



# HOSPITAL INFECTION CONTROL & PREVENTION

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## IPs Playing Critical Role in Antibiotic Stewardship

*Challenges remain, but programs in place at most hospitals*

By Gary Evans, Medical Writer

Infection preventionists (IPs) are playing key roles in antibiotic stewardship programs, which are now in place in most U.S. hospitals and making some hard-earned progress against a horde of multidrug-resistant bacteria.

“More and more it is important that infection preventionists work with people who are leading antibiotic stewardship efforts in hospitals. That is a collaboration that can directly impact the amount of antibiotic use occurring,” says **Lauri Hicks**, DO, a medical epidemiologist at the Centers for Disease Control and Prevention (CDC).

Misuse and overuse of antibiotics has led to emerging multidrug-resistant pathogens, including some pan-resistant strains that are impervious to the full formulary. However, discriminate use of antibiotics through stewardship programs combined with infection prevention efforts can stop the

emergence and transmission of resistant bugs.

“There is a real synergy between antibiotic stewardship programs and infection prevention and control,” says **Karen Hoffmann**, RN, MS, CIC, FSHEA, FAPIC, president of the Association for Professionals in Infection Control and Epidemiology.

“They are both interested in the common goal of keeping patients safe and improving patient outcomes. There are studies that show the more effective an infection control program is, particularly in terms of hand hygiene, the better the results of the stewardship program.”

Likewise, an effective antibiotic stewardship program can enhance infection control efforts, particularly when outbreaks are occurring or there are recurrent *Clostridioides difficile* (*C. diff*) infections.

“IP surveillance efforts overlap with

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**MEDICAL WRITER:** Gary Evans

**EDITOR:** Jason Schneider

**EDITOR:** Journey Roberts

**EDITORIAL GROUP MANAGER:** Leslie Coplin

**ACCREDITATIONS MANAGER:** Amy M. Johnson, MSN, RN, CPN

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the antibiotic stewardship program,” Hoffmann says. “They provide data on where you are at with antimicrobial resistance, particularly with *C. diff*. Antibiotic stewardship programs have to have that data in order to see their effectiveness.”

IPs are also known for their interactions with multiple disciplines, from environmental services to nurses and physicians.

“Regardless of the setting, IPs work with a really diverse population of healthcare providers,” she says. “They are working directly with the frontline providers, the nurses who often make the call to the clinicians for the antibiotics.”

This access can translate to insight and education, including using CDC definitions to verify that the patient has an infection that warrants antibiotic treatment.

“They can create a number of interventions to help with [stewardship], including antibiotic time outs and knowing the [CDC] core measures,” Hoffmann says. “There are a variety of things that they can do with the frontline providers that benefit antibiotic stewardship.”

## Most hospitals using core measures

Although much work remains, the CDC recently published a report<sup>1</sup> citing a dramatic increase from 2014 to 2017 in the number of hospitals adopting all seven of the recommended core elements of antibiotic stewardship programs. Of 4,992 hospitals responding to the CDC's National Healthcare Safety Network (NHSN) survey in 2017, 3,816 (76%) reported uptake of all the core elements. As outlined in the CDC report, the core elements

of a drug stewardship program are summarized as follows:

- **Leadership Commitment:** Dedicate necessary resources.
- **Accountability:** A single leader is responsible for program.
- **Drug Expertise:** A pharmacist leader works to improve antibiotic use.
- **Action:** Follow-through evaluation after, for example, a set period of initial treatment.
- **Tracking:** Monitor drug prescribing and resistance patterns.
- **Reporting:** Regularly disseminate antibiotic use and resistance data to staff.
- **Education:** Teach clinicians about resistance and optimal prescribing.

Although the core elements are more widely implemented and there are signs that antibiotic use is decreasing, it is difficult to directly tie stewardship efforts to reductions in drug-resistant healthcare-associated infections.

“We are seeing some improvements in some of these infections, but it is probably multifactorial,” Hicks says. “There's a major effort to improve infection prevention at the same time as the efforts to improve antibiotic use. We will be tracking the changes specifically in *C. diff* over time, both in hospitals and community settings. That is a really important infection to give us a sense [of] where there are opportunities to improve use.”

*C. diff*, which kills about 15,000 patients annually, frequently emerges after the administration of antibiotics used for other infections disrupts the commensal bacteria in the gut. As a result, antibiotic stewardship programs tempering the

use of the drugs have been heavily emphasized in recent years. The CDC previously reported a 20% reduction in *C. diff* from 2016 to 2017.<sup>2</sup> That put the agency back on track to reach an overall reduction goal — from a baseline of 2015 — of 30% in *C. diff* infections by 2020.<sup>3</sup> The surveillance data were reported by NHSN hospitals. (See *Hospital Infection Control & Prevention*, May 2019.)

