Formerly AHC Media

JULY 2018 Vol. 45, No. 7; p. 73-84

# Emerging Fungus Hard to Detect, Treat, Remove

Candida auris *requires sporicide to remove from environment*

*By Gary Evans, Medical Writer*

A highly drug-resistant yeast continues to emerge in the U.S. healthcare system, spreading to 11 states and threatening frail patients with fatal bloodstream infections (BSIs).

*Candida auris* poses difficulties on virtually every infection control front. First and foremost, it is difficult to detect by conventional lab methods, meaning by the time you identify it, you may be looking at multiple cases and widespread environmental contamination. Standard clinical testing may misidentify *C. auris* as *Candida haemulonii*, a fungus rarely associated with invasive infections, the CDC reports.[1] *(See related story on page 76.)*

> A RANGE OF MORTALITY BETWEEN 40% AND 50% IS SEEN IN HIGH-RISK PATIENTS WHO CONTRACT *C. AURIS* BLOODSTREAM INFECTIONS.

"Infection control personnel should first of all know what *C. auris* is, and then know whether their laboratory is able to identify it," says **Snigdha Vallabhaneni**, MD, MPH, a medical epidemiologist in the mycotic diseases branch at the Centers for Disease Control and Prevention (CDC). "If not, they should know what the common misidentifications are so they can be looking out for them. It is important to set up a good channel of communication with the lab so infection control personnel are notified."

For example, according to the CDC, "an increase in infections due to unidentified *Candida* species in a

**NOW AVAILABLE ONLINE!** **VISIT** AHCMedia.com or **CALL** (800) 688-2421

**Financial Disclosure:** Peer Reviewer **Patrick Joseph**, MD, reports that he is a consultant for Genomic Health Reference Laboratory, Siemens Clinical Laboratory, and CareDx Clinical Laboratory. Senior Writer **Gary Evans**, Editor **Jesse Saffron**, Editor **Jill Drachenberg**, Nurse Planner **Patti Grant**, RN, BSN, MS, CIC, and Editorial Group Manager **Terrey L. Hatcher** report no consultant, stockholder, speaker's bureau, research, or other financial relationships with companies having ties to this field of study.

HOSPITAL INFECTION CONTROL & PREVENTION

***Hospital Infection Control & Prevention®***,
ISSN 0098-180X, is published monthly by
AHC Media, a Relias Learning company,
111 Corning Road, Suite 250,
Cary, NC 27518-9238.

Periodicals Postage Paid at Cary, NC,
and at additional mailing offices.

**POSTMASTER:** Send address changes to:
*Hospital Infection Control & Prevention*
Relias Learning
111 Corning Road, Suite 250
Cary, NC 27518-9238

**SUBSCRIBER INFORMATION:**
Customer Service: (800) 688-2421
Customer.Service@AHCMedia.com
AHCMedia.com

**EDITOR:** Jesse Saffron
(919) 377-9427
jsaffron@reliaslearning.com

**SUBSCRIPTION PRICES:**
U.S., Print: 1 year with Nursing Contact Hours (12 issues), $499. Add $19.99 for shipping & handling. Online only, single user: 1 year with Nursing Contact Hours, $449. Outside U.S., add $30 per year, total prepaid in U.S. funds.

Discounts are available for group subscriptions, multiple copies, site-licenses, or electronic distribution. For pricing information, please contact our Group Account Managers at Groups@AHCMedia.com or (866) 213-0844.

**ACCREDITATION:**
Relias Learning LLC is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation. Contact hours [1.5] will be awarded to participants who meet the criteria for successful completion. California Board of Registered Nursing, Provider CEP#13791.

Successful completion of this CME activity, which includes participation in the evaluation component, enables the participant to earn up to 1.5 MOC Medical Knowledge points in the American Board of Internal Medicine's (ABIM) Maintenance of Certification (MOC) program. Participants will earn MOC points equivalent to the amount of CME credits claimed for the activity. It is the CME activity provider's responsibility to submit participant completion information to ACCME for the purpose of granting ABIM MOC credit.

Relias Learning is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

Relias Learning designates this enduring material for a maximum of 1.5 *AMA PRA Category 1 Credits™*. Physicians should only claim credit commensurate with the extent of their participation in the activity.

This activity is effective for 36 months from the date of publication.

This activity is intended for infection preventionists and healthcare epidemiologists.

Opinions expressed are not necessarily those of this publication. Mention of products or services does not constitute endorsement. Clinical, legal, tax, and other comments are offered for general guidance only; professional counsel should be sought for specific situations.

Copyright© 2018 by AHC Media, LLC, a Relias Learning company. All rights reserved. No part of this newsletter may be reproduced in any form or incorporated into any information-retrieval system without the written permission of the copyright owner.

patient care unit, including increases [in detection] of *Candida* from urine specimens," should raise a red flag.

Given its resistance to treatment, persistent environmental contamination, and long-term colonization of patients, some see *C. auris* as a "perfect storm" for "extensive, worldwide emergence" of a pathogen that was first identified in Japan in 2009.[2]

In addition to being difficult to identify, multidrug-resistant *C. auris* may not respond to commonly used antifungal drugs.

"*Candida auris* really has unprecedented levels of resistance compared to other types of yeast we see in healthcare settings," she says. "Almost 90% are resistant to fluconazole, which is one of the most commonly available antifungals. Thirty percent have resistance to amphotericin. Unlike in the bacterial world, we only have three major classes of antifungals."

