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Prevent the Bug, Save the Drug:

The IP as Antibiotic Steward

By Gary Evans, Senior Staff Writer

Once largely consigned to separate silos, infection prevention and antibiotic stewardship are starting to show signs of a powerful partnership. The CDC's most recent update¹ on the threat of antibiotic-resistant bacteria emphasizes that drug stewardship and infection control must essentially be inseparable if they are going to be successful.

"We recommend three critical strategies doctors, nurses, and other healthcare providers need to take with every patient, every interaction, to prevent infections and stop the spread of antibiotic resistance," CDC Director **Tom Frieden**, MD, MPH, says at a recent press conference. "First is preventing the spread of bacteria between patients. Second is preventing infections related to catheters and surgeries. And third is improving antibiotic use through antibiotic stewardship."

It is a message welcomed by clinicians who are trying to bring multiple strategies to bear on one of the great challenges in modern healthcare: preserving

the efficacy of life-saving antibiotics.

"What I like about this report is that this is the first time the CDC has connected all the dots together," says **Mohamad Fakih**, MD, MPH, senior medical director for antimicrobial stewardship and infection prevention at Ascension Health in St. Louis. "There is a connection — if a patient does not develop a central line infection, then antibiotics will not be needed or used. Also, appropriate surgical antimicrobial prophylaxis — which is part of antibiotic stewardship — reduces your surgical site infection rate."

Fakih and colleagues are implementing strategies that include determining the best, narrow-spectrum drugs for infections, with respect to both treating the patient and limiting the selection of resistant bacteria.

"For example, we are looking at the best antibiotics to treat pneumonia in the hospital setting that will help the patient while also making sure that the duration of use is appropriate — not giving more [antibiotics] than needed,"

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he says. “We advocate the most narrow-spectrum antibiotic for treating an infection if possible.”

The Ascension system includes some 130 hospitals and Fakhri and colleagues monitor antibiotic utilization trends to pick up outliers and intervene as necessary.

“We discuss this with the hospital pharmacy, infectious disease physicians and administrative leadership,” he says. “If we find any opportunities for improvement we counsel them and give them feedback.”

The Ascension hospitals are joining the CDC’s National Healthcare Safety Network module for monitoring antibiotic use and resistance in order to get a better picture of local variations in pathogens and susceptibility patterns. The critical accompaniment to these stewardship efforts will be an ongoing emphasis on infection prevention, he says.

“There is a connection and I think the CDC is making sure that people see it,” Fakhri says. “I truly believe that infection prevention and antimicrobial stewardship efforts should be a partnership.”

Though healthcare-associated infections are being reduced nationally — most notably a 50% decrease in central line-associated bloodstream infections (CLABSIs) between 2008 and 2014 — one in seven catheter- and procedure-related infections are still caused by antibiotic-resistant pathogens, the CDC reported. In addition, there was a 17% decrease in surgical site infections (SSIs) between 2008 and 2014 for 10 key procedures. However, one in seven remaining SSIs are caused by antibiotic-resistant bacteria. Catheter-associated urinary tract infections (CAUTIs) are still proving difficult to reduce, with 10% caused by resistant bacteria, the CDC notes.

The CDC report specifically cites seven problem pathogens that

are proving persistently dangerous to patients. This vanguard is led by *Clostridium difficile*, which kills some 15,000 patients a year and was reduced by only an incremental 8% between 2011 and 2014. As infection preventionists are well aware, *C. diff* is not an antibiotic-resistant pathogen in the classic sense, but a byproduct of overusing and misusing broad spectrum antibiotics that kill off commensal bacteria and leave the patient’s gut vulnerable to what the CDC terms “deadly diarrhea.” Thus, antibiotic stewardship and rigorous infection control must be combined to prevent *C. diff*; a spore former that is notoriously difficult to remove from healthcare worker hands and contaminated objects and surfaces. In addition to *C. diff*, the following six antibiotic-resistant bacteria are on the CDC’s enemies list:

- CRE (carbapenem-resistant Enterobacteriaceae);
- MRSA (methicillin-resistant *Staphylococcus aureus*);
- ESBL-producing Enterobacteriaceae (extended-spectrum β -lactamases);
- VRE (vancomycin-resistant enterococci);
- multidrug-resistant *Pseudomonas aeruginosa*;
- multidrug-resistant *Acinetobacter*.

Progress, peril

Though certainly progress has been made, on any given day about 1 in 25 hospitalized patients has at least one HAI.

“These infections are bad enough, but even more serious when caused by resistant bacteria,” Frieden says. “It’s deeply concerning. We’re seeing a lot of drug-resistant bacteria. That means that infections will be harder to treat, they’ll be more expensive to treat, and

patients will be less likely to survive.”

