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INSIDE

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As *Legionella* infections surge, CDC revises healthcare guidance

New ASHRAE standard could set compliance requirements

By Gary Evans, Senior Staff Writer

As Legionnaires' disease (LD) hits record levels fueled by several recent national outbreaks, the CDC is revising its guidelines on outbreak response for healthcare facilities, *Hospital Infection Control & Prevention* has learned.

Several issues appear to be on the table, including taking a more proactive approach by combining clinical and environmental surveillance findings, and possibly beginning outbreak investigations earlier based on a single confirmed infection.

A study presented this year at the CDC Epidemic Intelligence Service (EIS) conference showed that hospitals that intervene after one confirmed case of LD (aka legionellosis) may detect and even prevent more subsequent cases. The study by **Amanda Kamali**, MD, a CDC EIS officer in Los Angeles, noted that the standard for hospitals in Europe is to conduct quarterly environmental culturing of water systems for *Legionella*. However, the CDC recommends that U.S. hospitals test water systems only during an outbreak of two or more cases or after one case in a transplant unit.[1]

> "THE CDC RECOMMENDS THAT U.S. HOSPITALS TEST WATER SYSTEMS ONLY DURING AN OUTBREAK OF TWO OR MORE CASES OR AFTER ONE CASE IN A TRANSPLANT UNIT."

Kamali and colleagues reviewed healthcare cases in Los Angeles County to determine whether CDC guidelines

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should be changed to include culturing of water in high-risk areas (sinks, fountains, showers) after a single nosocomial case. Data from legionellosis surveillance in LA for October 2005 to August 2014 were reviewed. All cases were confirmed per CDC definition, which is in line with the *Legionella* incubation period of two to 10 days.

"Definite nosocomial cases are defined as those that were diagnosed after 10 or more days in a hospital or other healthcare facility, for example, a skilled nursing facility," Kamali tells *HIC*. "Possible nosocomial cases are those that spent two to nine days prior to diagnosis in a hospital or healthcare facility. Nosocomial cases in Los Angeles were found in both hospitals and other healthcare facilities."

Of 743 confirmed LD cases found over the time period, 55 (7%) were nosocomial infections acquired in 42 facilities. Of those, 40 (73%) were definite cases and 15 (27%) were possible. Fourteen (26%) were linked to six outbreaks. Five of the six outbreak index cases (83%) were definite infections. Overall, of 33 definite initial cases, five (15%) had subsequent cases at the same facility. Because 15% of definite cases were followed by subsequent cases, preventive environmental testing might be considered after one case, Kamali concluded.

"When we looked more closely at our data, we found that the cases with clinical isolates that were the same *Legionella* species and serogroup as the environmental isolates were clustered tightly in time," Kamali says.

The findings will no doubt be considered as the CDC develops the new outbreak investigation guidelines.

"There is certainly validity to intervening after one definite nosocomial case, and this is something we often recommend [on a case-by-case basis]," says **Laurel Garrison**, MPH, an epidemiologist in the CDC Division of Bacterial Diseases. "We are working on written best practices for outbreak response, and that document will contain updated recommendations for when to intervene in a healthcare facility."

If you test, you must treat

In general, routine water testing in the absence of infections may not be cost-effective, as the CDC states on its website that "there is no evidence-based consensus recommendation regarding routine testing for *Legionella* for the prevention of legionellosis; as many research gaps exist. However, if testing is performed and *Legionella* is found, a plan should be in place regarding actions needed to eliminate *Legionella* from the water system."[2]

The CDC is expected to align its forthcoming guidelines with the recently issued voluntary consensus standard to prevent legionellosis by the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE).[3] The CDC states that the ASHRAE standard applies to any inpatient healthcare facility including hospitals and long-term care facilities. It also applies to outpatient healthcare facilities as well as senior housing developments with or without on-site skilled nursing staff. The standard allows healthcare facilities to follow "an alternate path to compliance" that includes risk assessment for multiple organisms and clinical disease surveillance, the CDC noted.

"The CDC encourages healthcare facilities to develop comprehensive water safety management plans," Kamali says. "The newly released

ASHRAE [standard] provides a framework for proactively managing building water systems and reducing the potential for *Legionella* colonization of these systems. Routine culturing of hospital water systems is not required. Some states and hospital systems in the U.S. do routine culturing, as do many European countries."

The ASHRAE guidelines include an appendix for healthcare facilities, recommending that they form designated teams that include a certified infection preventionist and develop a legionellosis management plan. The plan should include specifics on when, where, and how water will be tested for *Legionella*. ASHRAE defers to CDC guidelines for actions after infections have been identified.