With care moving out across the continuum, the CDC has published antibiotic stewardship core measures for outpatient settings.<sup>4</sup> Drug-resistant pathogens respect no borders, so the CDC has also developed antibiotic stewardship core elements for resource-limited countries.<sup>5</sup> Globally, antibiotic use is — literally — all over the map, as some countries lack drugs while others use them indiscriminately.

“For example, in some countries, healthcare providers earn a large portion of their income by selling prescription drugs, leading to inappropriate or irrational antibiotic prescribing,” the CDC notes. Of course, patients who develop drug-resistant infections may travel to other regions, as has been demonstrated with several high-threat pathogens cited by the CDC.

The CDC will publish a new report on antibiotic-resistant threats in the coming months, updating the 2013 report that classified the pathogens in descending threat levels as “urgent” (i.e., *C. diff*); “serious” (i.e., multidrug-resistant *Acinetobacter*); and “concerning” (clindamycin-resistant Group B *Streptococcus*).<sup>6</sup>

“We are seeing improvements in a number of healthcare-associated infections, and there will be some more information released later this fall in that antibiotic-resistant threats

report,” Hicks says.

Despite the progress, the challenge is still staggering. In its new report, the CDC estimates that 30% of antibiotics prescribed in U.S. doctors’ offices and emergency departments each year are unnecessary.

“Antibiotic prescribing nationally has improved, with a 5% decrease from 2011 to 2016, but more progress needs to be made,” the CDC notes. “In 2016, 270 million antibiotic prescriptions were written in the United States. That’s enough antibiotic courses for five out of every six Americans to receive an antibiotic prescription.”

Given the situation, there is building momentum for a regulation requiring antibiotic stewardship to be adopted by the Centers for Medicare & Medicaid Services (CMS), which proposed a rule in 2016 that remains in limbo. Earlier this year, the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria urged the CMS to move the proposed rule to “immediate finalization.”<sup>7</sup>

“There is a critical need for mandatory, not voluntary, implementation of antibiotic stewardship programs in our nation’s hospitals,” the panel stated.

The Joint Commission adopted an antimicrobial stewardship standard in 2017,<sup>8</sup> but it appears a CMS regulation would be needed for the CDC to meet a 2020 goal to have programs in 100% of hospitals.

“The high percent of hospitals that are complying with all of the core elements have a lot to do with the accreditation requirements put in place in 2017,” Hicks says. “There are some other accreditation organizations out there [taking action] and I think that will also help. In terms of the CMS, we are hopeful that there will be a regulatory

requirement at some point. There is a requirement for nursing homes to have antibiotic stewardship programs.”

We asked Hicks to address a few of the specific findings in the new CDC report in the following interview, which has been edited for length and clarity.

**HIC:** The report found that antibiotics are often unnecessarily prescribed for respiratory illnesses, such as the common cold and bronchitis. You cite a 25% level of inappropriate prescriptions in hospital emergency departments (EDs). What do you think is happening there?

**Hicks:** There are some cross-cutting issues that apply to all settings, and the ED is not immune to that. There is a lot of concern about meeting patient expectations among physicians and nurse practitioners. We often hear from these different healthcare providers that there is pressure to prescribe even in situations where they know that antibiotics are unneeded. What is challenging about the ED setting in particular is that, obviously, there isn’t an established clinician-patient relationship. The clinician may not know what the likelihood of follow-up is if that patient takes a turn for the worse. If they have uncertainty about whether the patient needs an antibiotic, they may err on the side of prescribing because there is less of a relationship and less certainty about patient follow-up. There is the potential there to lead to unnecessary [antibiotic] use because of fear of missing something or diagnostic uncertainty.

**HIC:** You also report that fluoroquinolones, a known driver for *C. diff*, were often unnecessarily prescribed for urinary tract infections and respiratory conditions in

2014 data. Are you seeing any improvements in this trend?

**Hicks:** Yes, and I think some of the changes we are starting to see in fluoroquinolone prescribing are probably because there are concerns that they can potentially lead to consequences like *C. diff*. The other reason [for curtailed use of fluoroquinolones] are the FDA's warnings about potential adverse events. There was a warning not too long ago about the potential for aortic aneurysms and rupture in older adults in particular. That is a rare, but a very serious, consequence. *C. diff* is one reason we are seeing the fluoroquinolone decline, and there is also increased awareness of these adverse events.

**HIC:** You report that most adult patients need about five days of antibiotic therapy for community-acquired pneumonia, yet 70% of patients receive almost 10 days of therapy.