The problem is compounded in certain patient populations and settings like long-term acute care hospitals (LTACs). One in four catheter-related infections in LTACs are caused by a drug-resistant bacteria, afflicting patients that may stay a month before they move somewhere else on the healthcare continuum. Indeed, with a combination of severely ill patients, high antibiotic use and lengths of stay measured in weeks, LTACs have been described as a perfect storm for emergence of multidrug-resistant organisms.

“Part of this is the intensity of the patient population,” says **Sue Dolan**, RN, MS, CIC, hospital epidemiologist at Children’s Hospital (Aurora) Colorado and 2016 president of the Association for Professionals in Infection Control and Epidemiology (APIC). “They have multiple active diagnoses in addition to the acute episode [causing current hospitalization]. They have a number of comorbidities. All of the patients in that setting are higher risk patients.”

In giving CRE its highest public health threat rating of “urgent,” the CDC previously reported that while some 4% of U.S. short-stay hospitals had at least one patient with a serious CRE infection during the first half of 2012, about 18% of LTACs had one.²

“The other thing is that these patients are traveling between healthcare facilities as well,” Dolan notes. “Because of their multiple underlying diagnoses, they are in and out of a variety of facilities with a higher risk of exposure to drug-resistant organisms. Lastly, they have more exposure to medications and will have devices in for longer periods of time.”

Many of the some 500 LTACs nationally may have someone doing infection prevention among a number of other duties, but Dolan was

surprised that infection control was not listed as a department in some of the facilities she looked at on the Web.

“They list a wide variety of [clinical] expertise but they do not list an infection preventionist, so that was striking to me,” she says. “Even if they have one, what is their value and how does leadership view that program?”

CMS reg coming

They may begin to view it with greater urgency. CMS is targeting an antibiotic stewardship regulation by 2017 and recently announced a pilot project to assess the infection risks during transitions of care between hospitals and nursing homes. In addition, APIC continues to lobby for infection prevention resources and personnel across the healthcare continuum, including LTACs, ambulatory care, cancer centers and other settings where patients are at risk, Dolan says.

For the CDC’s part, Frieden says, “We need to do much more, we’re working with other federal partners, especially the CMS, to prevent infections in healthcare and use the data that’s reported to target prevention at every level.”

Overall, both the measured success thus far and the continued challenges ahead validate and underscore the importance of infection control programs in the nation’s healthcare settings.

“That came through very loud and clear to me,” Dolan says. “The spotlight is currently on antimicrobial resistance, but when you look at the structure — the mechanisms that are being put together to address these issues — those are things that infection preventionists are experts on. Especially the prevention side, and we work very closely in collaborative relations with pharmacists, frontline

staff, and the laboratory. So the IP is pretty key to this effort. The [CDC report] shows that the work that has been done and the efforts focused on the hospital setting have been making a difference. But this needs to go beyond hospitals so that the strategies can be used in other healthcare settings and tailored to things that might be different in those settings. That’s the big picture, and IPs are key in this work both in hospitals and outside the hospital settings like LTACs.”

Indeed, clinicians need to form regional and network information systems so they know what antibiotic resistance patterns are in their community hospitals and long-term care facilities, says **Peter Pronovost**, MD, PhD, FCCM, director of the Armstrong Institute for Patient Safety and Quality at Johns Hopkins Medicine in Baltimore. Such knowledge across the continuum would enable clinicians to make the link to other facilities when patients are hospitalized in acute care settings. Preventing infections and preserving antibiotics requires attention to detail in every task, thus the highly publicized success of Pronovost’s point-by-point checklist for insertion of central venous catheters.

“It requires constant vigilance,” he says. “We [recently] saw a bump in our *C. diff* infections and we noticed part of that was due to some of our practices regarding cleaning rooms and practices of some of our antibiotic prescribing.”

Again infection control and drug usage go hand in hand, particularly for a pathogen that can persist in the environment like *C. diff*. As far as catheter-related infections, remember that a CLABSI has a staggering 25% mortality rate.

“Prevent infections before they start,” Pronovost says. “Check catheters frequently, and remove them when you no longer need them. Ask if you

actually need them before you even place them. And finally, use the right antibiotics for the right duration.”

Antibiotics may need to be adjusted based on lab results and new information about organisms causing the infections, he says. A “time-out” 48 hours after drugs are initiated is recommended to determine if anti-

biotic therapy is still needed or if it should be refined, Pronovost says.

“A common mistake we make is to continue vancomycin when there is no presence of MRSA, the prime infection that the antibiotic treats,” he says. “We often tell our staff at Johns Hopkins, ‘If it doesn’t grow, let it go.’