What is causing LD increase?

Many infections are being identified, as the CDC reported 404 cases of legionellosis in the four-week period through Aug. 29. The total cases for the period exceed "historical limits," which by CDC definition means there were more than twice as many cases as would be expected for the same 4-week period in the past 5 years.[4]

There have been institutional and community outbreaks that include San Quentin (CA) prison; a Quincy, IL Veterans' Home; and the Bronx in New York City. Health officials in New York identified a cooling tower at the Opera House Hotel as the source of the Bronx outbreak, which infected more than 120 people and caused at least 12 deaths. Cooling towers are typically installed on or near buildings to discharge heat from air conditioning systems. In the absence of routine maintenance and water treatment, *Legionella* can get into these evaporation towers and be widely dispersed in airborne particles over the surrounding community. Similarly, fountains, hot tubs, and other water features have been previously implicated in community outbreaks.

The source of the outbreak at the Quincy Veterans' Home had not been determined as this issue went to press, but there were 54 cases and nine deaths as of September 11, state health officials reported. Likewise, San Quentin had seven infections in inmates but no known source as of September 2. In addition, an Alabama hospital outbreak reported earlier this year by the CDC caused 10 infections and two deaths in a unit for immune-compromised cancer patients. Individual showers in each patient's room were the likely source of at least some of the infections.

Healthcare LD outbreaks have often been traced back to showers and contaminated shower heads, which can create aerosols from which *Legionella* bacteria are inhaled. The Alabama hospital outbreak was traced to a stagnant area in the potable water system, but no new cases occurred after remediation activities were done that included superheating and flushing the water system and boosting chlorine levels. *(See* HIC*, June 2015.)* The gram-negative bacteria occurs in these point-source outbreaks and more often in sporadic cases, but LD is not transmitted person to person.

The CDC has no definitive explanation for the increase in infections, which really has been occurring more gradually for years. There are several strains of the pathogen, but most infections historically and in the recent cases have been caused by *Legionella pneumophila* serogroup 1. *Legionella* does not appear to have mutated in any way that would enhance transmission, but the cases could be a surveillance artifact caused by increased and better reporting, Garrison says.

"Heightened surveillance may be playing a role in the number of cases reported to CDC being on the rise over the past decade," she says. "[Or] this may reflect a true increase in the frequency of disease [due to] aging of the population, more high-risk individuals, climate, increased use of diagnostic testing, or more reliable reporting to CDC."

Thus, despite the increase, the general consensus is that the CDC estimate of 8,000 to 18,000 hospitalized cases annually in the U.S. would be much higher if diagnostic testing were done more often. Likewise, the mortality rate is listed in the 5% to 30% range, but may run higher in healthcare-associated cases if antibiotic treatment is delayed. LD risk groups include frail, immunocompromised patients, smokers, and those with pre-existing medical problems.

"People with certain underlying conditions continue to be at increased risk for Legionnaires' disease," Garrison says. "As we see the number of Legionnaires' disease cases reported to CDC on the rise, it's possible some of those cases will be healthcare-associated — as we've seen in some recent outbreaks. Water system devices located in or next to facilities that serve vulnerable populations deserve heightened attention when it comes to maintaining them to prevent the amplification of *Legionella*."

With the new CDC guidelines to be issued in the wake of the ASHRAE standard and the recent outbreaks, scrutiny by regulatory authorities for healthcare compliance with LD infection control measures may increase.

"ASHRAE 188-2015 is a standard, and establishes minimum risk management requirements for building water systems. Standards are generally incorporated into building codes over time," the CDC states. "[It] is a voluntary consensus standard that may be adopted into local plumbing codes.

If so, enforcement may be performed by the local authority having jurisdiction, so check for local guidance."

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CDC, FDA sound alarm on recurrent problems in reprocessing

Breakdowns in basics of cleaning, disinfection, sterilization

Warning that continuing infection control lapses are endangering patients, the CDC and the FDA recently issued a joint alert calling for healthcare facilities to review policies and practices in cleaning and processing reusable medical devices.

"Recent infection control lapses due to non-compliance with recommended reprocessing procedures highlight a critical gap in patient safety," the agencies said in a health advisory issued Friday, September 11. "Healthcare facilities (e.g., hospitals, ambulatory surgical centers, clinics, and doctors' offices) that utilize reusable medical devices are urged to immediately review current reprocessing practices at their facility to ensure they are complying with all steps as directed by the device manufacturers, and have in place appropriate policies and procedures that are consistent with current standards and guidelines."