**Hicks:** It is interesting because we see that [10-day] duration of therapy whether we are talking about hospitalized patients or those in outpatient settings and nursing homes. I think this goes back to the perception that giving something and giving more of it is better than not giving something and giving less. We are hoping to shift that paradigm. We need to because we now know that giving more [antibiotics] is not necessarily safer. It also takes some effort when the patient is being

discharged from a hospital to identify how many days of therapy they have been on, and decide how many days of therapy they should [continue]. A lot of courses of therapy happen after hospitalization. We are recommending that at the time of discharge, there is a reevaluation of both the duration and the selection of the antibiotic.

**HIC:** The report notes that azithromycin is not a recommended treatment for common pediatric infections but was being prescribed in 18% of cases reviewed. What is the disconnect there?

**Hicks:** Macrolides like fluoroquinolones and azithromycin are both what we consider broad-spectrum antibiotics. There can be a perception that they may be effective because they target many organisms. Azithromycin was also very effectively marketed for many years. In the case of azithromycin use in kids — there are very few indications for it. In fact, what we are finding is that sometimes kids are getting azithromycin when it is not even the first-line recommended drug, which could potentially lead to treatment failure. We are very concerned that there is this misperception that it is better because it is broader. In the case of a lot of the common conditions we are treating in kids, the better first-line agent is amoxicillin. There are a lot of beliefs and behaviors that we need to work on to change prescribing. The reason why azithromycin is not

recommended typically is because of concern for antibiotic resistance among the most common types of bacteria that cause ear infections.

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## Sepsis Can Begin With a Single Infection

*CDC toolkit calls for rapid intervention*

**A**ntibiotic stewardship works both ways, with the goal being to stop unnecessary use but speed therapy to patients in critical need. They do

not get much more critical than those with sepsis, who face rapid organ failure if left untreated.

“Antibiotic stewardship programs

and sepsis care programs in facilities should be coordinated because prompt use of antibiotics is a critical component of sepsis care,” the

Centers for Disease Control and Prevention (CDC) emphasizes in a recently published report.<sup>1</sup>

A critical step in sepsis treatment is to assess antibiotic therapy 48 to 72 hours after initiation. This review can inform decisions to stop, change, or continue therapy based on the patient's status and lab culture results.

An online CDC toolkit<sup>2</sup> can help healthcare facilities track sepsis and improve antibiotic treatment, says **Lauri Hicks**, DO, a medical epidemiologist at the CDC. The toolkit can be used in quality-improvement efforts, particularly those to identify the antibiotics used in sepsis, "so hospitals can facilitate both rapid administration and appropriate de-escalation of antibiotics in sepsis to improve patient care," the CDC explains.

"There is a lot of opportunity to educate about sepsis prevention and that is where CDC is most active right now," Hicks says.

That includes a "Get Ahead of Sepsis" campaign that urges patients, their families, and their caregivers, to ask this question: "Could this infection be leading to sepsis?"<sup>3</sup>

"The purpose of that campaign is to make sure patients with early signs and symptoms [of sepsis] are recognized and given the appropriate

medical management triage," Hicks says.

Those at higher risk for sepsis include babies younger than 1 year, adults 65 and older, and those immune-compromised or with chronic conditions, such as diabetes.

"Sepsis happens when an infection you already have — in your skin, lungs, urinary tract, or somewhere else — triggers a chain reaction throughout your body," the CDC states. "It is life-threatening, and without timely treatment, sepsis can rapidly lead to tissue damage, organ failure, and death."

There are about 1.7 million cases of sepsis annually in the United States, resulting in about 270,000 deaths, the CDC reports.

"The other piece of this — when we are talking about antibiotic stewardship, a lot of people think it is about not using antibiotics," Hicks says. "But in the case of sepsis, it is making sure that patients get exactly what they need when they need it."

It is important that all the relevant stakeholders in a hospital are aware of sepsis, she adds. "That includes the IPs [infection preventionists] as well as the antibiotic stewardship program, the emergency department physicians, and those working in ICUs."

"Getting sepsis initiatives in place

in facilities is something that IPs are involved in," says **Karen Hoffmann**, RN, MS, CIC, FSHEA, FAPIC, president of the Association for Professionals in Infection Control and Epidemiology. "These tools from the CDC are so helpful because they standardize that practice. It's up to the IPs then to individualize that to their facilities and help them get implemented."

According to the CDC, patients suffering sepsis onset may have signs and symptoms that include:

- confusion or disorientation,
- shortness of breath,
- high heart rate,
- fever, shivering, or feeling very cold,
- extreme pain or discomfort,
- clammy or sweaty skin.

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## ID Groups Demand Border Patrol Give Detainees Flu Shots

*'You could not design a more ideal circumstance for transmission'*

**T**he U.S. Customs and Border Protection's (CBP) decision to not vaccinate migrants in detention facilities against flu and other infections is being slammed by leading clinicians and public health officials.