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A Win-Win-Win: Saving Antibiotics Good for Everyone

Some take home points from the antibiotic stewardship program at Ascension Healthcare in St. Louis include the following, according to **Mohamad Fakh**, MD, MPH, senior medical director for antimicrobial stewardship and infection prevention at Ascension.

Antibiotic stewardship and infection control efforts include a reminder that all facets of society have a stake in preserving antimicrobial efficacy.

The nation:

- Resistant organisms can be spread between hospitals and communities and are a threat to all patients.
- A national action plan has been established for combating antibiotic-resistant bacteria.
- A national goal has been set that hospitals have antimicrobial stewardship programs and achieve a reduction in inpatient inappropriate antibiotic use by 20%, by 2020.

The patient:

- A common and preventable harm [resistance, *Clostridium difficile* infection (CDI), side effects, and interactions].
- Not all antimicrobials are equal: Optimizing the antibiotics will lead to better outcomes.

The hospital/ healthcare system (in addition to the patient’s perspective):

- Preventing resistance and CDI reduces risk to other patients.
- Treating multidrug-resistant organisms and CDI is very difficult and costly.
- CDI is publicly reported and underperformance is associated with financial penalties.

Key Strategies

The following are some specific strategies and goals to rein in antibiotic resistance and improve stewardship used by the Ascension program:

1. Optimize and standardize antimicrobial therapy.
 - Establish minimum appropriate indications, restrictions for acute care hospitals developing clinical pathways, protocols to treat different infections.
 - Standardize perioperative antimicrobial prophylaxis.
2. Optimize testing for infection workup, which includes identifying and addressing variation; incorporating proper testing in order sets based on evidence; and avoiding testing without clinical indications.
3. Use data mining and electronic decision support to enhance appropriate antimicrobial use, including electronic health records to incorporate the indications and duration of antibiotics; and medication management software to support prospective monitoring to improve treatments real-time.
4. Evaluate the use of the different antimicrobial classes through a dashboard and directly engage opportunity hospitals to help them improve. ■

CDC Atlas Tool Maps out Resistant Bug Threat

Provides a snapshot of prevalence, regional variation

Trying to get a literal picture of the prevalence and geographic distribution of antibiotic-resistant bacteria in the U.S., the CDC has created an electronic, interactive map that can be accessed on the Web or through a mobile app. The Antibiotic Resistance Patient Safety Atlas reports the percentage of various healthcare-associated infections caused by antibiotic-resistant bacteria. (*The atlas can be found at: 1.usa.gov/1SmXtFK.*)

“It uses data reported from more than 4,000 healthcare facilities to give national, regional, and state map views of superbug-drug combinations showing percent resistance over time,” CDC Director **Tom Frieden**, MD, MPH, said at a recent press conference.

The data were reported as HAIs to the CDC’s National Healthcare Safety Network (NHSN) from 2011-2014 by 4,403 healthcare facilities, including general acute care hospitals (3,676), long-term acute care hospitals (506), and free-standing inpatient rehabilitation hospitals (221). Long-term care and skilled nursing facilities were not included at this time due to insufficient available data.

The summary metrics produced by this atlas only reflect HAIs reported to NHSN and are not adjusted to produce national estimates of antibiotic resistance. The CDC also includes a caveat about comparing the percentage of resistance across states, noting that HAI reporting requirements vary by state and the data are not adjusted for patient-level factors like demographics or severity of illness.

Some highlights from the atlas include the following:

- The percent of Enterobacteria-

ceae resistant to carbapenems (CRE) causing HAIs among states ranged from 0–27.9% (3.5% nationally), with higher percent resistance in several Northeast states and sporadically across the country.

- The percent of *Staphylococcus aureus* resistant to methicillin (MRSA) causing HAIs among states ranged from 32.5–67.8% (46.4% nationally), with higher percent resistance reported among Southeastern states.

- The percent of *P. aeruginosa* resistant to antibiotics in at least three categories (multidrug-resistant *P. aeruginosa*) causing HAIs among states ranged from 3.1–46.9% (14.2% nationally), with higher percent resistance reported among several Southeastern states and sporadically across the country.

- The percent of *Acinetobacter* resistant to antibiotics in at least three categories (multidrug-resistant *Acinetobacter*) causing HAIs among states ranged from 5.0–88.1% (54.8% nationally), with highly variable reporting of this less common pathogen across the country.

- The percent of Enterobacteriaceae resistant to extended-spectrum cephalosporins (indicative of extended-spectrum β -lactamase presence) causing HAIs among states varied by organism:

- *E. coli*: 0–24.4% (13.4% nationally), with higher percent resistance reported among some Northeastern and Western states, and territories.

- *Klebsiella* spp.: 0–73.0% (20.0% nationally), with higher percent resistance reported among some Northeastern and Western states, and territories.