The agencies cited recent reports of patients being notified that they may be at increased risk for infection due to lapses in basic cleaning, disinfection, and sterilization of medical devices. These events involved failures to follow manufacturers' reprocessing instructions for critical (e.g., surgical instruments) and semi-critical items (e.g., endoscopes).

The advisory did not cite specific incidents, but the problem is chronic and in evidence frequently in the media as healthcare facilities reach out to patients and warn them of possible exposures. There have been a series of outbreaks of CRE (carbapenem-resistant Enterobacteriaceae) linked to duodenoscopes, which are notoriously difficult to clean and disinfect for safe reuse. More concerning is the blatant disregard of basic reprocessing standards. One of the most flagrant examples of this was at a Tulsa, OK, dental office where hepatitis C virus was transmitted in 2013. The staff had ignored recommendations to test autoclaves monthly with biological test strips — for 6 years. (*See* Hospital Infection Control & Prevention, *May 2013*) More recent examples cited by the CDC in published reports[2] include the following:

• The Bellevue Clinic and Surgery Center of Seattle Children's Hospital notified some 10,000 patients this year they could be at risk for infection because of improperly cleaned surgical instruments going back to 2010.

• A community health center in Tucson, AZ, earlier this year contacted dental patients about testing them for possible infection after discovering that dental equipment had not been sterilized.

• Last year, Pennsylvania authorities found that a surgery center failed to perform high-level disinfection of sigmoidoscope biopsy ports and to sterilize various forceps.

The CDC and FDA recommend that healthcare facilities arrange for a healthcare professional with expertise in device reprocessing to immediately assess their reprocessing procedures. This assessment should ensure that reprocessing is done correctly, including allowing enough time for reprocessing personnel to follow all steps recommended by the device manufacturer. In addition, other key recommended actions and interventions include the following:

Training

• Healthcare facilities should provide training to all personnel who reprocess medical devices.

• Training should be required and provided, upon hire or prior to provision of services at the facility, at least once a year thereafter, and when new devices or protocols are introduced (including changes in the manufacturer's instructions for use during the device's life cycle).

• Personnel should be required to demonstrate competency with device reprocessing (i.e., trainer observes correct technique) prior to being allowed to perform reprocessing independently.

• Healthcare facilities should maintain current documentation of trainings and competencies.

• If the healthcare facility hires a contractor for device reprocessing, the facility should verify that the contractor has an appropriate training program and that the training program includes the specific devices the healthcare facility uses.

• Copies of manufacturers' instructions for operating and reprocessing each type of reusable device should be readily available to staff and inspectors. This file should include instructions for use of chemical disinfectants.

Audits

Healthcare facilities should regularly audit (monitor and document) adherence to cleaning, disinfection, sterilization, and device storage procedures. Audits should be conducted in all areas of the facility where reprocessing occurs. Healthcare facilities should provide feedback from audits to personnel regarding their adherence to cleaning, disinfection, and sterilization procedures. Audits should assess all reprocessing steps, including:

• Performing prompt cleaning after use, prior to disinfection or sterilization procedures.

• Using disinfectants in accordance with manufacturers' instructions (e.g., dilution, contact time, storage, shelf-life).

• Monitoring sterilizer performance (e.g., use of chemical and biological indicators, read-outs of sterilizer cycle parameters, appropriate record-keeping).

• Monitoring automated endoscope reprocessor performance (e.g., print out of flow rate, time, and temperature, use of chemical indicators for monitoring high-level disinfectant concentration).

Infection Control

• Healthcare facilities should allow adequate time for reprocessing to ensure adherence to all steps recommended by the device manufacturer, including drying, proper storage, and transport of reprocessed devices. Considerations should be made regarding scheduling of procedures and supply of devices to ensure adequate time is allotted for reprocessing.

• Healthcare facilities should have protocols to ensure that healthcare personnel can readily identify devices that have been properly reprocessed and are ready for patient use (e.g., tagging system, storage in a designated area).

• Healthcare facilities should have policies and procedures outlining facility response in the event of a recognized reprocessing error or failure. Healthcare personnel should assess the cause of the error or failure and the exposure event in order to determine the potential risk of infection. The procedure should include how patients who might have been exposed to an improperly reprocessed medical device would be identified, notified, and followed.

• Individuals responsible for infection prevention and reprocessing at the healthcare facility should be consulted whenever new devices will be purchased or introduced to ensure that infection control considerations are included in the purchasing decision as well as subsequent implementation of appropriate reprocessing policies and procedures and to ensure that the recommended reprocessing equipment is available at the healthcare facility.