Closely confining people who may be weak and malnourished from an arduous journey sets the stage for an outbreak if flu or other infectious agents are introduced by a new arrival or, perhaps, a facility employee.

"You could not design a

more ideal circumstance for the transmission of respiratory viruses and intestinal pathogens because of the close, sustained, person-to-person contact they have within an enclosed environment," says **William Schaffner**, MD, a leading vaccine

expert and professor of preventive medicine at Vanderbilt University in Nashville.

A letter<sup>1</sup> submitted to Congress by clinicians at Harvard University and Johns Hopkins hospital said autopsy results show that three children have died in U.S. custody since December 2018 in part as a result of influenza.

“These children were aged 2, 6, and 16,” the clinician letter states. “These tragic deaths appear to represent more than half of child deaths in the last year in these immigration facilities, and to reflect a rate of influenza deaths substantially higher than that in the general population.”

In addition to influenza, the Centers for Disease Control (CDC) recently reported that from Sept. 1, 2018, to Aug. 22, 2019, there were 898 confirmed and probable cases of mumps in detained migrants.<sup>2</sup>

The CBP has issued a widely quoted statement that “due to the short-term nature of CBP holding and the complexities of operating vaccination programs, neither CBP nor its medical contractors administer vaccinations to those in our custody.”

There is some speculation that medical care and vaccinations may occur at a later stage of the immigration process, but that could not be confirmed as this report was filed.

“They are not thinking in terms of the individual,” Schaffner says. “They are thinking administratively and bureaucratically. We know that immunity develops over 10 days to two weeks, so some of these children who are less than 8 years old would require two doses of vaccine separated by a month.”

With flu season approaching, time is of the essence.

“All of this is more poignant and pointed because we have had not

only the illnesses described, but they have had children who have died of influenza,” he says. “What could be more motivating for them to initiate protection against influenza at the earliest possible moment?”

Indeed, the issue raises a moral and ethical imperative for providers and caregivers.

“CBP actually keeps some people much longer than two or three days. If they are not committed to providing medical evaluations and preventive health services, that’s terribly unfortunate,” Schaffer says. “We as a society have — because of these policies — assumed

“IF THEY ARE  
NOT COMMITTED  
TO PROVIDING  
... PREVENTIVE  
HEALTH  
SERVICES,  
THAT’S TERRIBLY  
UNFORTUNATE.”

responsibility for these individuals. They are now our responsibility.”

Several major infectious disease groups also issued a joint statement calling the inaction on immunizations “a violation of the most basic principles of public health and human rights.”<sup>3</sup>

The statement was issued by the presidents of the Infectious Disease Society of America, the Society for Healthcare Epidemiology of America, the Pediatric Infectious Diseases Society, the HIV Medicine Association, and the American Society of Tropical Medicine and Hygiene.

“The CBP’s decision to withhold

vaccinations against seasonal influenza from migrants in border detention facilities ... runs directly counter to the imperative that no individual should be harmed as a result of being detained, and that the community standard of medical care be available to persons in the custody of the U.S. government,” the joint statement said.

Since 2010, the CDC has recommended universal flu vaccination for those age 6 months and older.

“In conditions of overcrowding, poor sanitation, and emotional stress involving vulnerable populations such as pregnant women and young children, choosing not to follow the CDC recommendations is particularly egregious,” the infectious disease groups stated.

## Infection control in detention

In the letter to Congress, the Harvard and Johns Hopkins clinicians outlined practical infection control measures that should be taken at the detention camps.<sup>1</sup> In addition to flu vaccination they recommended the following:

**Screening:** “All children should be screened for symptoms of influenza-like illness upon intake and transfer to a new facility. Symptoms of influenza-like illness include history of fever with either cough or sore throat. Infants and children with chronic medical conditions may present atypically, without fever and with other symptoms including muscle pain, headache, fatigue. [...] Children who screen positive for influenza-like illness symptoms should be considered for immediate isolation. To aid with the detection of new cases, border control staff should be instructed to report children

displaying influenza-like symptoms at the first sign of illness.”

**Testing:** “Children with influenza symptoms should be tested for the influenza virus in accordance with the Centers for Disease Control’s guidelines for investigating influenza outbreaks in closed settings. Testing results should be interpreted using the Centers for Disease Control’s Rapid Influenza Diagnostic Tests interpretation guidelines.”

**Isolation:** “Children with influenza-like illnesses should be placed in droplet isolation rooms. If separate isolation rooms are not available for each child, children presumed to have the same infection may be placed in the same isolation room.”