By comparison, other common fungal pathogens may only have a 10% level of resistance to fluconazole, but *C. auris* has developed mechanisms of resistance that are still under investigation.

"We have been lucky in the U.S. in that we have not seen a pan-resistant isolate yet — resistant to all three classes of antifungals," Vallabhaneni says. "That has definitely been seen in other parts of the world where *C. auris* has been around longer. It is very possible that we will see this. There are some other drugs in the pipeline that may be effective against *C. auris*."

A range of mortality between 40% and 50% is seen in high-risk patients who contract *C. auris* bloodstream infections.

According to the CDC, risk factors include recent surgery, diabetes, broad-spectrum antibiotic and antifungal use, and central venous catheter placement. The severely infected patients are typically the "sickest of the sick," those under long-term care with ventilators, tracheostomies, or gastrointestinal feeding tubes.

The CDC is seeing clear evidence of transmission in healthcare settings in the U.S., particularly in long-term care facilities with high-acuity residents.

"We definitely see transmission spreading from patient to patient on a single floor or even multiple floors in a healthcare facility," Vallabhaneni says. "Most of the time this has really been in long-term care facilities."

First reported in the U.S. in 2015, *C. auris* totaled 308 probable and confirmed cases as of April 30, 2018, according to the CDC. Most of the cases were in New York (169), New Jersey (89), and Illinois (31). Other states reporting at least one case include California, Connecticut, Florida, Indiana, Maryland, Massachusetts, Oklahoma, and Texas.

"In addition to these cases, it is important to note that we have about 500 more patients colonized with *C. auris*," Vallabhaneni says. "It is on their skin or in their nares — sites where it is not causing them any infection or clinical problems, but they can still transmit it to others. So in total it is about 800 cases including clinical and colonized."

Though there is hope the pathogen can be isolated and contained as cases are detected in the U.S., the numbers indicate its presence has more than doubled in the last year and it has become more widely dispersed.

Contributing to this trend is the lack of an effective decolonization protocol.

In New York, for example, only 16 of some 200 patients have been

successfully decolonized, with the rest continuing to carry the bug.

"Very few patients have cleared colonization, so that means they can potentially transmit as long as they live, basically," she says.

The CDC currently recommends[3] that patients with confirmed or suspected *C. auris* infection should be under the following infection control precautions in acute care hospitals, long-term acute care hospitals, and nursing homes:

- In a single-patient room under standard and contact precautions. If single rooms are limited, "use them for patients who may be at highest risk of transmitting *C. auris*, particularly patients requiring higher levels of care (e.g., bed-bound)," the CDC says. "Patients with *C. auris* could be placed in rooms with other patients with *C. auris*," but not with other multidrug-resistant organisms.
- "[Emphasize] adherence to hand hygiene. [Clean and disinfect] the patient care environment (daily and terminal cleaning)."
- "Minimize the number of staff who care for the *C. auris* patient. [With] multiple patients … consider cohorting staff who care for these patients."
- "[Continue] contact precautions for as long as the person is colonized."

## Fungi Superbug

CDC outbreak investigators have described *C. auris* as resembling more of a bacterial "superbug" than a typical yeast fungus. A characteristic of this is its ability to spread throughout the healthcare environment and persist on surfaces.

"We have found it in patient rooms, on all surfaces, and on the shared equipment and things that go in and out of a patient room — blood pressure cuffs, oximeter, crash carts, computers," she says. "There is a real added emphasis on environmental disinfection, as well as all of your usual infection control measures like hand hygiene, contact precautions, gowns, and gloves."

*C. auris* appears to be impervious to standard hospital-grade quaternary compound disinfectants, leading the CDC to recommend sporicidals indicated to kill *Clostridium difficile*. A new report[4] on hospital outbreaks in Colombia underscores how the emerging pathogen can contaminate the healthcare environment well beyond the patient bedside. Of more than 300 environmental samples collected, 11% were positive for *C. auris*.

"We knew beforehand it could be in the patient's immediate vicinity, such as the bed, mattress, and the handrails," says lead author **Nancy A. Chow**, PhD, an investigator in the CDC mycotic diseases branch. "But we found it on floors, in mop buckets, alcohol gel dispensers, and various pieces of equipment."

To reiterate the severity of that finding, a pathogen capable of causing 50% mortality rate in BSIs was found on hospital surfaces and objects far and wide.

"*Candida auris* is capable of extensive contamination," Chow says. "This is all the more reason to promote aggressive infection control practices and proper disinfection strategies in the U.S."

Another troubling finding in Colombia was that two nurses were colonized with *C. auris*. The two were identified among six healthcare workers screened for the pathogen.

"We found it on their hands and one healthcare provider also had a positive groin specimen as well," Chow says.

Both healthcare workers cared for the same patient with *C. auris*, and the strain for all three was genetically identical. Given the difficulty of decolonizing patients, the obvious concern is that healthcare workers could become persistent carriers of the fungus.

Fortunately, that has not been the trend in global investigations, Chow says.

"Even though we found *C. auris* in two of six healthcare workers, there have been other studies in the U.K. and Spain looking at healthcare providers and they have not found colonization," she says. "We still don't know the role of healthcare providers, and that is something we are currently investigating."

Testing also revealed colonization among contacts, family members, and noninfected patients.

The investigations in Colombia revealed how distinct clones of *C. auris* could establish in different regions, as genetic distinctions were observed in outbreaks separated by some 700 kilometers.

"We are seeing that there are some strains in the U.S. that look genetically related to strains from South America as well as South Asia," she says.

