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IDWeek 2017: Resistant Bugs Rampant in Long-term Care

CMS antibiotic stewardship requirements now in effect

By Gary Evans, Medical Writer

The nation's long-term care facilities are teeming with multidrug-resistant organisms (MDROs), giving pathogens that can cause virtually untreatable infections access to vulnerable patient populations across the healthcare continuum, epidemiologists warned recently in San Diego at the IDWeek conference.

While infection control and decolonization protocols for long-term care residents are under study, a measure that may have more immediate impact became effective Nov. 28, 2017. The Centers for Medicare & Medicaid Services (CMS) now requires antibiotic stewardship programs in long-term care settings, per a rule adopted last year that included this phased-in requirement.[1]

The CMS is requiring antibiotic stewardship programs in long-term care that include antibiotic use protocols and some type of drug usage monitoring system. Antibiotic overuse and misuse selects out MDROs by killing off susceptible strains. In addition, antibiotics can wipe out commensal bacteria in the gut, leaving the patient vulnerable to *Clostridium difficile* infection. Prudent use of antibiotics could reduce the level of such MDROs as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE) and carbapenem-resistant Enterobacteriaceae (CRE).

THE NATION'S LONG-TERM CARE FACILITIES ARE TEEMING WITH MULTIDRUG-RESISTANT ORGANISMS.

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The prevalence of MDROs in long-term care is in a large sense the direct result of the sheer volume of antibiotics used in these settings. The CDC estimates that 70% of nursing home residents will receive one or more courses of antibiotics over a given year. As is the case with hospitals, some 40% to 70% of these antibiotics are an inappropriate drug or completely unnecessary.

"Antibiotic use is a strong risk factor for both colonization with MDROs and for acquiring [infections] by MDROs," said **Mary-Claire Roghmann**, MD, MS, professor of epidemiology at the University of Maryland School of Medicine. "This has been shown over multiple studies, and we are now entering an era in which CMS regulations will promote antibiotic stewardship in long-term care facilities. Each facility will be asked to develop and implement a protocol by ensuring that residents who require an antibiotic are prescribed the appropriate drug. Part of the goal of this is to reduce the incidence of adverse events including the development of MDROs from unnecessary and inappropriate antibiotic use."

Phase 3 of the CMS requirements, which include designating an infection preventionist in long-term care, will take effect Nov. 28, 2019.

"Infection prevention coordinators have key expertise and data to inform strategies to improve antibiotic use," the CDC states.[2] "This includes tracking of antibiotic starts, monitoring adherence to evidence-based published criteria during the evaluation and management of treated infections, and reviewing antibiotic resistance patterns in the facility to understand which infections are caused by resistant organisms."

Given the prevalence of MDROs and the selective pressure exerted by antibiotic use in long-term care, the CMS antibiotic stewardship requirement comes at a critical time.

"The problem is pretty striking," Roghmann said. "The prevalence of MDROs in long-term care is very high. The most positive message is that CRE is still rare [1% estimated burden] in nursing home residents."

MDRO transmission routes are more complex in long-term care because of the high prevalence rates and the frequent movement of patients and residents across the healthcare continuum.

"If you think about the constant cycle we have between nursing homes and hospitals, this is, unfortunately, an opportunity to import residents colonized with MDROs into hospitals where there is additional spread," Roghmann said. "Simulation models show that if you were able to reduce MDROs in nursing homes, that would actually result in a lower prevalence of MDROs in hospitals."

Unknown Bugs

In addition, most long-term care facilities are largely unaware of how many residents are colonized with one or more MDROs, said **Susan Huang**, MD, MPH, director of epidemiology and infection prevention at the University of California, Irvine School of Medicine.

"The vast majority of multidrug-resistant carriage is unknown in long-term care," she told IDWeek attendees.

Presenting data from an ongoing study in a network of hospitals, nursing homes, and long-term acute care facilities (LTACs), Huang underscored that shared patients with MDROs move back and forth through all these settings.

"It is well known that the number, spread, and breadth of MDROs continue to rise in healthcare today," she said. "It begs a very important question about the importance of regional collaboration. If we work together – hospitals, nursing homes, LTACs – is it possible to achieve something much greater than any of us can achieve alone? This idea particularly applies to contagious spread of MDROs."

For example, an analysis of patient movement in her hospital revealed a wide network of other facilities receiving and transferring patients, Huang said.

"What we see over time is this widening bubble of exposure that we are creating in Southern California and actually up into northern California as people seek healthcare in all sorts of different places," Huang said.