**Initial treatment:** “Children with influenza-like illnesses should receive regular medical assessments to assist with the early detection of complications. Children with these symptoms should receive scheduled temperature checks, access to fluids, tissue and plastic bags for the proper disposal of tissues, and

access to soap and water. Frequently touched surfaces in close contact with symptomatic children must be regularly cleaned and disinfected. Toilets and other facilities that are used by such children should be cleaned and disinfected more frequently.”

**Antiviral treatment:** “Children who screen positive for influenza-like symptoms should be considered for presumptive antiviral treatment with oseltamivir, pending testing for influenza. Treatment is most effective if initiated in the first 48 hours of symptoms, but can still confer benefits after this time period. Children with severe presentations of disease, including respiratory failure and pneumonia, should be immediately transferred to hospital. Children who clinically deteriorate or fail to improve after receiving 3-5 days of presumptive antiviral treatment should also be promptly transferred to a hospital.”

**Post-exposure prophylaxis:** “Individuals who come into close contact with confirmed influenza

cases should be considered for postexposure prophylaxis, which is the preventive medical treatment with oseltamivir to reduce the chance of clinical symptoms developing. Specifically, all children under 2 years of age and detainees at high risk of complications should be offered medication promptly. Oseltamivir is 70-90% effective in preventing illness from influenza A or B viruses.”

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# CDC Drafts Infection Control Guidelines for Staph in NICUs

*Includes both MRSA and susceptible strains*

The Centers for Disease Control (CDC) has issued draft guidelines<sup>1</sup> to prevent invasive *Staphylococcus aureus* infections in neonatal intensive care units (NICUs).

Designed to protect neonates from staph infections caused by both resistant and susceptible strains, the draft includes recommendations open to comment until Nov. 6, 2019.

Methicillin-resistant *S. aureus* (MRSA) has caused numerous NICU outbreaks, but the CDC points out

that drug-susceptible *S. aureus* also poses a threat to this frail patient population.

“While MRSA has long been the focus of prevention efforts due to the difficulty in treating and eradicating it, recent studies have demonstrated that methicillin-sensitive *S. aureus* (MSSA) has morbidity and mortality equal to MRSA and occurs more frequently in NICU patients,” state the guidelines, which were issued by the CDC’s Healthcare Infection Control Practices Advisory

Committee (HICPAC).

“There are a few recommendations that are specific to MRSA and then some unresolved issues related to MSSA because that data is still accumulating,” says **Erin Stone, MA**, a member of the CDC division of healthcare quality promotion who works with HICPAC. “There is an emerging evidence base and our goal was to highlight the evidence where recommendations could be formulated, and to highlight gaps in the evidence as well.”

The recommendations and key statements in the draft guidelines include the following, which are accompanied by Stone's comments and explanations from the text. The term "*S. aureus*" includes both MSSA and MRSA. In addition to recommendations, there are categories of "conditional" recommendations and "no recommendation."

## Draft Recommendations

### Recommendation 2.1.A.1.

Perform active surveillance testing for *S. aureus* colonization in NICU patients when there is an increased incidence of *S. aureus* infection, or in an outbreak setting. (Recommendation)

"That is specific to infections and includes both MRSA and MSSA," Stone says. "If providers see an increase in *Staph aureus* infections — MRSA or MSSA — then they could conduct active surveillance testing for *Staph aureus* in general for colonization to then implement appropriate infection prevention and control measures."

The risks include, as cited in other recommendations, "unintended consequences, such as decreased healthcare personnel-patient contact, in other populations," the CDC guidelines stated. "This literature search did not identify studies suggesting harm from use of contact precautions in NICU populations," the CDC concluded.

### Recommendation 2.1.A.2.

Perform active surveillance testing for MRSA colonization in NICU patients when there is evidence of ongoing healthcare-associated transmission within the unit. (Recommendation)

The use of active surveillance testing for MSSA colonization in NICU patients to detect ongoing

healthcare-associated MSSA transmission is an unresolved issue. (No Recommendation)

"MSSA is an unresolved issue based on the evidence," Stone says. "If you see ongoing transmission of MRSA — that could be colonization or infection — you would then conduct active surveillance testing for MRSA. MSSA is not there yet."

However, the recommendation could be subject to change pending public comments and a final literature review before the draft is finalized, Stone says.

"To date, no studies indicate that conducting active surveillance for MSSA colonization will lead to subsequent interventions that will reduce MSSA transmission, so it is possible that the resource cost of testing and of any interventions prompted by positive tests for colonization may outweigh the benefits," the CDC stated. "Recent studies suggest, however, that active surveillance testing may lead to subsequent interventions that can decrease MSSA infections."