"*C. auris* likely came in from other countries."

## Will Containment Work?

In the U.S., the CDC is hoping to contain the fungus through its Antibiotic Resistance Lab Network (ARLN), a nationwide group of labs that rapidly identify pathogens and perform whole genome sequencing to shed light on transmission patterns.

Though originally designed to detect emerging gram-negative bacteria, the ARLN now is assisting in the identification of the emerging fungus.

"Early detection is the key to containment, so the ARLN can be a resource both for identifying and

confirming the presence of *C. auris*," Vallabhaneni says.

This is particularly critical in states where the pathogen has not gained a foothold. Rapid detection and infection control response to single cases has been successful in some states.

In places with more established *C. auris*, including New York, New Jersey, and Illinois, "a modified containment strategy" is implemented, she says.

"You're not going to be able to stamp it out, but we want to change the epi curve of transmission," she adds.

"We are still going to see cases, but can we reduce the number of cases and reduce transmission? That is our goal in those states."

Though that suggests a response to a pathogen that has essentially become endemic, Vallabhaneni is reluctant to concede as much at this stage. "We do think it is becoming more of a problem, but I wouldn't use the word 'endemic' yet," she says.

"In the big scheme of things, it is still only a few hundred cases and there are millions of people in New York and Chicago."

Similar to what has been seen with the emerging gram negatives such as CRE, *C. auris* threatens to establish a reservoir in long-term care facilities from which it may then spread across the healthcare continuum.

"These seem to be places where transmission is amplified," she says.

"Patients are in contact with each other longer, there are long lengths of stay, and resources for infection control are less than [in] hospitals. That doesn't mean that other places can sit back and relax. There is a lot of transfer of patients between long-term and acute care." ■

## REFERENCES


1. Escandón P, Cáceres CH, Espinosa-Bode A, et al. CDC. Notes from the Field: Surveillance for *Candida auris* — Colombia, September 2016–May 2017. *MMWR* 2018;67(15);459–460.
2. Clancy CJ, Nguyen MH. Emergence of *Candida auris*: An International Call to Arms. *Clin Infect Dis* 2017;64;(2):141-143.
3. CDC: Recommendations for Infection Prevention and Control for *Candida auris*. Feb. 18, 2018. Accessed June 1, 2018, at: https://bit.ly/2Hapm7K.
4. Escandón P, Chow N, Caceres DH, et al. Molecular epidemiology of *Candida auris* in Colombia reveals a highly-related, country-wide colonization with regional patterns in Amphotericin B resistance. *Clin Infect Dis* 2018 May 16. doi: 10.1093/cid/ciy411. [Epub ahead of print.]


# Misidentification of Fungus Delays Outbreak Response

C. auris *may elude commonly used diagnostics*

Infection preventionists should ensure their labs have the diagnostic capabilities to detect multidrug-resistant *Candida auris*, which often is misidentified as less pathogenic fungi.

"One of the challenges of *C. auris* is misidentification — most of the identification methods that clinical labs use cannot identify it reliably," says **Snigdha Vallabhaneni**, MD, MPH, a medical epidemiologist in the mycotic diseases branch at the Centers for Disease Control and Prevention (CDC).

If misidentification is suspected, clinicians can seek confirmation from state labs and the CDC's nationwide Antibiotic Resistance Lab Network. "We know that this can be misidentified, but all you need is confirmation with appropriate identification methods."

The ability of the multidrug-resistant fungus to elude detection and continue spreading in the healthcare environment was dramatically underscored in a report of outbreak investigations in Colombia.[1]

According to the CDC, the response to hospital outbreaks in Colombia in 2016 was hindered by misidentification of the pathogen.

An unusual 75 isolates of *Candida haemulonii* — a yeast that rarely causes invasive infections — were reported in ICU patients by health officials.

Looking at 45 of the isolates, the CDC and co-investigators determined, via matrix-assisted laser desorption ionization time-of-flight mass spectrometry, that all of them were *C. auris*.

"Clinical laboratories should be aware that automated laboratory systems might incorrectly identify *C. auris*, particularly as *C. haemulonii*, although the species reported depends on the system," the CDC advises.

"*C. auris* can be misidentified as a number of different organisms

when using traditional phenotypic methods for yeast identification such as VITEK 2 YST, API 20C, BD Phoenix yeast identification system, and MicroScan," the CDC warns.[1]

The type of misidentified organism varies somewhat by the diagnostic system used. The CDC lists these diagnostics systems and the *Candida* organisms most commonly misidentified:

- Vitek 2 YST: *C. haemulonii*, *C. duobushaemulonii*;
- API 20C: *Rhodotorula glutinis* (characteristic red color not present), *C. sake*;
- BD Phoenix: *C. haemulonii*, *C. catenulata*;
- MicroScan: *C. famata*, *C. guilliermondii*, *C. lusitaniae*, *C. parapsilosis*;
- RapID Yeast Plus: *C. parapsilosis*.

"As *C. auris* continues to gain recognition, updated versions of other yeast identification platforms may be able to identify [it]," the CDC advises.

"Please consult the instrument manufacturer for more information. When in doubt, please forward suspected *C. auris* specimens to CDC or state or regional public health laboratories for further characterization."

"All confirmed isolates of *C. auris* should be reported to local and state public health officials and to CDC at candidaauris@cdc.gov," the CDC says.

If *C. auris* is confirmed in a healthcare facility, the CDC recommends conducting a lab look-back study to see if prior cases had been missed.