Similar patterns can be seen whether the pathogen tracked is MRSA, *C. diff*, or VRE. "You see the exact same thing – this inexorable spread as people need more and more healthcare and get readmitted," she said.

The ultimate goal of the project is to find effective decolonization protocols for these settings so that transferring patients are less likely to bring MDROs with them. To establish baseline data in the first phase of the study, Huang and colleagues conducted an MDRO prevalence study in 38 facilities, which included 17 hospitals, 18 nursing homes, and 3 LTACs in the San Diego area.

"There is an extensive amount of patient-sharing across this county, across all facilities," Huang said. "Often, certain facilities are 'brokers' between many other facilities, where they share hundreds of patients across multiple hospitals and nursing homes."

Huang and co-investigators looked for adult patients with MDROs between September 2016 to April 2017, using nares, skin (axilla/groin), and perirectal swabs.[3] In nursing homes and LTACs, residents were randomly selected until 50 sets of swabs were obtained. Swabbing in hospitals involved all patients in contact precautions.

The overall prevalence of any MDRO among all patients and residents was 64%, with a range of 44% to 88%. Nursing homes had an 80% MDRO prevalence, with a range of 72% to 86%. LTACs had a 64% prevalence of MDROs, with a range of 54% to 84%.

Even in hospitals, where only patients in isolation were cultured, the investigators found 34% had another MDRO beyond the one that was known. "Overall we found that if you have one [MDRO] you are very likely to have another, and this really bears out no matter what setting we look at," she said.

Only 25% of culture-positive patients in nursing homes were known by the facility to have an MDRO.

"We found that there is absolutely extensive MDRO carriage throughout the facilities, whether it's hospitals, nursing homes or LTACs," she said. "In fact the nursing homes rival the percentage of positives of the hospitalized patients in contact precautions. The vast majority of nursing homes residents who are positive have a status that is completely unknown. In long-term acute care at least seven of 10 patients harbor an MDRO that is unknown to the facility."

Next Phase: Decolonization

As the next phase in the project, MDRO decolonization protocols are being trialed in the participating facilities.

"The hospitals are decolonizing patients who are in contact precautions for any reason," Huang said. "We give them daily chlorhexidine bathing or showering and nasal iodophor decolonization for five days."

The nursing homes and LTACs are using a different decolonization strategy.

"We do universal decolonization in those settings," Huang said. "We switch out their soap for chlorhexidine whether it is for a bed bath or a shower, and we do nasal iodophor for five days on admission. Then they enter into a facility cycle where Monday through Friday every other week all patients in the facility are decolonized."

Little CRE was detected and Huang expressed hope that a bug capable of virtual pan-resistance would not get a foothold in the region. However, "in southern California the most rapid rise of CRE is in long-term care," Huang cautioned.

The findings underscore the premise that facilities must work together in networks, communicating and decolonizing patients if possible.

"We need to think about how we can work together on this idea of contagious spread," Huang said. "We share a lot of patients. We believe regional cooperation is going to be critical to answering this question about how can we really contain MDROs."

That said, it will be particularly hard to reduce MDROs in nursing homes because the contact isolation approach used in hospitals is anathema to the goal of resident interaction and mobility in long-term care, Roghmann noted.

"We have to take into account

the social and interactive nature of nursing homes," she said. "We do not keep the residents in a single room. There is communal dining, group recreational activities, physical therapy, and recreation where residents are encouraged to come together. This really complicates the question of how to prevent transmission."

Nursing homes are typically a mixture to two different populations as defined by duration of stay, she explained.

"The 'long-stayers' are people who are there for more than three months – often years," Roghmann said. "They are primarily there because of cognitive and physical functioning. Then we have the 'short-stayers.' Those people are typically there after an acute care hospitalization. They are receiving rehabilitation or skilled nursing care."

Contrasting the two groups, Roghmann said, the long-stay residents typically have very high levels of MDRO colonization, while the short-stayers have risk factors such as medical devices and wounds that increase their risk of MDRO acquisition.

"It is the mixing within the nursing home that can really lead to spread," she said.

Similarly, MDRO "source residents" have many risk factors that include medical devices, chronic skin breakdown, problems with immunity, antibiotic use, and a very high dependency on healthcare workers for care. These patients can be colonized with a variety of MDROs at different body sites, she said.

"Then we have 'recipient' residents who can then acquire the MDRO, and they have many of the same risk factors," she said. "This is all occurring through a variety of different transmission pathways that may involve healthcare interactions with geriatric nurse's assistants, nurses, and physical therapists in an environment that is built to encourage interactions between the residents."