- *Enterobacter* spp.: 15.0–43.2% (28.5% nationally), with less vari-

ability reported across states compared to other ESBL pathogens.

- The percentage of Vancomycin-resistant Enterococcus spp. [VRE]) causing HAIs in states varied by species:

- *E. faecium*: 38.5–86.5% (77.3% nationally), with high resistance prevalence reported among most states.

- *E. faecalis*: 0–17.8% (6.9% nationally), with higher resistance prevalence reported among some Midwestern, Northeastern, Mid-Atlantic, and Western states.

Additional pathogens included in the atlas that may be of interest to healthcare professionals include the following:

- The percent of *Staphylococcus aureus* resistant to methicillin (MRSA) and additional antibiotics suggesting origin in the community (community-associated MRSA) causing HAIs among states ranged from 10.0–55.5% (31.2% national resistance), with higher prevalence reported in some Southern states.

- The percent of *E. coli* resistant to fluoroquinolone (a commonly prescribed class of antibiotics for infections thought to be caused by *E. coli* and related organisms) causing HAIs among states ranged from 12.1–50.5% (33.0% national resistance), with higher percent resistance reported in many Southern states, some Western states, and territories.

- The percent of *P. aeruginosa* resistant to piperacillin/tazobactam causing HAIs among states ranged from 0–41.7% among states (10.0% national resistance), with higher prevalence reported in several Southern states and sporadically across the country. ■

The One and the Many: Experts Urge New Paradigm on Antibiotic Resistance

Antibiotics are 'a shared community trust'

While the widespread overuse and misuse of antibiotics is frequently cited in discussions of increasing bacterial resistance, there are instances where even correct use for an individual patient raises the question of potential harm to others. A prevailing paradox in antibiotic therapy is that what is good for the one may be bad for the many.

Physicians are ethically compelled to help the patient in front of them, but in giving them antibiotic therapy they may inadvertently contribute to the rise of resistant organisms that threaten other patients. A recently published perspective piece by three leading antibiotic experts presents a novel argument to reframe the paradigm.¹

“Antibiotics are unique because they are the only pharmaceutical agents that have transmissible loss of efficacy over time,” they argued. “Other drug types should work as well in the future as they do today. However, because of the inevitable occurrence and transmission of antibiotic-resistant bacteria from patient to patient, every patient’s use of antibiotics affects the future ability of every other patient to use those same antibiotics. Antibiotics are a shared community property or trust, and clinicians, healthcare organizations, patients, and the public are bound together in the need to protect these drugs from misuse.”

Individual practitioners understandably may perceive antibiotic restrictions or enforcement beyond recommendations as limiting their autonomy to practice medicine, they conceded.

“However, misuse of antibiotics

does not just harm the individual, it has a negative health effect on everyone in society,” the authors observed. “The indulgence of individual practitioner freedom regarding antibiotic choices therefore must be tempered by the knowledge that inappropriate use of antibiotics affects society at large.”

To be effective, antibiotic stewardship programs must incorporate best practices, which include dedicating sufficient resources to the program, appointing a single leader to be accountable for performance, having appropriate antibiotic expertise, implementing action plans, monitoring bacterial resistance, reporting antibiotic usage to staff, and providing education. However, further improving antibiotic use will require increased accountability and transparency at the societal level, they noted.

IP parallel

“A parallel can be drawn between antibiotic stewardship and infection prevention,” the authors stated. “Hospitals have been required to have infection prevention programs for many decades. Yet no transformative progress in reducing healthcare-associated infections occurred until society began requiring public reporting of infection rates and linking such rates to pay-for-performance measures. This shift toward greater accountability and transparency in healthcare-associated infections has led hospitals to vest infection control programs with the authority to implement critical improvements. A similar shift could substantially accelerate ef-

forts to improve antibiotic use.”

For drugs other than antibiotics, appropriate use generally mirrors the way the drug was proven to be effective and safe in clinical trials. In contrast, “effective” and “safe” are necessary, but not sufficient, to define appropriate use of an antibiotic.

“Consider an antibiotic that has a broad spectrum of activity that includes both highly resistant bacteria and also more common susceptible bacteria for which many other antibiotics already exist. Use of such a drug to treat common susceptible bacteria drives resistance to the drug among bacteria that are more difficult to treat and for which no other options are available.”

For example, fluoroquinolones are the only oral antibiotics that reliably can be used to treat infections caused by gram-negative bacilli, including antibiotic-resistant bacteria such as *Pseudomonas* and *Acinetobacter*. Thus, routine use of these agents to treat skin, urinary tract, or respiratory tract infections caused by susceptible bacteria, when other treatment options are available, conflicts with fundamental antibiotic stewardship principles. The consequence is selection of resistant bacteria such that fluoroquinolones can no longer be reliably used to treat common infections or infections caused by more resistant bacteria.

