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CDC to CRE: You Cannot Pass

Rapid infection control forces rare retreat of a superbug

By Gary Evans, Medical Writer

A national containment strategy using powerful lab detection techniques and rapid intervention with infection control measures is blunting the emergence of pan-resistant pathogens, the Centers for Disease Control and Prevention reports.

Though it has implications for many multidrug-resistant organisms (MDROs), the CDC containment and intervention strategy[1] is currently focusing on carbapenem-resistant *Enterobacteriaceae* (CRE).

With a mortality rate in the 50% range for vulnerable patients, CRE strains can be resistant to the full antibiotic formulary — including the last-line class from which it draws its name. For example, a hospitalized patient in Reno, NV, died in 2016 of a CRE strain that was resistant to 26 antibiotics.[2] Of note, the patient had recently been hospitalized in India, where the specific enzyme conferring pan resistance — New Delhi metallo-beta-lactamase (NDM) — was first discovered.

> A NATIONAL CONTAINMENT STRATEGY IS BLUNTING THE EMERGENCE OF PAN-RESISTANT PATHOGENS, THE CDC REPORTS.

The CDC is concerned that NDM and other unusual mechanisms of resistance will gain an endemic presence, and the report cites 221 cases — out of 5,776 CRE isolates tested — where particularly aggressive eradication efforts were taken. *(See the related sidebar on page 51.)*

"These results prompted an aggressive response including many infection control assessments and

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colonization screens," **Anne Schuchat**, MD, CDC principal deputy director, said at a recent press conference. "The screenings showed that about one in 10 of these [CRE] could have continued spreading if left undetected."

Unpleasant Surprise

Picking up more than 200 CRE with unusual resistance mechanisms in nine months of lab surveillance data is a sobering finding, particularly when these bugs are viewed as the potential seeds of outbreaks.

"I was surprised by the numbers that we found," she said. "That was more than I was expecting, but it's the beginning of looking. We hope, though, that this won't be an inevitable march upward. By finding them early when there's only one in the facility, we can stop this from becoming common."

Highly drug-resistant pathogens like CRE not only threaten fatal infections in single patients; they have an insidious reach beyond the clinical moment, undermining the general protective effect of antibiotics used prophylactically to keep infections from setting in after surgery, organ transplant, or cancer treatment that blasts the immune system.

The new CDC report focuses primarily on more recent data, but the CDC has been wary of CRE since it first appeared in the U.S. more than a decade ago. Efforts to respond to index cases and trace patient contacts are paying off.

Surveillance data show something unusual — a superbug in rare retreat. Though at least one type of CRE has been reported in all 50 states, overall the class of *Enterobacteriaceae* that are resistant to carbapenems has gone down over time, explained **Arjun Srinivasan**, MD, CDC associate director for healthcare-associated infections and prevention programs.

"That was a real encouraging finding," he told *Hospital Infection Control & Prevention*. "We don't typically see a drop in overall resistance, but we are seeing that with CRE."

For example, in 2007 10.6% of all *Enterobacteriaceae* were carbapenem-resistant, but that dropped to 3.6% in 2015, the CDC reported.

"We have actually seen a dramatic reduction — about 15% per year — in the percent of Enterobacteriaceae that are carbapenem-resistant," Srinivasan says. "It lends support to the containment strategy, which takes elements of what we have learned in our efforts to control CRE. This new infrastructure takes it to the next level because of the increased response capacity."

The CDC has implemented the Antibiotic Resistance Lab Network (ARLN), which uses whole genome sequencing to rapidly detect MDROs and genetically describe their resistant mechanisms in great detail. Established in 2016, the network includes labs in 50 states, five cities, and Puerto Rico. The CDC also has state and local public health officials ready to implement containment measures once CRE is detected. The CDC says it is "encouraging healthcare facilities and public health authorities to respond to [even a single case] of an emerging antibiotic-resistant pathogen."

"We need clinicians and labs in hospitals to be aware of this opportunity, to look for the

resistant infections and recognize they can get help," Schuchat said. "Many clinicians and facilities may not have been aware of this, or they may not have been looking because they weren't able to keep up with the response strategy."

Nightmare Plasmids

Always savvy in public health messaging (the CDC has described pandemics in terms of zombie attacks), the agency previously dubbed CRE the "nightmare bacteria" because it can spread resistance to other organisms.

"The bottom line is that resistance genes with the capacity to turn regular germs into 'nightmare' bacteria have been introduced into many states," Schuchat said. "But with an aggressive response, we have been able to stomp them out promptly and stop their spread between people, between facilities, and between other germs."