### Recommendation 2.1.A.4.

If active surveillance testing for *S. aureus* colonization is implemented for NICU patients, test at regular intervals to promptly identify newly colonized patients. (Recommendation)

"Implementation of routine active surveillance testing for *S. aureus* colonization will enable facilities to identify colonized patients promptly and guide implementation of appropriate infection prevention and control measures to reduce person-to-person transmission," the CDC draft stated.

**Recommendation 2.1.A.5.** If active surveillance testing for *S. aureus* colonization in NICU patients is implemented, consider testing outborn infants or infants transferred

from other newborn care units on admission to promptly identify newly admitted colonized patients. (Conditional Recommendation)

"Outborn infants are infants born at another facility or infants transferred from other units within the same facility," Stone says. "Conditional recommendations are more to 'consider' this intervention. It means that the CDC and HICPAC have determined that the benefits of the approach are likely to exceed the harms."

### Recommendation 2.1.B.1.

If active surveillance for *S. aureus* colonization in NICU patients is performed, use culture-based or polymerase chain reaction detection methods. (Recommendation)

"If this recommendation is followed, facilities will be able to select the assay that best fits facility considerations and the needs at hand," the CDC states. "While PCR offers marginally increased sensitivity over culture for detecting *S. aureus*, culture has the advantage of having isolates available for molecular typing and susceptibility tests."

### Recommendation 2.1.B.2.

If active surveillance for *S. aureus* colonization of NICU patients is performed, collect samples from at least the anterior nares of NICU patients. (Recommendation)

"The anterior nares have the highest yield for identifying *S. aureus* colonization," the CDC draft stated. "Collecting samples from the axilla, rectum, and umbilicus can increase the yield."

### Recommendation 2.1.C.1.

Consider targeted decolonization for *S. aureus*-colonized NICU patients in addition to the implementation of, and adherence to, appropriate infection prevention and control measures in an outbreak setting, when there is ongoing healthcare-associated

transmission, or an increase in the incidence of infection. (Conditional Recommendation)

“Implementing targeted decolonization could result in a reduction in the *S. aureus* colonization rate of NICU patients, which then may result in a reduction in *S. aureus* transmission and infection in NICUs,” the CDC stated. “[However], if targeted decolonization were conducted for *S. aureus*-colonized NICU patients, harms could include significant systemic absorption of decolonizing agents, increased resistance to the decolonizing agent, and adverse skin reactions.”

The draft is one of four sections that will comprise the full “Guideline for Infection Prevention and Control in NICU Patients.” HICPAC previously published a section on

*Clostridioides difficile* (*C. diff*), but found insufficient evidence to make infection control recommendations. HICPAC concluded that the evidence was not sufficient to make evidence-based recommendations about the following issues:

- Characteristics of NICU patients at high risk for clinically relevant *C. diff* infection (CDI) who would warrant diagnostic testing for *C. diff*;
- The optimal assay or series of assays for detecting CDI among NICU patients;
- The significance of a positive *C. diff* test in a NICU patient.<sup>2</sup>

“The third section will be on central line-associated bloodstream infections in NICU patients.” Stone says. “That is in progress. We hope

to finalize that and open that up for public comment early next year. The final section will be respiratory illnesses in NICU patients.”

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## Trained Dogs Detect *C. diff* in the Environment

A spore-forming pathogen notoriously difficult to eradicate in the environment, *Clostridioides difficile* (*C. diff*) can persist in terminally cleaned rooms and pose a threat to the next patient. A Canadian hospital has adopted a novel solution to this persistent problem: using highly trained dogs to sniff out *C. diff* in a methodical manner akin to the way canines find drugs and explosives.

“The way the dogs are trained is as rigorous as anything else we do in the diagnostic lab,” says **Marthe Kenny Charles**, MD, a medical microbiologist at Vancouver General Hospital in British Columbia. “The goal is for us to identify the areas in the patient environment that are causing the promulgation of this organism. We wanted to have a way to ensure that the environment is

being cleaned adequately.”

According to a recently published paper<sup>1</sup> by Charles and colleagues, “In a series of examinations that assessed odor recognition and search capability, the canine team demonstrated 85.7% sensitivity and 94.7% specificity.”

After initial success with one team, a second dog and handler have been added. No one wants *C. diff* in the patient environment, but *Hospital Infection Control & Prevention* asked Charles if the dogs sometimes detect trace amounts incapable of causing infection.

“That’s a good question,” she says. “As you can tell in some of our recent publications, that is something that we are starting to look into in terms of trying to [quantify] the amount the dogs are able to smell. In terms of how that translates into the

infectivity of [*C. diff*], I don’t think we have the answer at this moment.”

Likewise, there are some signs of *C. diff* infections dropping, but as is often the case with infection control, it is difficult to ascribe a multifactorial effect to a single intervention.