“Yet the fluoroquinolones are approved to treat skin, urinary tract, and respiratory tract infections, and national guidelines recommend these agents to treat such infections, making it difficult for stewardship programs at the hospital level to prevent such use,” the authors

concluded. “Given that antibiotics represent a shared societal trust, the regulatory approval process and national practice treatment guidelines governing use of antibiotics should not be based solely on considerations

of efficacy and safety, as they are for all other drugs. Rather, for antibiotics, the regulatory approval process and national practice guidelines should incorporate fundamental principles of antibiotic stewardship.”

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Increasing Job Requirements Warrant More Funding for IPs, Epidemiologists

SHEA and APIC cite lack of resources and sufficient staff

As infection prevention and healthcare epidemiology continue to undergo a dramatic transformation in duties and responsibilities, resources and program support are lagging in many hospitals even as a Zika virus outbreak follows closely on the heels of Ebola.

“At present, many healthcare institutions are under-resourced, with insufficient reimbursement for hospital epidemiology (HE) services and too few IPs,” the authors of recently published study¹ reported. “Yet there is ample evidence that a comprehensive IPC/HE program can reduce healthcare-associated infections (HAIs), minimize the spread of MDROs, and address emerging infections and pathogens, ultimately keeping patients safer.”

The white paper by the Society for Healthcare Epidemiology of America (SHEA) also includes input from the Association for Professionals in Infection Control and Epidemiology (APIC). In a related development, as public health officials called the field to action again on another daunting issue — staving off a post-antibiotic era — APIC said more must be done, but resources are a continuing problem.

“APIC believes that the U.S. must do more to protect the 2 million Americans who develop infections from antibiotic-resistant bacteria

each year and the 23,000 who will die as a result,” the association said in a statement. “With the ongoing threat of emerging infectious diseases and antibiotic-resistant organisms, APIC remains concerned that many facilities are lagging behind in providing adequate support to protect patients and healthcare workers. Unfortunately, many healthcare facilities do not have enough staff dedicated to infection prevention and control. A recent APIC survey found that one in two hospitals had only one or less than one full-time equivalent infection preventionist on staff.”

Prepare first

IPs should clearly review their departments accomplishments and future challenges before approaching the C-suite with a request for more resources, says **Sue Dolan**, RN, MS, CIC, hospital epidemiologist at Children’s Hospital (Aurora) Colorado and 2016 APIC president.

“The IP clearly needs to identify where the program is and where the program needs to go,” she told *Hospital Infection Control & Prevention*. “They need to share that information to help leadership understand what resources are needed to get there. It’s not just walking in, saying, ‘I need another IP. I need an epidemiologist.’ It’s, ‘Here’s where we are, here’s

where we need to go, and here’s the resources that we need to get there.’ We worked together with SHEA to develop a program [description in the article] so the infection preventionist and the epidemiologist can have this conversation with senior leadership in their organization.”

As described in the paper, the scope of a healthcare institution’s infection prevention and control/healthcare epidemiology program should be driven by the size and complexity of the patient population served, that population’s risk for HAIs, and local, state, and national regulatory and accreditation requirements. Essential activities of all IPC/HE programs include but are not limited to the following:

- surveillance,
- performance improvement to reduce HAIs,
- acute event response, including outbreak investigation,
- education and training of both healthcare personnel and patients, and
- reporting of HAIs to the CDC National Healthcare Safety Network as well as entities required by law.

The program may be involved in a number of other activities depending on the needs of the organization, the annual risk assessment, and resources available. The effective program must

be multidisciplinary and include experts in both healthcare epidemiology and infection prevention. Expertise is defined by sets of core competencies established by SHEA and APIC. Program personnel must have authority delegated from institutional leadership to perform essential activities and implement changes to reduce HAIs. The number of personnel is not determined solely by the number of patients served by a given facility, but rather by the scope and complexity of program activities.

“The budget allocated for the program must support adequate numbers of personnel (infection preventionists and healthcare epidemiologists) to execute program activities,” the authors emphasized.