"Review past microbiology records — as far back as 2015, if possible — to identify cases of confirmed or suspected *C. auris*," the CDC advises.[2] ■

## REFERENCES


1. Escandón P, Cáceres CH, Espinosa-Bode A, et al. CDC. Notes from the Field: Surveillance for *Candida auris* — Colombia, September 2016–May 2017. *MMWR* 2018;67(15);459–460.
2. CDC: Recommendations for Infection Prevention and Control for *Candida auris*. Feb. 18, 2018. Accessed June 1, 2018, at: https://bit.ly/2Hapm7K.


# CDC Hammering Out Healthcare Worker Infection Control Guidelines

*Rethinking occupational exposures to various pathogens*

Comprehensively updating an infection control guideline that is two decades old, the Centers for Disease Control and Prevention (CDC) currently is immersed in an immense draft and review process that will include an "out of the box" rethinking of occupational exposures.

Originally published in 1998, the CDC recommendations for infection control in healthcare personnel are undergoing a systematic update that will provide recommendations for occupational exposures with more than 20 pathogens that can be acquired in healthcare settings.

One of the difficulties is defining an unprotected exposure to a given pathogen that does not underestimate the risk nor overstate it, says **David Kuhar**, MD, of the CDC's division of healthcare quality promotion. "If you 'under-identify,' transmissions can happen," he says. "If you 'over-identify,' that can lead to work restrictions and post-exposure prophylaxis for people who don't need them."

Emphasizing that this is a somewhat theoretical framework designed to generate discussion and feedback, Kuhar recently presented the following seven occupational exposure definitions to the CDC's Healthcare Infection Control Practices Advisory Committee (HICPAC):

- **Percutaneous Injury Exposure:** A percutaneous injury (e.g., needlestick) with inoculation of potentially infectious body fluids that may include blood, tissue, secretions, or others;
- **Mucous Membrane Contact Exposure:** Mucous membrane contact with potentially infectious body fluids that may include blood, tissue, secretions, or others;
- **Non-intact Skin Contact Exposure:** Contact of exposed skin that is chapped, abraded, afflicted with dermatitis, or otherwise compromised with potentially infectious body fluids that may include blood, tissue, secretions, or others;
- **Intact Skin Contact Exposure:** Unprotected direct contact with an infectious source person or their environment;
- **Face-to-Face Exposure:** Unprotected, close, face-to-face

contact with an infectious source person;

• **Close Proximity Exposure:** Unprotected contact within 6 feet of an infectious source person;

• **Long-distance Exposure:** Unprotected contact with infectious particles suspended in the air at a distance greater than 6 feet from the source.

## Caveats and Questions

There is a wealth of contingencies in this approach, including pathogen-specific factors that may vary by the duration of some exposures. Likewise, potentially infectious body fluids can differ among pathogens.

Options for post-exposure prophylaxis will vary, and work restrictions also are largely dependent on the source of exposure. To reiterate, the one consistency in all of the definitions is they are regarded as "unprotected exposures, with 'unprotected' encompassing whether or not they were wearing, or not appropriately using, recommended personal protective equipment," he says.

We continued our interview with Kuhar with the following questions.

**HIC:** What is the underlying concept of these definitions of occupational exposures?

**Kuhar:** The idea is to have a consistent way to try to approach this between pathogens. Some of them are very different from one another, but we want to try to take a consistent and understandable approach.

We will also provide examples where we can for guideline users. The challenges in doing this are many. We have very limited science on how some of these are transmitted from person to person. So, achieving some consistency amid the limitations is challenging.

**HIC:** You used the term "strawman" in referring to these exposure groups, emphasizing that this is an early iteration of a theoretical model.

**Kuhar:** Yes, we just wanted to put forward a draft of a set of definitions that cover the spectrum of infectious exposures in healthcare. We wanted to see if [HICPAC] thought this was an adequate way to do it. We wanted to put something out that covered the whole spectrum — to give the committee something to react to. But we were clear that we are not married to this if people thought we should take a different approach. In truth, we are still testing it.

Our plan now is to apply it to several different pathogens that we intend to cover in the guidelines, such as measles, tuberculosis, *Staph aureus*, and others that are transmitted in different ways in healthcare settings to see how well this kind of categorization fits and how well it describes exposures.

**HIC:** What kind of feedback are you getting on this approach?

**Kuhar:** Overall, the feedback was very positive. I got the sense that having some consistency and clarity in describing exposures is very much wanted, not just by the HICPAC committee but by the liaison [members] as well.

Some of the considerations are that we need to be careful about how accurate we are in our descriptions. We received some feedback of the need for examples of procedures and interactions when providing care for patients, which may vary for diseases that are transmitted. The at-risk interactions that involve providing care for a patient may be different even between diseases that are transmitted similarly. So our examples are probably going to have to be pathogen-specific.

**HIC:** Is this concept of "long distance" exposure another way to look at airborne transmission?

**Kuhar:** The idea was to capture exposures to contaminated air at distances greater than six feet from the source -— things that we often think of as airborne transmission relevant to TB, measles, and varicella.

For a number of reasons, we didn't call it airborne transmission, as that may come with some preconceptions that are not quite accurate. We have to give some careful thought to the names of these categories. We were struggling with sensible names for some of them, and that one in particular.

**HIC:** How are these exposure definitions different from what has been in previous CDC guidelines?

**Kuhar:** The ones that are subtly different are the ones that are describing exposures to a person. Sharps injuries, touching people — those are fairly well recognized kinds of exposures and consistent with how we previously thought about it. However, distance from an infectious source is something that there has been previous questions about, something where there has been a lot of variability in exposure definitions over the years.