The threat is not really overstated by the pulp fiction moniker, as CRE genes that can confer resistance to whole classes of antibiotics can be transferred via plasmids to other bacteria. That is a haunting shortcut compared to the evolution of resistance through a kind of natural selection, as antibiotics typically kill down the susceptible bugs and open a niche for those with inherent resistance to multiply. The plasmid problem means IPs and public health officials could awake to wonder if some extremely common pathogen — *E. coli*, for example — is becoming impervious to antibiotic treatment.

"The resistant plasmids pose the greatest threat," Srinivasan told *HIC*. "That's one of the reasons

CDC Detects 221 Bugs with Unusual Drug Resistance

'Non-KPC' CRE include New Delhi enzyme

In a laboratory review of 5,776 carbapenem-resistant Enterobacteriaceae (CRE) isolates collected over nine months, the CDC found 221 pathogens with "unusual" mechanisms for resistance. The CDC is using its nationwide Antibiotic Resistance Lab Network (ARLN) to detect these virtually untreatable bugs, which can be resistant to whole classes of drugs.

"The 221 [isolates] were in 27 different states," **Anne Schuchat**, MD, CDC principal deputy director, said at a recent press conference. "So this wasn't just a problem in one or two states where we have been following up outbreaks. The kinds of infections that they had included pneumonia, urinary tract infections, and bloodstream infections."

According to the CDC, the laboratories conducted "carbapenemase-production testing and molecular detection of genes encoding for the five carbapenemases of primary public health concern." The most prevalent by far is *Klebsiella pneumoniae* carbapenemase (KPC).

The 221 isolates with novel resistance mechanisms were "non-KPC" carbapenemase producers. "These included non-New Delhi metallo-beta-lactamase (NDM), Verona integron-encoded metallo-beta-lactamase (VIM), imipenemase (IMP), and oxacillinase-48-like carbapenemase (OXA-48)," the CDC reported.[1]

The CDC did not have data on the age range or underlying conditions of the patients. "These germs are out there and they're a problem," Schuchat said. "We have seen young people with cystic fibrosis succumb to these types of resistant germs. We have also seen them in the elderly."

Overall, about 25% of all CRE tested had plasmids that can transfer antibiotic resistance to other bacteria — the "nightmare" aspect of CRE.

CDC's containment strategy calls for quickly identifying unusual resistance in patients, and assessing infection control at the facility if there is concern about transmission. The ARLN labs use cutting-edge whole genome sequencing techniques to reveal antibiotic-resistant mechanisms at the genetic level in pathogens, including these 221 troubling outliers.

"Whenever you have something that's unusual, it presents the greatest opportunity to control it and to prevent it from spreading to other people," **Arjun Srinivasan**, MD, CDC associate director for healthcare-associated infections and prevention programs, said at the press conference.

(Continued on page 52)

why we are so worried about this type of resistance in CRE. They don't just move between strains of the same bacteria. It can be a *Klebsiella* donating to a *Pseudomonas*. There is a tremendous potential for spread when you are talking about a plasmid."

Indeed, the CDC listed CRE as an urgent public health threat, its highest-level alert, in a previous report listing a murderer's row of antibiotic resistant pathogens.

Though bacteria are endlessly resilient, it appears the CDC has come up with a promising strategy.

Using the ARLN labs and containment response, the CDC works with state and local health departments to assist healthcare facilities with CRE and other bugs of concern. The lab confirmation of CRE triggers a public infection control assessment of the facility by local public health officials under CDC guidance.

"These health departments will often go on site — this is not just a phone call," Srinivasan said.

"In many instances, the health department staff will work directly with the infection experts and practitioners in the hospital to do observations of hand hygiene, contact precautions, and environmental cleaning."

CRE and other MDROs are notorious for moving across the continuum, passing quietly through checkpoints from skilled nursing facilities, long-term care, hospitals and back again. If anything can overcome the CDC detection and containment strategy, it is probably a lack of communication and documentation by local facilities sharing patients.

"These weren't just in hospitals," he said. "I think that's an important point. We know that the healthcare system is connected by patients. And when patients move, the resistant bacteria move with them."

Long-term care is particularly vulnerable to CRE and similar gram negatives, as residents often are on antibiotics, interaction is encouraged, and isolation is difficult. In a previous modeling analysis, the CDC projected that 10 facilities sharing patients — but not collaborating — would see their overall level of CRE increase by 12% (2,000 infections) in five years.