While the dogs are identifying *C. diff* that may otherwise linger in the environment, the effect goes beyond that in those who witness the dogs at work. The detection rounds typically include an infection preventionist (IP) along with staff nursing and environmental cleaning.

“It opens communication and conversation,” Charles says. “The IP sometimes provides guidance on how to clean whatever items have been alerted by the dog. I think there is something really visual about the dogs alerting in different areas.”

In that sense, the dog detection event resonates as a reminder to the nurses and staff of the importance of infection control and environmental cleaning. The dogs also are used on units that have experienced recent cluster events with antibiotic-resistant organisms like methicillin-resistant *Staphylococcus aureus* (MRSA).

“Because we know that MRSA, for example, is the type of microorganism that can be transmitted by contact, the belief is that if there has been a breach in terms of infection control practices, then there might be *C. diff* and other organisms that could be transmitted,” Charles says.

**Teresa Zurberg**, RCT, is one of the dog handlers tracking *C. diff* in the hospital. She is a validated explosives and narcotics canine detection handler and co-authored a recent article on the Vancouver program.<sup>2</sup> Zurberg works with an English Springer Spaniel named Angus. *Hospital Infection Control & Prevention* asked about her unusual job in the following interview, which has been edited for length and clarity.

**HIC:** How did you get involved in the *C. diff* detection program?

**Zurberg:** In 2013, I had *C. diff*. I had a wound on my leg that became infected and I had to go in for some IV antibiotic therapy. I ended up with *C. diff* and was in the hospital for about a week. I lost about 20 pounds, and when you are only 5-foot-1, 20 pounds is a lot of weight. I have never been so sick in my life. At that time, I was a professional canine handler with bomb dogs and drug dogs. We had a Springer Spaniel puppy that I knew was going to be a working detection dog, but we hadn't decided what for. My husband, who is a nurse in quality and patient safety at the hospital I work at, came

across an article about a dog in the Netherlands who had been trained to look for *C. diff* in patients. He asked me, “Can you train a dog to do this?” I said, “Yes; if it's got an odor I can train a dog to find it.” That's when we approached the quality and patient safety executive team and proposed training a dog to do this. But instead of looking at patients — because you always test patients — [we proposed] to look at the environment. There is no logistically feasible way of testing the environment for reservoirs of *C. diff*.”

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**HIC:** The reports indicated that dogs are detecting *C. diff* with a high sensitivity and specificity. Do you, as an expert, feel that the dogs are performing this task sufficiently to justify the program?

**Zurberg:** Definitely. No detection dog in the world is ever going to be 100%. You have to factor in so many things, like handler error. The dogs are the easy ones to train. It's the people who take longer to train.

**HIC:** Some may assume anyone could walk a dog around the hospital. What happens in your interactions with the dog? Do you pick up cues?

**Zurberg:** To be a canine handler is a profession. It's not just any person off the street, even though we have people who try to do it all

the time. First, you have to have the right dog. If I go look at 100 dogs, I might shortlist 10. Out of that 10, I might pick one. All dogs can sniff, but not all dogs can work, especially in the environment that we work in. In the world of detection, we work in environments that are fairly extreme. We have people around us all the time, we have to navigate hazards, we have to talk to people while we are still looking and working the dog. Then, answer questions if the dog alerts.

There is a lot of rigor that goes into everything we do to make it a credible program. There is the sport of “nose work,” which I have judged and used to teach. A lot of people think it is just that easy; you do a three-minute search holding a leash and follow the dog around. But there is so much more going on. We have to have medical backgrounds and understand infection control practices and procedures. We have to be familiar with hospital environments and be able to do education in the moment. All this kind of happens at the same time, so it takes a lot to do it.

**HIC:** When you are inspecting a terminal cleaned before the next patient is transmitted, what is the process? Do you unleash the dog?

**Zurberg:** We never take the dog off the leash at any time. We do the entire hospital environment. If we go to a unit, we are doing the hallways, everything in the hallways, the nursing stations, the clean supply rooms, the linen carts, shared sinks and showers. We do not generally do rooms that have patients in them. If you think about the kind of contamination that they are hitting on, when a dog tries to find drugs or bombs they are usually trying to find a package that someone had tried to hide. They are concealed

and there are only little pinpoint dots of odor coming out. Whereas, for *C. diff* contamination, something has rubbed up against something else to cause contamination. The odor is kind of in a smear pattern, and depending on how big it is and where it is, it will show a change of behavior in the dog. Our dogs will either sit, lay down, or pace if it is up somewhere high and is a large contamination. We spend thousands of hours learning the dog's communication to be able to interpret that.