For example, for diseases where you recommend droplet precautions, not everything is considered an exposure within six feet, which is a typical droplet distance. Really, intense face-to-face contact is needed. Six feet away for a brief period of time wouldn't be considered an exposure. We are hoping that we can tease out those differences to provide clarity, but not lose specificity and accuracy in how we describe these. We don't want

to over-identify or under-identify potential exposures.

**HIC:** Where do the guidelines stand and what are you looking at in terms of a timeline?

**Kuhar:** We are doing two major sections. One is the infrastructure for occupational health services for infection prevention.

The second is the individual pathogens, where we are talking about the epidemiology and control of roughly 20 to 25 pathogens that are transmitted in healthcare settings among healthcare personnel.

Section one is that entire infrastructure, which is done. The second section is going to come out as pieces on individual pathogens.

We are not going to hold that whole section [for publication]. Section one we developed all together; section two we are going to publish in smaller pieces.

So, we will put out a measles, mumps, and rubella section, for example, and keep adding individual pathogens until we get them done.

**HIC:** When will the first section on occupational health program infrastructure be published for public comment?

**Kuhar:** The draft is in CDC clearance. I anticipate getting it through in the next six weeks. After that, it will go in the *Federal Register* for public comment.

It will then come back to HICPAC to review the public comments and update the guideline as needed. Then it will go back through CDC clearance.

I think from start to finish we are talking about roughly a year to [final] publication of that section. ■

# The Next Wave: Diagnostic Stewardship

*Knowing whom and when to test — and for what*

On the heels of the antibiotic stewardship movement, there is a new push to rein in and refine the use of diagnostics to detect healthcare-associated infections (HAIs).

As with antibiotics, the call for diagnostic stewardship began due to the current perception that too much testing is being done, resulting in false positives and unnecessary treatments that may harm patients.

"In the majority of studies across medicine in the U.S., there is a significant amount of overtesting that occurs across disciplines," says **Costi D. Sifri**, MD, hospital epidemiologist at the University of Virginia Health System in Charlottesville. "The infectious disease world may be coming to this a little bit later than other disciplines, but this is well recognized and understood in things like radiology and laboratory testing for hospitalized patients."

Sifri and colleagues report[1] that "most current efforts to reduce HAIs focus on strategies to prevent infection without addressing unnecessary testing or diagnostic error."

"Overuse of tests is predicted to increase false positives that trigger needless downstream cost and treatment that may cause harm for the patient," they report. "Conversely, test underuse risks missed diagnoses and potential harm related to untreated conditions. As with antimicrobial utilization, we hypothesize that there exists a state of optimal test use for HAIs in at-risk patients."

Accordingly, diagnostic stewardship for HAIs begins with an attempt to identify this "sweet spot," he says.

"We emphasize this idea of a 'Goldilocks' area of proper testing," he says. "There is a significant amount of overtesting, but there could be risks if we swing the pendulum too far and go to undertesting. That hasn't yet been identified as a true problem, but we anticipate that it could be."

The concept is analogous to antibiotic stewardship, where the goal is to refine administration rather than eliminate drug use.

"You want to use the right antibiotic of the most narrow spectrum for the duration of time that leads to the best outcome for the patient without relapse, but also without unnecessary exposures to antibiotics," Sifri says. "Yet, if we limit antibiotics too much, we could have bad outcomes for patients."

This recognition is translating to greater attention to both the frequency of blood and urine cultures and the techniques and diagnostics used. Honing testing could also prevent infections by blocking unnecessary antibiotic administration, avoiding, for example, the well-established risk of patients on broad-spectrum drugs to develop *C. diff*.

"The whole of diagnostic stewardship is sort of this articulation of proper tests collection, the right type of tests, and then the right interpretation," he says. "That is the new paradigm."

## Included in New Guidance

One of the first guidelines to address the concept of diagnostic

stewardship was recently published in the form of *C. diff* recommendations by several infectious disease groups and the Centers for Disease Control and Prevention.[2] These guidelines, for example, recommend testing patients for *C. diff* with new onset of unexplained diarrhea, defined as three or more unformed stools in 24 hours. The guidelines also noted that molecular tests are used in more than 70% of hospital labs, but these tests have pros and cons. For example, nucleic acid amplification testing for *C. diff* toxins "may identify colonized rather than clinically infected patients."

"It is the first guideline I'm aware of where there are different recommendations depending on whether you have diagnostic stewardship as part of your intervention," Sifri says.

Similar to their critical supporting role in antibiotic stewardship, infection preventionists can be key players on diagnostic teams. There is a need for insight from IPs "on decisions of not only how to test patients, but whom to test," he says. "Their knowledge and understanding of healthcare infections can help people working in the clinical laboratory."

For example, IPs may emphasize to clinical laboratorians when rapid diagnostics are particularly helpful in terms of patient identification.

"A rapid test to identify *C. diff*, for example, may be of high value to an infection preventionist so they can make a decision on whether the patient needs to continue to be in isolation," he says.

Likewise, the timing and accuracy of diagnostics can inform the type of hand hygiene or the intensity of environmental cleaning needed.

"The IP can guide the decision of whom to test through tools that I think we are just starting to understand, like clinical computer decision-support tools or algorithms that can be implemented on hospital floors," Sifri says. "They know how to disseminate that information to bedside providers, and that will be to the benefit of everyone."