In addition to – or perhaps because of – these differences between long-term and acute care, there is a dearth of data showing the efficacy of infection control practices in nursing homes. Also, long-term care facilities may have scarce resources to adopt infection control measures.

A Clinical Prediction Rule

Contact precautions often are triggered by MDRO culture positivity in acute care hospitals, but using that

Decolonization Protocol Yields Mixed Results

Benefits seen for non-ICU patients on central lines

A decolonization protocol that has reduced infections in ICU patients did not translate that overall efficacy when researchers tried it on non-critical care patients. However, when they targeted non-ICU patients with central and other lines in place, they saw MRSA and VRE infections drop by one-third.

The decolonization protocol included using chlorhexidine for routine daily bathing, as well as mupirocin in the nares twice daily for five days.[1] However, the intervention had little impact on ward patients and the infection rates were not significantly different from the control arm that continued standard care.

"This finding led us to ask the question, 'If it is not beneficial in the overall population, are there subsets of higher-risk patients for which decolonization might be beneficial?'" said **Susan Huang**, MD, MPH, director of epidemiology and infection prevention at the University of California, Irvine School of Medicine.

Presenting the findings recently in San Diego at the IDWeek conference, Huang reported decolonization benefits were realized when they broke down the data and looked only at patients with lines. "Looking at patients with central lines, midlines, and lumbar drains, we found a significant 32% reduction in MRSA and VRE clinical cultures," she said. "These patients accounted for only 12% of the entire study population, but they were responsible for over a third [of infections]."

The study randomized 53 hospitals in 15 states to a control arm or intervention protocols.

"We didn't see an overall impact for house-wide decolonization, unlike what we have seen in ICU trials," Huang said. "It is very likely that these are lower-risk patients (overall). But we do report a very large and significant benefit in the higher-risk patients who had devices." ■

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approach in long-term care may be both expensive and stigmatizing, she said. Moreover, some people may be only transiently colonized while others have persistent colonization. As an alternative, contact precautions and other interventions could be triggered by the clinical characteristics of the residents, she said.

"For example, we know that people with medical devices are at risk for [MDRO] acquisition and infection," she said. "We know that skin breakdown makes people at risk for transmitting. Some studies have shown that residents who have the highest dependence on healthcare workers are at increased risk as well."

The other issue is that MRSA, for example, can colonize multiple body sites and is not necessarily picked up by a nares swab. Swabbing multiple body sites as was done in the Huang study may not be a real-world alternative for nursing homes. Given these issues, it might make more sense to develop a "clinical prediction rule" rather than surveillance cultures for predicting transmission, she said. Such a rule could include clinical variables such as skin breakdown or the presence of devices.

"The prevalence and spread [of MDROs] within nursing homes fuels the spread of MDROs in the healthcare system," Roghmann said. "Whatever intervention we create it needs to be sustainable for that setting. It needs to work within the resources that nursing homes have and it needs to address some of the cultural biases against the use of infection control. I think that we have taken an enormous step in putting forward antibiotic stewardship in the nursing homes, because it will reduce the spread of [MDROs]." ■

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Driving *C. diff* to Zero? It's Possible

An IP keeps bug at bay for almost one year

Driving infection rates to zero is a worthy aspirational goal but it is seldom accomplished in reality, particularly with *Clostridium difficile*.

This spore-former resists eradication on healthcare worker hands and the patient environment, explaining in part why it is proving one of the most difficult infections to reduce in national surveillance data. But an infection preventionist in Ohio drove *C. diff* to zero for a stunning 341 days with a multifaceted program that had buy-in from healthcare colleagues and hospital administration.

"When it comes to *C. diff*, people believe that just being below a benchmark is enough," says **Lisa Beauch**, BSN, RN, CAPA, CPAN, CIC, regional infection prevention manager at Toledo Mercy Health-St. Anne Hospital. "Everybody thinks that zero is impossible. While it is a lot of hard work, it is possible."

More from Beauch shortly, but consider the difficulty of this task in light of national data recently released by the Centers for Disease Control and Prevention (CDC) in San Diego at the IDWeek 2017 meeting. As a follow-up to a 2011 study, the CDC surveyed 143 of the same hospitals in 2015 for prevalence of healthcare-associated infections (HAIs). Data from nearly 9,000 patients showed declines in surgical site infections, UTIs, and central line infections, but *C. diff* infections did not budge.