• Healthcare facilities should maintain documentation of reprocessing activities, including maintenance records for reprocessing equipment (e.g., autoclaves, automated endoscope reprocessors, medical washers and washer-disinfectors, water treatment systems), sterilization records (physical, chemical, and biological indicator results), and records verifying high-level disinfectants were tested and replaced appropriately.

• Healthcare facilities should follow manufacturer recommendations for maintenance and repair of medical devices that are used to perform reprocessing functions as well as medical devices that are reprocessed. If healthcare facilities contract maintenance and repair of these devices to third-party vendors, healthcare facilities should verify that these vendors are approved or certified by the manufacturer to provide those services.

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APIC: IPs should use bold new ANA vaccine statement to open discussion of APIC policies

The ANA reaches out to a critical group: Nurses

Infection prevention leaders say the field has been given a critical opportunity to open vaccine policy discussions and improve both patient and worker safety by the surprisingly strong stance recently taken by the American Nurses Association (ANA). The ANA is calling for all nurses and their healthcare colleagues to be immunized against all recommended vaccine-preventable diseases unless they have verified medical or religious reasons for declining.

"As an infection preventionist and a nurse who happens also to be member of the ANA, I support this," says **Mary Lou Manning**, PhD, CRNP, CIC, president of the Association for Professionals in Infection Control and Epidemiology (APIC). "I applaud them for taking the lead on this — for making this a more global approach for all vaccine-preventable diseases. This really allows IPs to intervene in their place of employment with another document, another lever, to try to get more immunizations in their organizations that are mandated."

APIC has long recommended that all healthcare workers receive flu immunizations as a condition of employment, but does not have a recommendation for all the other vaccinations similar to the ANA's.

"It's something we do need to discuss," says Manning, director of the doctor of nursing practice program at Thomas Jefferson University School of Nursing in Lafayette Hill, PA.

Likewise, individual healthcare setting will decide whether and how to adopt the ANA recommendations. To open discussions, IPs should take the ANA position statement to their infection control committee and their nursing workforce, Manning says.

"The beauty of this document and its position is that it is a great place to really have a conversation from the perspective of the safety of both the patient and the healthcare worker," Manning says. "It really is a much broader based application. It's exciting to see this."

The ANA position statement calls for immunization with all vaccines currently recommended for healthcare workers by the CDC's Advisory Committee on Immunization Practices (ACIP), which include hepatitis B, influenza, measles, mumps, rubella, pertussis, and varicella.[1]

Needed message to nurses

While other professional associations have made similar statements on healthcare vaccinations, the ANA speaks to the absolute critical group when it comes to vaccines and patient safety: nurses, says longtime vaccine advocate **William Schaffner**, MD, chairman of the department of preventive medicine at Vanderbilt University Medical Center in Nashville.

"Nurses have more face time with patients than any other healthcare discipline. From a patient safety point of view, that's the group that is the most important to be vaccinated. It's so urgent," Schaffner says. "This strong statement by the ANA not only informs their members, but now individual healthcare facilities — hospitals, clinics, doctors' offices — can cite this speaking to their personnel. We hope this will persuade them to be vaccinated. It has been no secret that, speaking generally, nurses have been one of the healthcare disciplines that has not supported comprehensive immunization as strongly as we would have hoped. Having ANA now speak to their members is very important."

Vaccine issues and arguments in healthcare have primarily focused on seasonal flu shots, which hospitals are increasingly mandating to achieve high compliance. However, the ANA action was prompted by the shocking return of vaccine-preventable diseases like measles, which has resurged in several highly publicized outbreaks in recent years. During the first 7 months of 2015, 183 people from more than 20 states were reported to have measles, with five outbreaks resulting in the majority of those cases, the CDC reports.[2] While these are primarily cases in public outbreaks, utter chaos can rapidly ensue if an undiagnosed of case of measles is admitted to a hospital.
(See related story, page 116.)

"Measles was definitely a significant factor in that so many of the people who were infected were unimmunized," says **Ruth Francis**, MPH, MCHES, program specialist in the ANA's nursing practice and work environment department. "That really brought home to us the fact that we were just not doing a very good job to make sure the public is educated. A way to do that is to ensure our nurses are fully immunized themselves and then we are leading by example and educating patients and parents to make sure that everyone is immunized. I think

people take for granted that because others are immunized that they are protected through herd immunity. That actually is not the case if they themselves are not fully protected. The [measles] impact was just so huge and broad geographically it really made us realize we have some work to do in our communities."