In addition, in the era of value-based purchasing and other quality metrics, the Centers for Medicare & Medicaid Services (CMS) may eventually incentivize diagnostic stewardship, he notes. This could include quality improvement process measures like staff education on test ordering, interpretation, and proper specimen collection.

"In the near future, the CMS may begin to require diagnostic stewardship in the form of an approved clinical-decision support system to receive full payment for advanced diagnostic imaging tests," Sifri and colleagues note in the paper.

While such incentives can drive quality improvement, there also is a more insidious aspect where testing decisions are influenced beyond the clinical realm.

Overtesting has long been termed "defensive medicine." There also are anecdotal reports of not wanting to obtain a blood culture "because you don't want to be blamed for a central line infection," he says.

"That's the kind of thing ID clinicians are hearing and are concerned about," he says. "There may be changes in testing approaches because some of these hospital-acquired conditions may have significant consequences."

Testing for HAIs also raises compelling medical and ethical questions because the results may not only protect the immediate patient, but others downstream that could be exposed. The stakes are higher.

"The consequences of being wrong have potential impact beyond the patient you are caring for," Sifri says. "That is unique and different from, for example, a mammogram or routine testing for hospitalized patients. It is different if you have a delayed diagnosis for *C. diff* or MRSA." ■

## REFERENCES


1. Madden GR., Weinstein RA, Sifri CD. Diagnostic Stewardship for Healthcare-Associated Infections: Opportunities and Challenges to Safely Reduce Test Use. *Infection Control & Hospital Epidemiology*, 2018;39;2:214-218.
2. McDonald LC, Gerding DN, Johnson S, et al. Clinical practice guidelines for *Clostridium difficile* infection in adults and children: 2017 update by the Infectious Diseases Society of America (IDSA) and Society for Healthcare Epidemiology of America (SHEA) [Published online February 15, 2018]. *Clin Infect Dis* doi: 10.1093/cid/cix1085.


# NICU MRSA Surveillance: Seek, Find, Then What?

An effective MRSA surveillance program in a NICU needs to address a question of balance. You must consider your resources, as one healthcare system found that "while more frequent monitoring led to greater use of a decolonization regimen, it also reduced the likelihood of isolation rooms being available."[1]

Preventing MRSA colonization in neonates is critical because some

30% colonized may develop invasive infection.

"Current practices for preventing invasive disease due to MRSA in the [NICU] include a 'seek and destroy' infection control program, whereby periodic surveillance cultures are obtained and colonized infants are decolonized and/or isolated," the authors note.

The researchers conducted a simulation study to assess MRSA transmission in a NICU, with unit-wide surveillance occurring at periods of 1, 2, 3, and 4 weeks. This "was compared against the current NICU policy of dynamic surveillance," which calls for weekly surveillance when there has been one or more positive MRSA cultures. If not, screening occurs every three weeks. At each surveillance period, colonized infants are decolonized with a regimen that is 56% effective and moved to isolation rooms, if available, they reported.

"Intuitively, a more frequent surveillance program sounds appealing but must be balanced with its corresponding risks and drawbacks," they concluded.

*Hospital Infection Control & Prevention* interviewed the lead author of the paper, **Neal D. Goldstein**, PhD, MBI, an infectious disease epidemiologist at the Christiana Care Health System and an assistant research professor at Drexel University in Philadelphia.

**HIC:** You "observed that more frequent surveillance resulted in fewer MRSA colonized infants with shorter mean colonization times." However, you cited the variables of hand hygiene efficacy and availability of isolation space. You note that not one size fits all, but can you comment further on what factors must be taken into account to seek a balanced approach to this clinical challenge?

**Goldstein:** Hand hygiene is probably the single most important factor in a clinical environment for staving off spread of organisms, like MRSA. But even with outstanding compliance, we have seen that MRSA can still spread. This brings into focus the other components of MRSA prevention: use of decolonization regimen, contact precautions, isolation (either in a dedicated room or in situ). A balanced approach means that an institution has all of these tools at their disposal. But they are not needed at all times — that is the point of surveillance.

**HIC:** Would you recommend that hospitals that set up a surveillance program for MRSA also monitor hand hygiene efficacy or have a good idea of their unit's rate before implementing surveillance?

**Goldstein:** The first step that any institution should take is to be able to describe the burden of MRSA in their clinical setting over time. Then, the appropriate strategies can be adopted. We saw that colonization ebbed and flowed in the unit. This suggests that the right strategies are needed at the right time. That is the balance between costs and potential for harm. Our "dynamic" policy was created before we undertook this analysis, and the modeling demonstrated this was a reasonable approach to MRSA surveillance.

If an institution is observing a high burden of MRSA colonization — especially relative to comparable institutions or peers — the infection control program should examine compliance with hand hygiene. And not only compliance, but effectiveness [to ensure] it is being done correctly. Consider other prevention tools such as universal gloving for all patient interactions, decolonization regimens, contact precautions, use of isolation rooms, and so on. One of the main features of our model is we provided the framework for such infection control analyses. Any institution can adapt and apply our modeling approach to their site-specific characteristics.

**HIC:** Can you comment a little more on your decolonization protocol and whether it might be applicable for use by other hospitals?

**Goldstein:** The basic premise of a decolonization program is to actively identify patients who are colonized with a pathogenic organism, like MRSA, and prophylactically treat them to prevent development of invasive disease and the potential for spread to other people. Despite its documented success rate, a good proportion of NICUs still do not employ a decolonization program.