"HAI prevalence was significantly lower in 2015 compared to 2011 … suggesting national efforts to prevent SSIs, reduce catheter use, and improve UTI diagnosis are succeeding," the CDC concluded.[1] "By contrast, there was no change in the prevalence of the most common HAIs in 2015, pneumonia and *C. diff*, indicating a need for increased prevention efforts in hospitals."

As IPs are well aware, this is no inconsequential infection. *C. diff* is a common cause of diarrhea in hospitalized patients, but can escalate to life-threatening complications in the gastrointestinal tract in infections that are directly attributable to the death of some 15,000 patients annually, the CDC estimates.

Key interventions at Beauch's 100-bed hospital include monitoring compliance with hand hygiene and barrier precautions, an enhanced

cleaning regimen, and antibiotic stewardship. After patient transfer or discharge, rooms of suspected or confirmed *C. diff* patients are cleaned with bleach and disinfected with UV light, and privacy curtains are changed. The policy also emphasized routine bleach cleaning of high-touch areas, including the nurses' station and door handles. To put the issue brightly on the radar, Beauch began posting "days since last" *C. diff* infection. We asked her to tell us more about the successful program in the following interview.

'We were so close'

HIC: You note that prior to 2015, your hospital had 40% more *C. diff* infections than it should for its demographics and patient population. Can you comment further on that?

Beauch: Based on our size and the community burden of *C. diff*, the CDC's National Healthcare Safety Network gives a standard infection ratio. They estimate this based on our risk factors and how many potential infections we should have. So, say we should have 10 *C. diff* infections, but we had 14. That would be 40% more than they felt we should have. Of course, the goal is always zero. One is too much, that goes without saying, and we keep pounding that home. We could no longer tolerate [the attitude of] "as long as we are below what is expected, we're fine."

HIC: Given the tenacity of *C. diff*, it is remarkable that your hospital almost went a full year without a healthcare-associated infection.

Beauch: We went 341 days — from July 27, 2016 to July 4, 2017. It was pretty devastating. We had our daily safety call, and when the manager announced it you could just hear everyone give out a collective sigh. We were so close. I had a party planned — we were planning on a big celebration. We still celebrated — don't get me wrong — but to have made it to 365 days would have been just amazing. We celebrated the success that we did have and started over again. We had those cases in July and now we're back to zero.

HIC: How do you define a nosocomial case of *C. diff*?

Beauch: The lab ID event is very cut and dry. If they have a positive specimen day four or later in their stay [it's hospital-associated]. The expectation is that if they would have come in with it, we would have tested for it in the first couple of days.

Sometimes things do slip through the cracks and that is part of the education that we do. We are asking questions right at admission. We are testing them and appropriately getting them classified as community-acquired.

There is a consistency of stool that should be tested and should not be tested. We shouldn't be testing formed stool. Sometimes tests are ordered on stool that don't meet criteria. We are trying to change that mindset. By definition, *C. diff* is three or more watery stools in a 24-hour period. So if a patient is having formed stool, they do not have *C. diff*. They could be a carrier. There are people who carry *C. diff* and are asymptomatic, but we are actually testing for active *C. diff*. We isolate active cases. The way that *C. diff* is transmitted is obviously the stool. Normally, a patient who is continent and washes their hands is not an issue.

HIC: You had multiple interventions so it is probably difficult to single out any one thing. What is your basic role in the program?

Beauch: It does no good for me to stomp my feet, yell at the walls, and say, "We have a *C. diff* problem." You've got to get out there. I go out and talk to the nurses and find out what's going on, where are we at? Just getting everybody speaking the same language is huge. We do education with the physicians because we do PCR testing that is very accurate. So a negative is almost certainly a negative.

HIC: In terms of antibiotic stewardship, did you target certain drugs that are known to trigger *C. diff* by wiping out the commensal bacteria in the patient gut?

Beauch: There are antibiotics that are at a higher risk of causing *C. diff* — if you have been exposed — than others. But more importantly we would find that, for example, in a chronic obstructive pulmonary disease (COPD) patient. Typically, no antibiotic or a single antibiotic is appropriate for COPD. We found that physicians were hitting them with two or three antibiotics like they have pneumonia, when in fact they have COPD. We don't want them putting patients on a broad-spectrum, throw-everything-but-the-kitchen-sink antibiotic if they don't have pneumonia. That exposes them to a lot of antibiotics that they probably don't need. It just happened that the clinical pharmacist and I were both trying to get an antimicrobial stewardship program up and running at a more robust level. *C. diff* ended up being a nice tie-in because we already had administrative support for stewardship. It's way more than a three-legged stool — environmental cleaning, hand hygiene, antimicrobial stewardship. We have found it is also appropriate [to have] testing, education, and administrative support. It ends up being a lot.