Change and challenge

The last two decades have seen a wide variety of new challenges emerge for infection control and healthcare epidemiology, including the following:

- legislative mandates,
 - public reporting,
 - pay-for-performance,
- payment penalties,
- HAI prevention collaboratives,
 - bioterrorism (i.e., anthrax attacks),
 - new and emerging pathogens such as pandemic H1N1 flu, MERS, and Ebola,
 - Occupational Safety and Health Administration (OSHA) mandates,
 - first National Action Plan to reduce HAIs,
 - rise of multidrug-resistant organisms (MDROs), and
 - unprecedented antimicrobial shortages and lack of new drugs.
- “Meeting these regulatory and

accreditation requirements along with increasingly frequent legislative mandates for HAI data requires a substantial investment of resources and is a key element of an effective IPC/HE program,” the authors wrote. “In addition, CMS, under its inpatient quality reporting, is currently requiring acute care providers to report CLABSI, catheter-associated urinary tract infections, and select surgical site infections, as well as hospital-onset *Clostridium difficile* infection and hospital onset methicillin-resistant *Staphylococcus aureus* bloodstream infection. ... The Affordable Care Act provisions include a mandate that facilities within the highest quartile for certain infections be penalized 1% of their Medicare reimbursement.”

In addition, CMS Conditions of Participation 482.42(a) states, “A person or persons must be designated as infection control officer or officers to develop and implement policies governing control of infections and communicable diseases. ... The interpretive guidelines for 482.42(b) state that it is the responsibility of the chief executive officer, the medical staff, and the director of nursing to implement successful corrective action plans for problems identified through the infection prevention program.”

Similarly, The Joint Commission Standard IC.01.01.01 requires an individual with clinical authority over the infection prevention program to have responsibility for developing a system for identifying, reporting, investigating, and controlling infections and communicable diseases, the authors added.

While there are plenty of regulatory incentives for hospital administrators to support infection control, there is also one real-world reason: Efforts to reduce HAIs and

protect patients from all manner of infectious threats are not likely to be successful without support from senior administration. Period.

For example, the principal investigator behind implementation of a checklist for central line insertion that ultimately saved thousands of patients’ lives said it could not have been done without an entire organizational commitment.

“We went into hospitals that had very low bloodstream infections and those that were not able to get low to see what differentiated those two,” says **Peter Pronovost**, MD, PhD, FCCM, director of the Armstrong Institute for Patient Safety and Quality at Johns Hopkins Medicine in Baltimore. “We found that it wasn’t one thing, but there were some very specific things that hospitals did. Number one, the leaders declared and committed a goal of zero preventable infections. Number two, they supported creating and enabling infrastructure. They worked with the infection prevention team and quality and safety people to support clinicians.”

Moreover, in a recent call to action at a press conference on the threat of antibiotic resistance, CDC Director **Tom Frieden**, MD, MPH, said, “CEOs [and] administrators are a major part of the solution. It’s important that they make a priority of infection prevention, sepsis prevention, and antibiotic stewardship. Know your facility’s data and target prevention efforts to assure improvements in patient safety.”

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Zika Update: U.S. Approaching 200 Cases

Will mosquitoes spread virus widely this summer?

As confirmed cases of the Zika virus disease continue to mount in the United States, frontline providers are scrambling to ensure that appropriate patients are screened for the illness, and to minimize the risk of transmission, especially to pregnant women.

As of March 9, 2016, 193 travel-associated Zika virus cases had been reported in the U.S. In addition, at least nine U.S. pregnant women have acquired Zika virus traveling to areas where transmission is ongoing, underscoring the message that expectant mothers should strongly reconsider any travel plans to areas where spread is occurring.

“Among the six women with Zika virus disease who experienced symptoms during the first trimester, two women experienced spontaneous pregnancy losses, two terminated [their pregnancies], and one pregnancy is continuing without complications,” says **Denise Jamieson**, MD, MPH, CAPT, USPHS, the co-lead of the pregnancy and birth defects group of the CDC’s Zika response team.

Further, one of the women delivered a child with microcephaly, a devastating birth defect that stunts brain and skull development.

“Two women with Zika virus disease were exposed during the second trimester of pregnancy,” she says. “One delivered a healthy infant and the other pregnancy is continuing.” One woman who was infected with Zika during her third trimester delivered a healthy baby, Jamieson said.

A number of cases of sexual transmission of Zika in the U.S. are also under investigation. In addition to the link to microcephaly,

public health authorities know that Zika can trigger Guillain-Barre syndrome in a small number of infections. However, while investigators are looking into this issue, their sharpest focus is on mitigating the risk posed by Zika to pregnant women, and frontline providers have a crucial role to play in this effort.

Hospitals in the Southeastern United States are particularly attuned to the threat Zika poses because there are concerns that endemic Zika transmission may develop in the region in a matter of months. In early February, Florida Gov. Rick Scott declared a state of emergency in four Florida counties where people have been diagnosed with Zika, although all these cases are linked to travel to regions where Zika is already endemic.

Christine Curry, MD, PhD, a virologist and an OB/GYN with the University of Miami Miller School of Medicine, and a faculty member at both the University of Miami Hospital and Jackson Memorial Hospital in Miami, is actively involved with making sure both campuses are up to date on the latest Zika guidelines and prepared to identify any potential cases that might present for care.