The program we use at Christiana Hospital is essentially the same as the one described in this article: bathing with chlorhexidine gluconate and intranasal mupirocin ointment. This is a protocol that we have had success with and can definitely be adapted and applied in a variety of settings, not just neonatal. In fact, many institutions follow a similar program in adult settings. The treatment for colonization is not expensive; rather, the expense incurred is from the active surveillance component of the program. Because in order to decolonize, you first need to identify those who are colonized. Nevertheless, we encourage other institutions to use our models to examine the patient care networks in their settings to estimate the effectiveness of an MRSA surveillance program. ■

## REFERENCE

1. Goldstein ND, Jenness SM, Tuttle D, et al. Evaluating a neonatal intensive care unit MRSA surveillance programme using agent-based network modelling. *Jrl Hosp Infect* 2018; DOI: 10.1016/j.jhin.2018.05.002.

# Seeking Vaccines for HAIs

*Trials include many tribulations — but potential payoff is significant*

The quest for vaccines for *Clostridium difficile*, *Staphylococcus aureus*, and other causes of healthcare-associated infections (HAIs) has not yet led to a breakthrough, but the promise of such a game-changing development makes for a dogged pursuit.

"There is primary prevention, where you are preventing disease in the person vaccinated, but the downstream effects are interesting to think about," says **Anthony Fiore**, MD, MPH, MS, chief of epidemiologic research and innovations in the division of healthcare quality promotion at the Centers for Disease Control and Prevention (CDC).

For example, a patient who acquires MRSA typically is prescribed vancomycin, a last-line antibiotic that could be preserved if the patient had staph immunity via a vaccine.

Thus, vaccines against HAIs would immediately benefit antibiotic stewardship, which has taken on a sense of urgency with the rising tide of drug-resistant pathogens and the tendency of antibiotic use to select out *C. diff* in the patient gut.

"These are very challenging vaccines to make," says Fiore.

"Many of these HAIs are caused by organisms for which we don't really understand natural immunity. People can get *C. diff* infection multiple times. It's not like measles or hepatitis A, where you get it once, it's bad, but you never get it again because your immune system now 'knows' it."

The problem is like the one encountered in the search for a universal influenza vaccine, where researchers are trying to recreate an immune response that the human body has not mounted in nature.

"For whatever reason, there are a lot of infections for which that is the case, whether that is because there are a lot of strain types or whether you just don't ever develop good immunity," he says.

"When you have a situation like that it is hard to understand how to make a vaccine, which is, of course, just trying to stimulate the patient immune system."

As formidable as these barriers are, pharmaceutical companies continue to pursue HAI vaccines in part because the market for an effective one would be substantial.

"There are some pharmaceutical companies that have taken on this challenge, even in the face of some of the earlier staph vaccines and more recently a *C. diff* vaccine that have ultimately not worked — even though they looked good in the initial studies," Fiore says.

The CDC is not directly involved in the clinical trials, but is staying abreast of the work for a possible breakthrough. Hurdles for safety on a large scale have been cleared, but ultimately vaccine efficacy has not been sustained.

Phase III trials for both a *C. diff* vaccine and an *S. aureus* vaccine were underway as this issue went to press.

"Fingers crossed," Fiore says. "Sometimes we only understand in retrospect what the key component was that made a vaccine successful."

If successful vaccine against HAIs could be developed, the initial indication would likely be for certain patient groups, he notes.

"The exception might be a *C. diff* vaccine if you tried to give it to everyone over 60 or something like an age-based recommendation," he says.

"For a staph vaccine, you might end up giving it to people undergoing some sort of orthopedic surgery. Right now, the trial is in those getting spinal surgery. So, it might be that ultimately the indication is pretty narrow." ■

# Post-endoscopy Infections in Outpatient Surgery

*A broad range of infection rates*

Post-endoscopic infections are more common than previously thought, and vary widely by ambulatory surgical facility, researchers report.[1]

"Although screening colonoscopy is not without risk, the risk is lower than diagnostic endoscopic procedures," they found.

With some 15 million colonoscopies and 7 million osophagogastroduodenoscopies (OGDs) performed annually in the United States, the authors sought

to estimate the rates of infections after colonoscopy and OGD performed in ambulatory surgery centers (ASCs).

The researchers identified colonoscopy and OGD procedures performed at ASCs in 2014 via all-payer claims data from six states.

They tracked infection-related emergency department visits and unplanned inpatient admissions within seven and 30 days after the procedures.

In addition, they examined infection sites, organisms, and predictors of infections.

The rates of post-endoscopic infection per 1,000 procedures within seven days were 1.1 for screening colonoscopy, 1.6 for non-screening colonoscopy, and 3.0 for OGD. For comparison, the rates were higher than infections after mammography (0.6) but lower than bronchoscopy (15.6) and cystoscopy (4.4).

"Predictors of post-endoscopic infection included recent history of hospitalization or endoscopic procedure, concurrence with another endoscopic procedure, [and] low procedure volume or non-freestanding ASC," they reported.

"Rates of 7-day post-endoscopic infections varied widely by ASC, ranging from 0 to 115 per 1,000 procedures for screening colonoscopy, 0 to 132 for non-screening colonoscopy, and 0 to 62 for OGD," they reported. ■

## REFERENCE


1. Wang P, Xu T, Ngamruengphong S, et al. Rates of infection after colonoscopy and osophagogastroduodenoscopy in ambulatory surgery centres in the USA. *Gut* 2018; Published Online First: 10 Apr 2018. DOI:10.1136/gutjnl-2017-315082.