HIC: How does your infection control compliance reporting work?

Beauch: Every day I round, and I have some "secret shoppers" that round as well. As I am walking down

the halls by the isolation rooms I will look in, if the door is open, and see if everybody is wearing appropriate PPE. I then write down the person's name and the department. At the end of the day I email that list to all of the managers of the staff I saw. So if it was a nurse on med-surge, I send it to the med-surge manager. If it is a dietician, I send it to the dietary office. This is everything — good or bad.

HIC: That's interesting. You report people who are compliant?

Beauch: Recognition is just as important as having an intervention if they are not complying. When I see people that are not compliant, I wait until they come out and then have a conversation right there — immediate feedback. We discuss what was going on. Today, I had a conversation with a couple of nurses. They were upset because they were in an isolation room without a gown, but the bed alarm was going off — the patient was half out of the bed. I told them, of course, our patients always come first, but they are so in tune now to these conversations. The staff know that both the good and the bad are going to be reported to their managers. Mercy Health as a whole has a zero-tolerance policy and the expectation for hand hygiene 100% of the time, whether the patient is in isolation or not.

HIC: Were you able to determine what caused the infections that ended your zero streak?

Beauch: We ended up having three. One we really could not tell, it may have actually been a case of [nosocomial] *C. diff*. The other two appeared to be inappropriate testing. They sent non-diarrhea stool and it got tested. But it ends up being hospital-acquired because the patients were in day four or after. So, we go back and educate again. It's a bell

Do Long-sleeved Physician Coats Spread *C. diff*?

The "bare below the elbows" approach to infection control, wherein physicians wear short sleeves rather than their traditional white coats, has been met with some derision as a misguided approach by "fashion police."

On the other hand, proponents argue that staff wearing infrequently washed long-sleeved coats from patient to patient have a swirl of microbes about them equivalent to that on the *Peanuts* character "Pig-Pen." *(For more information, see* Hospital Infection Control & Prevention*, January 2016.)*

Given similar concerns with stethoscopes and neckties, the bare-below-the-elbows argument makes intuitive sense, but seems to lack the hard data to sway the majority of white-coated physicians. For instance, at a study presented recently in San Diego at IDWeek 2017, the voice of physician dissent to this concept included this example: "Another stupid checkbox for healthcare workers that makes no practical sense. Our skin have bacteria on them as well."[1]

The idea, of course, is that one could wash the hands and wrists, but the sleeve cuff of the coat is going to touch successive patients. Could pathogens be spread this way?

A study by **Amrita John**, MBBS, an epidemiologist at University Hospitals Case Medical Center in Cleveland, sought to answer that question with the help of two mannequins and 34 healthcare workers. A benign surrogate DNA marker for *Clostridium difficile* was used.

"During simulations of patient care the sleeve cuff of the long-sleeve white coats frequently transferred the viral DNA marker," John said. "No transmission occurred when short sleeves were worn. During work rounds, the cuffs of physicians in long-sleeve white coats frequently contacted patients or environmental surfaces."

In the study, healthcare workers were randomly selected to wear either long-sleeved or short-sleeved white coats while examining a mannequin contaminated with cauliflower mosaic virus DNA, a surrogate pathogen. They would then remove their gloves, wash hands, and don new gloves before moving to another "patient" mannequin that was uncontaminated.

"In 25% of interactions when long-sleeve coats were worn it was noted that the sleeve cuffs and wrists were found to be contaminated with the DNA markers after examining the first mannequin," she said. "No such contamination was noted with short-sleeve coats."

"It was then noted that in 15% of interactions when long-sleeved coats were worn the environment of the second mannequin was contaminated with the DNA marker. Again, no contamination with the short sleeves. Finally, in 5% of interactions when long-sleeve coats were worn the [second] mannequin was contaminated. Nothing with short sleeves," John said. ■

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you just have to keep ringing. We're trying and it truly takes a village. You could not do this alone, nor should you. Infection prevention is supposed to be the facilitator. You have to get the buy-in from every level. We talk about this every day, and the isolation compliance and hand hygiene is reported once a week. That gets sent out and it is posted, so everybody gets called on the carpet. Where was the breakdown and where can we go from here? What do we have to do to keep this from happening again? This represents the great work of everybody in this building and they have done a phenomenal job of taking this and running with it. ■

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Vaccine Rash Confounds Investigation of Measles Outbreak

Minnesota immigrants worried about autism link to MMR

Measles is notorious for moving quickly through a non-immunized population, but a large outbreak in Minnesota presented another challenge. As public health officials and hospitals moved to rapidly immunize people at risk, the clinical picture was clouded by numerous vaccine-associated rash illnesses (VARI).