“We are working really closely with the Department of Public Health and the CDC because the guidelines are changing every 24 to 48 hours,” Curry says. “It is really challenging to make sure that everyone is on the same page.”

Travel history

Using the CDC guidelines,

clinicians have created a series of screening questions that are largely related to travel, Curry notes.

“I am most familiar with the obstetrics questions, so for every patient who is known to be pregnant in the ED and in the outpatient setting, such as when they go to their doctor visits, we ask them about recent travel.”

Regions of concern where Zika cases have been identified during the current outbreak include the Caribbean, Mexico, Central America, and throughout South America. The virus has also been identified in the Pacific Islands, including American Samoa, Samoa, the Marshall Islands, and Tonga. There have been reports of transmission in Cape Verde, an island country off the northwest coast of Africa.

For women who present to the ED, if they have recently traveled to a Zika-affected area, they will be offered a pregnancy test, according to Curry.

“Some people don’t even know if they are pregnant, so they fall into the obstetrics category unknowingly,” she says.

Another workflow adjustment concerns patient counseling.

“For everyone who is pregnant, we are now saying, ‘Do not travel to these [Zika-affected] areas. Cancel your travel or delay your travel until after you are done with your pregnancy,’” Curry explains. “We are also telling [pregnant] women if their partner has traveled [to Zika-affected areas] to use condoms.”

Any pregnant woman who discloses that she has traveled to a Zika-affected area within the

past two to 12 weeks undergoes screening to check for evidence of a Zika infection, Curry notes.

“We are following the CDC protocol in terms of performing repeated ultrasounds so that even if a test is negative or a test is equivocal we stand a chance of detecting any neurologic issues early.”

Moving target

Curry explains that as of early February, no women had yet tested positive for Zika at either the University of Miami Hospital or Jackson Memorial Hospital campuses, but she acknowledges this could change.

“It is a moving target, so it is hard to predict volume,” she says. “We’re ensuring that everyone is up to date on who is supposed to be screened and that we have a sufficient number of ultrasonographers so that all these additional ultrasounds can get done in a timely way.”

Curry stays in contact with the Florida Department of Public Health on a daily basis and has also taken charge of making sure obstetrics providers are apprised of any recommended changes in practice related to Zika.

“I provide weekly updates ... and also make sure that we are keeping really good track of [pregnant women] because when our patients get scared, they have a tendency to fall out of care,” she says. “Right now, we are in clinical service mode, but we are gathering data in a way so we can retrospectively look at this experience and try to understand [such questions as] of all the women who traveled [to Zika-affected areas], how many had

infections, and of those who had infections, how many had affected babies. Of the affected babies, what were the problems and how serious were they, because we don’t really have the numerators or the denominators to counsel patients right now.”

While answers to such questions are critical, they will be difficult to pin down.

“IN THE MEANTIME, THE CDC HAS PREPARED ZIKA PREVENTION KITS FOR PREGNANT WOMEN WHO LIVE IN ZIKA-ENDEMIC AREAS.”

“Pregnancy is 40 weeks long, so an event that maybe happened when someone was 11 weeks pregnant may be difficult to recall, test, or hypothesize about 30 weeks later,” Curry says. “The delayed presentation of the abnormality also makes it kind of a nightmare for the epidemiologists to track down because they are looking back over 40 weeks of a person’s experience trying to figure out what is common to all of these cases.”

Nonetheless, the Miami region is likely more attuned to the issue than regions that are less exposed.

“In South Florida in particular, people went through the chikungunya introduction a couple of years ago and dengue — diseases that have the same mosquito vectors — so the Department of Public Health and researchers in this part

of the country are more familiar with it,” Curry says. “There is the potential that if the Zika virus is introduced to South Florida, we will be in the exact same position as all these other [Zika-affected] countries, so people here are being proactive because we distinctly do not want that to be the situation.”

In the meantime, the CDC has prepared Zika prevention kits for pregnant women who live in Zika-endemic areas. The kits include educational materials, mosquito repellents, condoms, and thermometers. The kits also include tablets that can be placed in standing water to prevent mosquitos from multiplying there. Also, the FDA has expedited approval of a laboratory test that can detect antibodies to the Zika virus.

“These antibodies appear in the blood of a person affected with Zika beginning as early as four days after the start of illness and can last for several weeks,” explains **Julie Villanueva**, PhD, the laboratory team lead for the CDC’s Zika response team. “The Zika test can determine whether a person may have been recently infected.”

While it will take time before the test is widely available in labs across the United States, the CDC has completed all the necessary quality assurance checks with all laboratories offering the test. The first priority is making sure public health departments across the United States have access to the test.