# Joint Commission Looking at High-level Disinfection

*Community health centers hit with citations*

Infection preventionists who have oversight or consulting work with community health centers should be aware that The Joint Commission (TJC) is zeroing in on high-level disinfection problems in these settings.

"Our surveyors at community health centers are observing many serious infection control-related risks concerning high-level disinfection and sterilization practices during recent onsite survey events," notes **Pam Komperda**, BS, project manager of TJC accreditation for community health centers.

"Any immediate threat to the health or safety of patients or staff that is identified during your onsite survey can lead to a Preliminary Denial of Accreditation decision."

In a TJC blog[1], Komperda said the top noncompliance item is the accreditation requirement for infection prevention measures when "performing intermediate and high-level disinfection and sterilization of medical equipment, devices, and supplies."

Some of the lapses accreditation surveyors are citing include:

- **Poor Training:** Lack of documented frontline staff competency and training specific to the sterilization processes specific to infection control. Lack of trained, documented managerial/supervisory oversight specific to this area.
- **Overlooking Evidence:** Little use or adherence to any sterilization evidence-based guidelines. Use of chemical indicators for ultrasound probes expired. Poor adherence to manufacturers' instructions for use for medical and dental instruments and supplies.
- **Ignoring Indicators:** Premature release of instruments prior to the 24-hour read time of biological indicator result as required per the manufacturer's instructions. Inconsistent use of chemical indicators in paper-plastic peel pouches. Inadequate documentation of physical/mechanical monitoring that sterilization parameters were met (time, temperature, pressure).
- **Noncompliant Use of Instruments:** Failure to use personal protective equipment, including protective gowns or eye shields, during decontamination activities. Instruments being cleaned, decontaminated, and left to dry in the only sink available in the procedure room. No clean sink available for hand hygiene. ■

## REFERENCE


1. Komperda P. High Level Disinfection Control Alert for Health Centers. Joint Commission Blog: On Infection Prevention & Control. Mar. 19, 2018. Available at: https://bit.ly/2pRttzc.

HOSPITAL INFECTION CONTROL & PREVENTION

**EDITORIAL ADVISORY BOARD:**

**Kay Ball**, PhD, RN, CNOR, FAAN
Professor, Nursing
Otterbein University
Westerville, OH

**Allison McGeer**, MD
Professor,
Dalla Lana School of Public Health,
University of Toronto, and
Director, Infection Control and
Microbiologist, Mount Sinai Hospital
Toronto

**William Schaffner**, MD
Chairman,
Department of Preventive Medicine,
Vanderbilt University
School of Medicine
Nashville, TN

**Connie Steed**, MSN, RN, CIC
Director, Infection Prevention,
Greenville Health System
Greenville, SC

**Katherine West**, BSN, MSEd, CIC
Infection Control Consultant,
Infection Control/Emerging Concepts
Manassas, VA

**REVIEWERS:**

**Patrick Joseph**, MD
Chief of Epidemiology,
San Ramon (CA) Regional Medical
Center, and President, California
Infection Control Consultants
San Ramon

**Patti Grant**, RN, BSN, MS, CIC, FAPIC
Director, Infection Prevention/ISO
Internal Audit, Methodist Hospital
for Surgery
Addison, TX

Interested in reprints or posting an article to your company's site? There are numerous opportunities for you to leverage editorial recognition for the benefit of your brand.
Call: (800) 688-2421
Email: Reprints@AHCMedia.com

To reproduce any part of AHC newsletters for educational purposes, please contact the Copyright Clearance Center for permission.
Email: Info@Copyright.com
Phone: (978) 750-8400

# CME/CE INSTRUCTIONS

To earn credit for this activity, please follow these instructions:

1. Read and study the activity, using the provided references for further research.

2. Log on to AHCMedia.com then select "My Account" to take a post-test. *First-time users must register on the site.*

3. Pass the online test with a score of 100%; you will be allowed to answer the questions as many times as needed to achieve a score of 100%.

4. After completing the test, a credit letter will be emailed to you instantly.

5. Twice yearly after the test, your browser will be directed to an activity evaluation form, which must be completed to receive your credit letter.

# CME/CE QUESTIONS

1. **Which of the following is *Candida auris* being most frequently misidentified as in clinical labs?**
   a. *Candida haemulonii*
   b. *Rhodotorula glutinis*
   c. *Candida lusitaniae*
   d. *Candida parapsilosis*

2. ***C. auris* totaled 308 probable and confirmed cases as of April 30, 2018, according to the CDC. How many estimated additional cases were there of *C. auris* colonization?**
   a. 200
   b. 300
   c. 500
   d. 1,000

3. **As with antibiotics, the call for diagnostic stewardship began due to the current perception that too little testing is being done, resulting in highly publicized incidents where patients were neither diagnosed nor treated.**
   a. True
   b. False

4. **According to Anthony Fiore, MD, MPH, MS, Phase III trials are underway for both a *C. diff* vaccine and a vaccine against which of the following?**
   a. *Candida auris*
   b. *Acinetobacter baummanii*
   c. *Streptococcus pneumoniae*
   d. *Staphylococcus aureus*

# CME/CE OBJECTIVES

Upon completion of this educational activity, participants should be able to:

1. Identify the clinical, legal, or educational issues encountered by infection preventionists and epidemiologists;

2. Describe the effect of infection control and prevention issues on nurses, hospitals, or the healthcare industry in general;

3. Cite solutions to the problems encountered by infection preventionists based on guidelines from the relevant regulatory authorities, and/or independent recommendations from clinicians at individual institutions.