"It's estimated that this reaction can occur in about 5% of non-immune MMR vaccine recipients, and it can be clinically indistinguishable from measles," said **Rajal Mody**, MD, MPH, a CDC epidemiologist assigned to the Minnesota Department of Health in St. Paul.

Mody presented the results of the investigation recently in San Diego at the IDWeek conference.

"Even routine measles testing doesn't really help because it is going to be positive for both true measles as well as VARI," he said. "Although it is not considered contagious, and is not really that much of a medical risk factor — it's not dangerous to people who have it — it does pose risks of unnecessary isolation of patients, unnecessary contact investigations, and post-exposure prophylaxis. All of this is really a waste of public health resources at a time when they are really limited due to a big outbreak investigation."

> A DISEASE ONCE DECLARED ERADICATED IN THE U.S. EXPLODED AFTER SOMALI FAMILIES IN MINNESOTA CHOSE TO NOT VACCINATE THEIR CHILDREN.

During April through June 2017, Minnesota was hit with the largest measles outbreak in the state in 27 years. In another chapter to a familiar story, a disease once declared eradicated in the U.S. exploded in a population that did not vaccinate their children. Somali families living in Minnesota feared onset of autism with receipt of measles-mumps-rubella (MMR) vaccine, an association that has been thoroughly debunked time and again by the CDC and independent epidemiologists.

"Anti-vaccination advocates latched on to the Somali parents' fears and passed on misinformation that MMR was the cause," Mody said. "The outbreak disproportionately affected children of Somali descent."

The index case in the outbreak was a one-year-old child of Somali descent with no history of travel or known exposures. The child went to two daycare centers attended by other Somali children, and these children went on to multiple other daycare centers.

"The index patient set off a chain reaction," Mody said. "Transmission occurred in over five daycare centers, two schools, one hospital, and at least 16 households. We investigated over 8,400 exposed contacts. About 8% or 700 people were susceptible to measles and the public health department excluded more than 500 people from public settings, such as schools and non-emergency healthcare visits."

The outbreak vaccine protocol was an accelerated two-dose MMR recommendation for children.

"They would have the first dose at 12 months and the second dose as early as 28 days following the first dose," he said. "We initially gave this recommendation for the highest-risk children, those in Hennepin County and Somali children statewide."

As vaccination and testing increased so did suspected VARI, which was defined as a rash occurring in a person within 21 days after receipt of MMR vaccine, and in whom a measles vaccine strain was detected in nasal or pharyngeal swabs or urine samples. More than 42,000 MMR doses were administered during the outbreak. Mody and fellow investigators ultimately identified 71 measles cases and 30 cases of VARI. The median age of VARI patients was 1.2 years, and for measles cases 2.8 years.

VARI diagnosis increased with rising MMR administration, with rash onset occurring a median of 11 days after immunization. The clinical presentations between VARI and measles can be hard to discern, but an epidemiological link to a known case is a strong indicator that it is a real measles infection.

"Presence or absence of measles exposures is an important distinguishing factor," Mody said. ■

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Heater-cooler Infections Linked to Tap Water

Four patients die in Duke outbreak

Heater-cooler devices used in cardiac surgery continue to be implicated in patient infections, and the take-home lesson from one recently reported outbreak is use only sterile water in the units.

Use of municipal tap water emerged as a risk factor in an investigation of *Mycobacterium abscessus* outbreak in nine cardiac surgery patients, said **Arthur W Baker**, MD, MPH, of the Duke Center for Antimicrobial Stewardship and Infection Prevention in Durham, NC. Four (44%) patients died of *M. abscessus* infections, Baker said recently in San Diego at the IDWeek conference.

The outbreak was somewhat different in that the majority of infections linked to heater-coolers have been caused by *Mycobacterium chimaera*.

"*M. abscessus* has a tendency to form biofilms and for this reason can be persistent in the environment," Baker said. "It can be found in municipal water supplies, and therefore it can be found in hospitals that use municipal water."

Heater-cooler units used in cardiac surgery have exhaust fans that can aerosolize bacteria over the sterile operating field if biofilms form within the unit. After a case was identified, a retrospective review was conducted to find all patients who underwent cardiac surgery and had positive cultures for *M. abscessus* from 2013 to 2016. Of the nine patients who met the case definition, seven (78%) were infected after valve replacement.