U.S. clinicians are becoming more suspicious of measles, but many providers have actually never seen an infection with a virus that was declared eliminated from the U.S. in 2000. How was that triumph undone? A key factor was the publication of some erroneous, later-retracted "research" that attempted to link MMR (measles, mumps, rubella) vaccine administration to the onset of autism in children.[3] A misguided anti-vaccine movement complete with celebrities and the echo chamber of the Internet began to steer parents and children away from MMR immunization in the U.S. Travelers and foreign visitors from places where measles is still endemic also have also contributed to outbreaks, particularly when they are exposed to one of the groups who have refused vaccination. In that regard, measles introductions are going to continue, so infection preventionists and their employee health colleagues should know the immune status of staff to avoid a mad scramble after a case is in the hospital.

Verify exemptions

Under the ANA policy, healthcare personnel who request exemption from vaccinations for religious beliefs or medical contraindications should provide documentation from "the appropriate authority" supporting the request.

"For the exemptions, the nurse needs to provide documentation from an authorized person — either a medical provider or a head of their church with a religious statement," Francis says.

Individuals who are granted exemption "may be required to adopt measures or practices in the workplace to reduce the chance of disease transmission" to patients and others, the new policy indicates. Typically, these measures include wearing surgical masks or being assigned to non-patient care duties.

ANA's position on immunization for healthcare personnel aligns with the newly revised Code of Ethics for Nurses with Interpretive Statements, which says RNs have an ethical responsibility to "model the same health maintenance and health promotion measures that they teach and research," including immunization, Francis explains.

"The need to be immunized, I think, is seen as a good thing for all health professionals, especially if they are having contact with patients," Francis says. "This is another way that professionals can be sure that their standard of practice is 100% and that's where it should be. To be honest with you, we have not had any pushback on this so far. I know that other associations are equally in line with the CDC and ACIP recommendations. This is nothing new to the nurses and the ANA really feels strong about getting out there and making sure this happens."

Building momentum

Indeed, the ANA action adds to a growing list of professional organizations calling for full immunization of healthcare workers with all recommended vaccines. In 2013, three major medical organizations — the Society for Healthcare Epidemiology of America (SHEA), the Infectious Diseases Society of America, and the Pediatric Infectious Diseases Society — recommended that hospitals that do not achieve a 90% rate of immunization on an ACIP recommended vaccine for healthcare workers should mandate that vaccine.

"More and more facilities are moving toward mandatory programs," says **Hilary Babcock**, MD, MPH, SHEA board member and infectious diseases professor at Washington University School of Medicine in St. Louis. "[IPs and] occupational health professionals are in favor of achieving high vaccination rates [and] many recognize that mandatory programs are the best way to achieve those high levels."

Most states do not have a law requiring vaccination of healthcare workers, leaving the onus on hospitals and healthcare facilities to develop their own policies, the ANA notes. While it's well known that getting healthcare workers immunized for seasonal flu is a challenge, the ANA cites some partial data that suggests many workers are not taking the other vaccines, either. Although data was not broken out for individual vaccines, an ANA health risk appraisal found that only 55% to 75% of nurses have received the full schedule of all recommended vaccines.

"The percentage of workers who are not immunized is higher than we would like it to be, but certainly it is increasing and facilities are making it mandatory for workers to work in different areas," Francis says. "But we still have some work to do and we know there are some workers who are not protected."

Pertussis threat

Many are certainly not protected against pertussis, another resurging disease that poses a risk to patients such as pregnant women and newborns. The level of immunization in

healthcare workers has been estimated at below 40%, though the CDC has recommended the Tdap vaccine for a decade. The other issue is that immunity conferred by the Tdap vaccine can wane within a few years. Though admitting they had little data to support the move, the CDC recently reported that infection preventionists can consider revaccinating workers with Tdap if they are facing a pertussis outbreak.

"If there is a vaccine that healthcare facilities really need to pay attention to it's Tdap because they are probably not up to snuff," Schaffner says. "The recommendation is all healthcare workers should get a dose of Tdap, and lots of institutions have still not geared up to do that. Our occupational health service took a two-pronged approach. They focused first on everybody that worked in the children's hospital and also added all emergency personnel and obstetrics. Those were our first [groups] and then the second prong was to provide it during everyone's annual update."

Given the threat of pertussis to infants and other high-risk patients, mandatory policies may pick up momentum on Tdap. At one health system, a mandated policy — even allowing for legitimate medical and religious declinations — resulted in a pertussis vaccination rate of 98%.[4]

"Working at a pediatric facility for a very long time, pertussis is one of those problems that we came across very often," Manning says. "And for adults immunity wanes even after you are fully vaccinated. The ANA policy can also help move that [issue] forward and help healthcare organizations come up with policies for pertussis immunization."