**HIC:** If something is detected, who is contacted?

**Zurberg:** When we go out to screen a unit, we have people who come with us. We have somebody from the environmental services team, and we also usually have a unit rep or an infection preventionist who comes with us as well. Say the dog hits on a [piece of equipment] that is the nursing staff's responsibility to clean. They get them to have it cleaned. Everything we do is in the moment. As soon as the dog alerts, actions are taken to mediate that alert.

**HIC:** It sounds like the dogs really engage the staff in a unique way.

**Zurberg:** The dogs have been able to show us things we never considered. First, they make the infection control teaching tangible — people see why we tell them to wash their hands and to clean equipment after use. You see the dog working and then they sit and alert, and people are like, “Oh, now I get it.” A lot of times we have alerts in clean supply rooms. Why? Because people are not taking off their gloves. They are dealing with the patient, they have gloves on, forget something, and go grab it out of the clean supplies. They have now contaminated the clean supplies, and the dogs make

these lessons tangible in the moment.

**HIC:** How do patients and families react to the dogs when they see them in a hallway or an empty room?

**Zurberg:** We have floppy-eared dogs for a purpose in the hospital. Both the other handler and I used to work German shepherds and malamutes when we did explosives and narcotics. But in the hospital, you need a softer-looking dog. We have people there who are scared of dogs, and there are some cultures where dogs are not always a good thing. We want to be respectful of that. The dogs we have are just generally cute and they open conversations that may have never taken place. It allows for us to have in-the-moment education with patients, families, and staff.

**HIC:** What is something unusual that you have found working with the dogs?

**Zurberg:** When the bathrooms are cleaned, everybody cleans the outside of the toilet paper dispenser, and we didn't think about it until Angus' nose went to the “inside” of the toilet paper dispensers. It makes sense, but it was something we hadn't thought of before. Our environmental services team changed practices and let their cleaners know that this is a hot spot.

**HIC:** How does the dog decipher the signature of *C. diff* from fecal matter?

**Zurberg:** The dog's nose-brain connection is different from humans. Dogs can scent-differentiate. In terms of senses, dogs are born nose, eyes,

ears. A larger part of their brain is directly used for scent differentiation — that's how they take in their world. Before we start working a dog in the hospital we go through a rigorous validation and certification process. We do double-blind, third-party testing on the canine teams before we start working. First, the dogs are only ever put on one odor. The only odor that is important to these dogs is *C. diff* — that is the only odor they are trained on. When they alert I can say, “That's *C. diff*.” When they are tested and validated to work, we do odor recognition tests. They have to pick out the correct odor that is *C. diff* positive. They have to ignore the distractor odors. So, Angus has to pick a *C. diff* culture out of the lineup and also a *C. diff* fecal sample that is positive. At the same time, he has to ignore and walk past a fecal sample that does not have *C. diff* in it. They smell in parts per million and parts per billion.

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1. Charles MK, Wang Y, Zurberg T, et al. Detecting *Clostridioides (Clostridium) difficile* using canine teams: What does the nose know? *Infection Prevention in Practice* 2019;1:100005. Available at: <https://bit.ly/2k9lmz1>. Accessed Sept. 12, 2019.
2. Li C, Zurberg T, Kinna J, et al. Using scent detection dogs to identify environmental reservoirs of *Clostridium difficile*: Lessons from the field. *Can J Infect Control* 2019;34:93-95.

## COMING IN FUTURE MONTHS

- What is the most labor-intensive infection you have to deal with?
- Will CMS finally pull the trigger on antibiotic stewardship regulation?
- Joint Commission citations for lax hand hygiene
- Bed bugs: The IP role when the “bugs” are real



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## CME/CE QUESTIONS

1. According to Lauri Hicks, DO, a CDC medical epidemiologist, which organism is the CDC specifically tracking to assess the effectiveness of antibiotic stewardship programs?
  - a. Methicillin-resistant *Staphylococcus aureus*
  - b. *Candida auris*
  - c. *Clostridioides difficile*
  - d. Carbapenem-resistant Enterobacteriaceae
2. The CDC reported that most adult patients need about five days of antibiotic therapy for community-acquired pneumonia, yet 70% of patients receive approximately how many days of therapy?
  - a. 10
  - b. none
  - c. three
  - d. seven
3. The CDC draft guidelines to prevent invasive *Staphylococcus aureus* infections in NICUs recommend that if active surveillance for *S. aureus* colonization in NICU patients is performed, use:
  - a. discretion to avoid false positives.
  - b. culture-based tests.
  - c. polymerase chain reaction (PCR) detection.
  - d. either culture or PCR.
4. In addition to detecting *C. diff* in the environment, dogs used in a Canadian hospital also:
  - a. comfort patients in the hospice unit.
  - b. remind nurses and staff of the importance of infection control and environmental cleaning.
  - c. help rehab patients be mobile.
  - d. alert to healthcare workers with unwashed hands.

## 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.