HEATER-COOLERS CAN AEROSOLIZE BACTERIA OVER A STERILE OPERATING FIELD.

"Median time from suspected inoculation in the operating room to first positive culture was 49 days (range 38-115 days)," Baker and colleagues reported.[1] "Seven (78%) patients had bloodstream infections, and six (67%) patients had sternal wound infections. Six (67%) patients developed disseminated disease with infection at multiple sites."

In addition to switching to sterile water, the hospital decided to purchase new heating-cooling units because the devices are notoriously difficult to completely disinfect once they have been implicated in an infection. The hospital now is using an enhanced disinfection protocol and has seen no more infections linked to the devices since the intervention.

Treatment cured five patients, but the infections were difficult to clear. In addition to antibiotics, the patients had to undergo multiple surgeries.

"Five patients required multiple sternal debridements," Baker said.

Though other patient deaths were not directly caused by *M. abscessus*, only one patient still survived when Baker reported the case at IDWeek. ■

REFERENCE

1. Baker AW, Maziarz EK, Lewis SS, et al. Invasive *Mycobacterium abscessus* Infection after Cardiac Surgery: Epidemiology and Clinical Outcomes. Abstract 999. IDWeek 2017. Oct. 4-8, 2017. San Diego.

APIC to CDC: Need for *Legionella* Guidance

Ambulatory care, water sampling issues raised

In light of numerous Legionnaires' disease outbreaks in the last few years, the CDC has asked clinicians in the field what should be emphasized in revised guidance to reduce the growth and transmission of *Legionella spp.* in healthcare water systems.

The Association for Professionals in Infection Control and Epidemiology (APIC) recently submitted comments, asking for more clarity on ambulatory settings and testing water supplies.

"It is not clear from current guidelines how institutions and healthcare professionals should be assessing risk for ambulatory care practices such as physician offices or specialty care centers," APIC stated. "In addition, it would be helpful to have guidance on proper sampling methodology and when sampling is warranted. Specific guidance on sampling after a *Legionella* remediation event would also be helpful."

Ambulatory services may be contracted out by hospitals and healthcare networks, making it difficult to access water treatment plans and exercise oversight.

"Having concrete directives on what project managers and owners are required to provide in order to assist in the prevention of *Legionella* and other waterborne pathogens would be helpful in driving accountability with building owners," APIC stated. "A clear understanding of high-risk populations is something that is not [possessed] by project managers and site owners."

While supporting guidelines for water systems to prevent *Legionella* infections, APIC told the CDC that water management requirements and recommendations from multiple sources are confusing.

"The challenge lies in placing the burden on healthcare personnel to perform a crosswalk of guidelines from multiple sources such as ASHRAE [American Society of Heating, Refrigerating and Air-Conditioning Engineers], CDC, and individual state or local requirements," APIC stated in the comments. "Water management plans are designed to assess risk and put practices in place to prevent transmission, but it is difficult for healthcare facilities to be fully compliant with sometimes contradictory guideline requirements."

When and if to test potable water supplies in hospitals has been a subject of ongoing debate, and APIC raised the issue in appealing for CDC guidance.

"It will be helpful for guidance on testing parameters and sampling methodology to better understand when testing is warranted and how to properly collect samples and interpret findings," the association said. "APIC also encourages the development and approval of novel rapid test methods for quantifying live *Legionella* in water samples for use by accredited laboratories. In addition, more precise guidance including specific steps to take after renovation or prior to opening new construction would be most helpful to our members." ■

CDC: Clinicians Should Be Vigilant in Watching for Post-hurricane Infections

Ask about travel to Puerto Rico and the U.S. Virgin Islands

"Clinicians assessing patients currently in or recently returned from hurricane-affected areas should be vigilant in looking for certain infectious diseases, including leptospirosis, dengue, hepatitis A, typhoid fever, and vibriosis," the CDC stated stated in a recent health advisory notice.

"CDC is aware of media reports and anecdotal accounts of various infectious diseases in hurricane-affected areas, including Puerto Rico and the U.S. Virgin Islands," the CDC stated. "Because of compromised drinking water and decreased access to safe water, food, and shelter, the conditions for outbreaks of infectious diseases exist."

The contamination of water supplies and the exposure to dirty flood water are concerns in disaster settings.

"Additionally, vector-borne diseases can occur due to increased mosquito breeding in standing

water," the CDC warned. "Both Puerto Rico and the U.S. Virgin Islands are at risk for outbreaks of dengue, Zika, and chikungunya."