Villanueva notes that some closely related viruses to Zika, such as dengue, may also trigger a positive result on the Zika test.

“[Consequently,] those positive specimens will be sent to the CDC or a laboratory designated by the CDC for further confirmation,” she says. ■

Global Village: After Ebola and Zika, Patient Admitted to U.S. Hospital with Lassa Fever

HCW acquired in West Africa

As this issue went to press, the CDC confirmed that a patient admitted to Emory University Hospital's Serious Communicable Diseases Unit has Lassa fever, a hemorrhagic virus endemic in parts of West Africa.

Lassa is not considered as deadly or as easily transmitted as Ebola, but of course we have seen that incoming exotic diseases do not always follow predicted behavior patterns. There has never been a reported case of Lassa fever transmission in the United States, but given that was also said about Ebola and Zika virus, we must certainly hope it remains the case. However, Emory's containment unit is state of the art, and the team led by Bruce Ribner, MD, successfully treated four Ebola patients during that outbreak.

There have been Lassa fever patients treated in the U.S. before, including one who died last year in a New Jersey hospital.

The recently admitted Lassa fever patient is an American physician assistant working for a missionary organization in Togo, West Africa. The virus can be transmitted by infected humans, but only through direct contact with bodily fluids — not through casual contact nor the airborne route.

While Ebola is thought to have an animal reservoir in bats, Lassa is carried in Africa by the "multimammate rat," which can excrete virus in urine and may colonize homes if it finds a food source. Similar to Hantavirus, viral particles from rodent excretions can be inhaled by people, particularly if they are sweeping up or otherwise

stirring a contaminated area. It can also be ingested if food is contaminated.

In Africa, healthcare workers can acquire the virus from patients if proper PPE is not used and they have blood or body fluid exposures. It can also be transmitted through contaminated equipment or needlesticks. Approximately 15%-20% of patients hospitalized in Africa with Lassa fever die from the illness. However, only 1% of all Lassa virus infections — including those in the community — result in death.

Death in NJ

In the aforementioned New Jersey case, a patient traveled from Liberia to Morocco to JFK International Airport on May 17, 2015. The patient did not have a fever on departure from Liberia, did not

report symptoms such as diarrhea, vomiting, or bleeding during the flight, and his temperature was taken on arrival in the U.S. and he did not have a fever at that time.

On May 18, the patient went to a hospital in New Jersey with symptoms of a sore throat, fever and tiredness. According to the hospital, he was asked on the 18 about his travel history and he did not indicate travel to West Africa. The patient was sent home the same day, and returned to the hospital on May 21 when symptoms worsened. The patient was transferred to a second hospital prepared to treat viral hemorrhagic fevers. Samples submitted to CDC tested positive for Lassa fever. Tests for Ebola and other viral hemorrhagic fevers were negative. The patient was in appropriate isolation when he died shortly thereafter and no secondary cases occurred. ■

We Need Your Help!

The *Hospital Infection Control and Prevention* editors are planning topics for 2016 issues and would like your feedback on topics recently covered. Please help us by answering three questions at the following link:

<https://www.surveymonkey.com/r/HICSpring2016>

Thank you for your help!

COMING IN FUTURE MONTHS

- Live from Charlotte: APIC 2016 Conference
- HCV outbreaks plague hemodialysis
- Zika genetically modified
- mosquitoes — what could go wrong?
- Taking CLABSI prevention beyond the ICU
- Q&A with APIC President



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CME/CE QUESTIONS

- 1. Tom Frieden, MD, MPH, CDC director, said which of the following must be done consistently to prevent antibiotic resistance?**
 - A. Preventing spread of bacteria between patients.
 - B. Prevent infections related to catheters and surgeries.
 - C. Improve antibiotic use through stewardship.
 - D. All of the above.
- 2. The CDC report specifically cites seven problem pathogens that are proving persistently dangerous to patients. Which of the following was NOT cited on the list?**
 - A. Carbapenem-resistant Enterobacteriaceae
 - B. Vancomycin-resistant *Staphylococcus aureus*
 - C. Vancomycin-resistant enterococci
 - D. Multidrug-resistant *Pseudomonas aeruginosa*
- 3. A recently published article points out that antibiotics are unique because they are the only pharmaceutical agents that have transmissible loss of efficacy over time.**
 - A. True
 - B. False
- 4. As described by SHEA and APIC, the scope of a healthcare institution's infection prevention program should include, but not be limited to, which of the following?**
 - A. Double gloving for surgeries on patients with known bloodborne pathogens.
 - B. Education and training of both healthcare personnel and patients.
 - C. Monitoring and reporting of PPE compliance to OSHA.
 - D. All of the above

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.