With so many groups now on board, if healthcare worker vaccine rates don't improve, the call for mandates may extend to federal regulations. CMS included many healthcare worker vaccines in its final hospital infection control survey issued last year. However, they were listed for information only, as CMS does not have the current authority to cite for failure to vaccinate. That said, many think vaccinations and other items on the CMS survey could eventually be required as conditions of participation, meaning compliance could affect reimbursement rates.

"[SHEA] would support including vaccination rates as a quality metric, without necessarily requiring that a specific strategy be used to achieve it," says Babcock.

The ANA hopes it does not come to that.

"There really are some challenges when you make it regulatory," Francis says. "Who ends up being the police to make sure that it happens? Is there a financial impact or licensure impact if it is not adhered to? My hope is that people will come on board with a strong statement and see the value of [immunizations] rather than needing a regulation."

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Measles can cause costly chaos even if no transmission occurs

A single case leads to more than 1000 exposures

Considering everything that went absolutely wrong — and that's a lot — it's something of a minor miracle that more than 1,000 people were exposed to measles in May 2014 at Inova Health System in Fairfax, VA, without a single case of transmission. Not one.

The infection preventionist who found herself in the middle of a nightmare that began on a quiet Sunday afternoon used a less reverent phrase in describing the outcome.

"We kind of think there was an element of pure dumb luck involved in that," said **Dana Cole**, MPH, CIC, an IP at Inova who described the incident recently in Nashville at the annual conference of the Association for Professionals in Infection Control and Epidemiology (APIC).[1]

This is not a case of all's well that ends well, however, but of very hard lessons learned after a near perfect storm. For IPs in hospitals that have communication breakdowns, non-required and poorly documented measles immunization of staff, and an old building with old HVAC — this is what can happen after a 3-year-old child from India is admitted

with upper respiratory symptoms.

"It was a Sunday afternoon around three and our on-call infection preventionist got a call that we had a confirmed case of measles in our children's hospital," she said. "He was admitted [directly] to our pediatric surgical unit, so we were relieved he didn't come through the ED."

However, the first red light was already blinking about the timing of the call.

"He had been admitted to pediatric urgent care the Thursday prior to this phone call, so he had been in the hospital four days," she said.

A pediatric infectious disease consult had been done, but the patient was put in droplet precautions, a step down from the airborne precautions warranted for measles. One confounder might have been that the child's immunizations appeared up to date, but a rubeola IgM test was ordered as part of the differential diagnosis and the patient developed the classic rash on day three of admission. Again, infection prevention was not notified and the call that came in four days after the admission was a notification of confirmed measles by the health department.

"Another [factor] is that the Inova healthcare system does not currently require any proof of immunity or vaccination for vaccine-preventable diseases with the exception of influenza," Cole said, drawing a few gasps out of the APIC audience. "We didn't hear about this patient until that Sunday afternoon phone call. So we had no clue what was going on."

Damage control

Now completely in damage-control mode, Cole and colleagues assessed their options.

"We knew the patient had not been in an airborne isolation room because the physician ordered droplet, thinking that was sufficient," she said. "It was already hospital day four. We looked at [CDC recommendations] and knew our exposed staff had to have proof of immunity or be restricted from work by the fifth day after exposure. So again it is a Sunday night and they had to be restricted starting Monday morning."

The IPs immediately notified hospital administration, which formed a multidisciplinary response team that included employee health, nursing and physician leadership, infection prevention, lab, emergency management, and security.

"We also needed to look at our exposed patients because they would have to be placed on airborne precautions on day five after exposure if they did not have proof of immunity," she said. "The healthcare department recommended that we find out if they had an oral history of measles, were born before 1957 or they had a history of [at least] one MMR vaccine."

"Just as a side note," she added. "One of the things we learned were that different standards for proof of immunity were really confusing for our leaders that were trying to figure out if their staff and patients were exposed to measles," she added. "They asked a lot of questions and it became really challenging for them, but we are also not sure if there is anything that we could have done to change that in a safe and practical way."

Infection prevention and employee health personnel went to the hospital that Sunday afternoon after the call and began investigating possible staff and patient exposures in the pediatric unit.

"By the end of the evening we had evaluated all of these people and identified that we only had one nurse who needed to be restricted from duty until she could provide proof of immunity," Cole said. "Four patients who were all immune suppressed required further follow-up and were placed on isolation. So at that point we were feeling pretty good about ourselves because we had gotten a lot done. But this would not be a very interesting story if that was the end of it."

Antiquated HVAC

The measles patient was admitted to the pediatric surgical unit in Inova's literal "original building," which was constructed in the early 20th century as Fairfax Hospital.