The period of increased risk could run through March 2018 if the current pace of restoration efforts continues, the CDC noted.

"Providers in healthcare facilities that have experienced water damage or contaminated water systems should be aware of the potential for increased risk of infections in those facilities due to invasive fungi, nontuberculous *Mycobacterium* species, *Legionella* species, and other gram-negative bacteria associated with water (e.g., *Pseudomonas*), especially among critically ill or immunocompromised patients," the CDC emphasized. ■

REFERENCE

1. CDC. Advice for Providers Treating Patients in or Recently Returned from Hurricane-Affected Areas, Including Puerto Rico and US Virgin Islands. Oct. 24, 2017. Available at: http://bit.ly/2jcrF3T. Accessed Nov. 13, 2017.

Rapid Test for Emerging *C. auris* Under Development

CDC awards grant for researchers to validate earlier results

Candida auris, a multidrug-resistant fungus that is emerging globally, poses many infection control challenges, not the least of which is that it is difficult to identify with traditional diagnostics.

To address this issue, the CDC awarded investigators at Rutgers University a $300,000 grant to develop better testing methods.

"It is very difficult to detect with current methodologies that are used in hospitals, so it sort of flew in under the radar," says **David S. Perlin**, PhD, executive director of the Public Health Research Institute at Rutgers. "The best and most accurate way is through a molecular test we published a few months ago on the development of a real-time PCR assay to rapidly identify this pathogen."

That study[1] described a test that targets rDNA region nucleotide sequences, which are specific identifiers for *C. auris*. "That set the foundation for the CDC grant," he says. "We have been working with CDC on this issue for the better part of a year."

If the test is validated in this larger trial, it will enable hospitals to rapidly identify *C. auris* in patients or the hospital environment.

"We can identify it from a surface in less than two hours using real-time PCR," Perlin says. "What is really unique about *C. auris* is that it is the first yeast that we have seen that survives very nicely outside of the body."

Candida species such as *C. albicans* on an immune-suppressed patient's skin flora may seed an infection, but *C. auris* is transmitting between patients more like a bacterial pathogen.

"*C. auris* can persist on skin, on surfaces, and it can be transmitted in principle from patient to patient," Perlin says. "That's what makes it rather unique. In many ways it is like the *Staph aureus* of the yeast and *Candida* world. It is extremely unusual and also problematic. From an infection control standpoint it is very difficult to eradicate from hospitals."

And given its high level of resistance to antifungal drugs, it poses an immediate risk to frail patient populations.

"This pathogen is life-threatening, with mortality rates somewhere between 40% and 60%," he says. "So you really have to be able to identify it and manage it. It develops multidrug resistance, and in many cases it just becomes an untreatable strain." ■

REFERENCE

1. Kordalewska M, Zhao Y, Lockhart, SR, et al. Rapid and Accurate Molecular Identification of the Emerging Multidrug-Resistant Pathogen *Candida auris*. *J Clin Microbiol* 2017;55:2445–2452.

COMING IN FUTURE MONTHS

- Probiotics for *C. diff*: Is the jury out for lunch?
- CMS antibiotic stewardship requirements for hospitals
- The Holy Grail of a universal flu shot
- Using genome sequencing to reveal transmission patterns

HOSPITAL INFECTION
CONTROL & PREVENTION

CME/CE INSTRUCTIONS

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

1. Read and study the activity, using the provided references for further research.
2. Log on to AHCMedia.com then select "My Account" to take a post-test. *First-time users must register on the site.*
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4. After completing the test, a credit letter will be emailed to you instantly.
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CME/CE QUESTIONS

1. **Phase 3 of the Centers for Medicare & Medicaid Services requirements in nursing homes will include:**

   a. establishing an antibiotic stewardship program.
   b. designating an infection preventionist.
   c. adoption of clinical prediction rules.
   d. All of the above

2. **A decolonization protocol in non-ICU patients was not effective overall, but did lower MRSA and VRE infections in patients with:**

   a. central lines.
   b. midlines.
   c. lumbar drains.
   d. all of the above

3. **According to Lisa Beauch BSN, RN, a positive *C. diff* specimen on day four or later of hospitalization is classified as a healthcare-associated infection.**

   a. True
   b. False

4. **Investigators estimated that vaccine-associated rash illnesses can occur in approximately what percentage of MMR vaccination of non-immune people?**

   a. 1%
   b. 5%
   c. 10%
   d. 15%

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.