"Later that [Sunday] evening our engineering department reviewing our HVAC system found that the [heating and air ventilation] for that unit circulated throughout the entire original building," Cole said. "It's called the original building for a reason and I'm pretty sure it's held together with chewing gum and paper clips at this point. The [measles] patient room itself was actually slightly [air-flow] positive to the hallway and the air returns."

That means measles virus, a notorious airborne spreader, could now have been moving through the various building departments with impunity for several days. It was time to call the state health department and the CDC. The decision made in consultation was to err on the side of caution and "consider everyone in the building who did more than just pass through as exposed to measles," Cole said. "So our exposure just got a lot larger."

Patients potentially exposed to measles included an inpatient psychiatric unit and a postpartum unit. "Diagnostics radiology was our big killer because they serve inpatients from all over the hospital as well as a huge outpatient population," she said.

As their office was also in the

original building, the infection prevention staff almost got caught up in the outbreak they were investigating. "Three of us almost got excluded from work because they couldn't find our [immunization] records," Cole said. "The cafeteria and engineering are also in this building so it became a huge exposure at this point."

The emergency response team began divvying up tasks, with action items including evaluation of patients and staff for exposure and immune status, establishment of an emergency testing center for drawing titers, development of communication tools for patients and staff, and management of exposed staff and patients. On day seven, the hospital implemented its Incident Command System to assist with the response.

Close to calling it a disaster

"We didn't call it an internal disaster, but we did use that structure to keep our tasks organized," Cole said. "Infection prevention was managing all of our exposed inpatients with the assistance of nursing. The health department was wonderful and managed all of our exposed outpatients and discharged patients. Employee health managed all of our Inova employees while IPs managed all our licensed independent practitioners (LIPs) and contract employees."

The hospital communication department developed all needed messaging for staff, visitors, and patients and set up a hotline to help LIPs determine if they were exposed and what they needed to do in order to come back to work. Lab and engineering teamed up to set up some emergency testing centers in large tents for employees, LIPs and contractors and others that needed titers drawn, increasing testing at one point from three times a week to three times a day.

"Ultimately 362 patients were exposed, 71 inpatients and 291 outpatients," Cole said. "Of those, 20 required further follow-up and had titers done and placed in isolation. We were fortunate to have enough airborne isolation rooms to accommodate them. Hundreds upon hundreds of staff, LIPs and contractors were exposed. Overall, 754 people had to have rubeola titers drawn, and given the timing they all had to be restricted from work until we could get the results back — which made people very unhappy. Fortunately, 93% of them demonstrated immunity to measles."

However, 6% (47 people) had to be completely restricted from duty until day 21 after exposure, while 10 people had to wait and get tests redone because their results were unclear.

Among the "hard lessons learned" were poor communications exact a severe toll.

"If we had gotten that one phone call [sooner] we still would have had exposures, but it would have been a lot fewer and we would have had a lot more preparation time to put our response plan together," Cole says. "The volume of exposures was just crazy. Ultimately, well over 1,000 people were exposed. If we had requirements in place for staff and physician vaccinations and proof of immunity it would have saved a lot — 750 [of them] were kept out of work.

Though much of the response was positive teamwork, the test results came back only as a name with no job identifiers so there was more labor needed to connect the dots of possible exposures.

"Recordkeeping was an absolute disaster," she said. "We got stacks of paper on a daily basis and tried to figure out what to do with them. Our employee health department was in the process of trying to upgrade their system but what they had right then was not set up to be able to do reporting or easy searches."

Contact staff

"Communication is key," Cole said. "So please make sure that your staff know how and when to get in touch with you. Don't assume that they know. Refresh their memories periodically. Standardize recordkeeping and dissemination — having it come from one place. Implement policies for proof of immunity. That is something that we are actually doing now. We got a little waylaid by Ebola, but our new policies are moving through our med-exec committees as we speak. Hopefully, they will be passed by the end of the year, but it would have made a huge difference in the work that we had to do."

Things that went well in the massive response included the strong support of hospital leadership. "If we needed to have it happen, it happened," she said. Assistance came through in the form of hotline staffing by employees from sister facilities, and the health department took a very active role that was both supportive and helped coordinate the overall response.

"We were also fortunate enough to use this as an exercise for emergency management so that met our Joint Commission requirements for the year and made our emergency manager very happy," she concluded. "As a quick epilogue, about six weeks ago we had another [measles] patient come through our ED and everything went so much better. The patient was isolated quickly. There was a lot of communication between the ED, the [admitting] unit, and ourselves."

REFERENCES
1. Cole D, Peninger M, Singh S, et al. Measles Emergency Response: Lessons Learned from a Measles Exposure in an 800-bed Facility. Presentation Number 021. APIC Conference. Nashville, TN. June 27-29, 2015. ■

CDC issues core elements for antibiotic stewardship in nursing homes

Follows similar action by CMS as the war on (misused) drugs continues

It's no exaggeration to say that antibiotic stewardship programs in nursing homes will literally save lives. Broad spectrum antibiotics in particular can wipe out commensal gut flora and set the stage for *Clostridium difficile* infection (CDI) in this frail, elderly population. *C. diff* caused some 115,400 infections with onset in nursing homes in the United States in 2012, comprising nearly one-quarter of all U.S. CDI cases. Of those, some 8,700 (8%) residents died within 30 days of diagnosis, researchers report.[1]

To attack the problem, new recommendations from the CDC advise all nursing homes to improve antibiotic prescribing practices and reduce their inappropriate use to protect residents from the consequences of antibiotic-resistant infections, such as CDI. Complementing a similar publication for hospitals last year, the CDC has issued *Core Elements of Antibiotic Stewardship for Nursing Homes* (http://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html). Key tenets of the guidelines stress leadership involvement, accountability, tracking, and reporting antibiotic use.

The CDC effort follows similar action by CMS, which recently proposed a rule that would require long-term care facilities to incorporate an antibiotic stewardship program—including antibiotic use protocols and antibiotic monitoring — into their infection prevention and control programs. *(See* Hospital Infection Control & Prevention*, September 2015.)*

Approximately 4 million Americans are nursing home residents. Antibiotics are the most frequently prescribed medications in nursing homes, as up to 70% of residents receive one or more courses of the drugs each year. Unfortunately, some 75% of antibiotics prescribed in nursing homes are given incorrectly, meaning either the drug is unnecessary or the prescription is for the wrong drug, dose, or duration, the CDC reports.

The Core Elements guide provides practical ways for nursing homes to initiate or expand antibiotic stewardship activities. The CDC includes examples of how antibiotic use can be monitored and improved by nursing home leadership and staff. A checklist is included to assess policies and practices already in place and to review progress in expanding stewardship activities on a regular basis. Ultimately, the CDC recommends that nursing home antibiotic stewardship activities should include, at a minimum, the following:

Leadership commitment: Demonstrate support and commitment to safe and appropriate antibiotic use.

Accountability: Identify leaders who are responsible for promoting and overseeing antibiotic stewardship activities at the nursing home.

Drug expertise: Establish access to experts with experience or training in improving antibiotic use.

Action: Take at least one new action to improve the way antibiotics are used in the facility.

Tracking: Measure how antibiotics are used and the complications (e.g., *C. difficile* infections) from antibiotics in the facility.

Reporting: Share information with healthcare providers and staff about how antibiotics are used in the facility.

Education: Provide resources to healthcare providers, nursing staff, residents, and families to learn about antibiotic resistance and opportunities for improving antibiotic use.

REFERENCES
1. Hunter J, Mu Y, Dumyati, M., et al. National Estimates of Incidence, Recurrence, Hospitalization, and Death of Nursing Home-Onset of *Clostridium difficile* Infections — United States, 2012. CDC 64th Annual EIS Conference. Atlanta: April 20 – 23, 2015 ■

COMING IN FUTURE MONTHS

- Ebola report finds that Texas hospital, CDC were learning on the job
- Antibiotic stewardship success — find out what works
- Is MERS mutating? Coronavirus not fading away like SARS
- IPs take a look at their reprocessing practices — are they safe?

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CNE/CME QUESTIONS

1. The CDC reported that legionellosis cases for a 4-week period through Aug. 29 exceeded "historical limits," which by CDC definition means there were more than twice as many cases as would be expected for the same 4-week period in the past

A. 5 years
B. 10 years
C. 15 years
D. 20 years

2. According to a joint advisory issued by the CDC and the FDA, healthcare facilities should maintain documentation of reprocessing activities, including:

A. maintenance records for reprocessing equipment
B. sterilization records
C. verifying high-level disinfectants were tested and replaced appropriately
D. all of the above

3. According to William Schaffner, MD, which vaccine for healthcare workers is particularly underutilized?

A. Tdap
B. MMR
C. HCV
D. HBV

4. Approximately 8,700 nursing home residents die annually within 30 days of diagnosis of what infection?

A. Legionnaires' disease
B. MRSA
C. *Clostridium difficile*
D. Pneumococcal pneumonia

CNE/CME 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 health care 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.