"CDC estimates show if only 20% effective, the containment strategy can reduce the number of [CRE] by 76% over three years in one area," Schuchat said. "That will let us bend the curve or slow the spread of rising resistance."

Real-world Example

Edward Septimus, MD, FIDSA, FACP, FSHEA, medical director of infection prevention and epidemiology at HCA Healthcare in Houston, gave a real-world example of how communication and collaboration with other facilities can prevent "silent transmission" of CRE. There is a CDC ARLN lab in Houston, explains Septimus, who was not involved in the CDC report.

"About six months ago, we had two patients come in to the hospital that were on ceftazidime/avibactam, which is one of the new beta-lactamase inhibitors that have high activity against CRE," he told *HIC*.

The patients came in the same week, drawing the attention of an infection preventionist and a clinical pharmacist, who was monitoring use of the new antibiotic.

"It turned out they came from the same nursing home," he said.

Septimus and colleagues contacted the nursing home to alert them to the situation, and began pre-emptively isolating patients who came in from the facility.

"They were immediately put in contact precautions and they were actively screened," he said. "We

(Continued from page 51)

"The genetic testing information goes back to the hospital through the state so that both the laboratory and the state are aware of what's going on. And then the response team in the state can help the facility respond."

The facility would then implement contact precautions and look at contacts to ensure transmission has not occurred.

"The provider is at the center of this," he said. "They're the primary focus of the information. They get these results back and then it really becomes a team effort. One of the messages that we want to send with this is that no provider has to go it alone." ■

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were able to reach out and help the nursing home because they don't have the same resources as an acute care hospital."

Meanwhile, the isolates from the first two patients had been sent to a CDC network lab, enabling a detailed view of the resistance genes.

"They pick up a number of unique resistance genes that have not been commonly seen before because these labs actually do genomics on organisms," he said. "I think it's a real advantage to have the lab infrastructure that can assist in identifying these MDROs."

Trying to find these mechanisms of resistance with the old microbiology techniques was difficult.

It took longer to identify pathogens and afforded less detail on transmission.

"You could have someone who had CRE, and it took five days in the laboratory to identify it," Septimus said. "With molecular [tests] for certain genes, you can pick up these mechanisms much faster."

Genomic details can show patterns of transmission, but in this case none occurred, in part because the index patients were in private rooms before the CRE was identified.

"This was unusual, but I'm happy to say we have not seen any more [CRE] from that nursing home," he said.

"But we want to pick these people up early and not have silent transmission, because that's what often happens," he added. "With whole genomic sequencing, we can figure how it is being transmitted. Remember, we are in a global community."

The CDC report described similar incidents, including one in Iowa, where a nursing home resident with a UTI was found to have CRE.

"Over the following weeks, the Iowa Department of Health and the nursing home did several on-site assessments to identify any gaps in the infection control that might have let this germ spread," Schuchat noted at the press conference.

The patient had lived in the nursing home for several years, with no history of surgery or hospital care.

> IN AN ERA OF EMERGING INFECTIONS AND GLOBAL TRAVEL, ANY BUG ANYWHERE CAN BE JUST ABOUT ANYWHERE ELSE WITHIN 24 HOURS.

Given that, investigators suspected transmission was occurring within the facility.

A containment team was dispatched, and 30 residents were tested.

"Sure enough, five others were carrying the resistant gene," Schuchat said.

"By following infection control protocols — simple steps like consistent use of gloves and gowns — workers at the facility were careful not to let [CRE] spread further," she added.

In addition, last year the CDC and the Tennessee Department of Health identified an unusual CRE type, and an infection control assessment and screening of hospital contacts was completed within 48 hours.

"No transmission was identified," the CDC concluded in the report.

"Because the index patient had a recent healthcare exposure in another country, ARLN regional laboratories expanded their services to perform CDC-recommended admission screening for patients with a history of overnight healthcare stays outside the United States during the preceding six months."

Have Bug, Will Travel

The international aspect of this enforces the conventional wisdom in an era of emerging infections and global travel: Any bug anywhere can be just about anywhere else within 24 hours.

"It's important to recognize that even in remote areas, the threat of highly resistant gram-negative pathogens is real," **Jay Butler**, MD, past president of the Association of State and Territorial Health Officials, said at the CDC press conference.

"We can't wait until one case becomes 10, or 10 cases become 100," he added. "We can intervene early and aggressively to stop spread. Unusual resistance is relevant to all of us. These organisms don't care about state or city lines."

In addition to far-flung threats, the containment response and lab testing should work on other problem pathogens beyond CRE, including emerging multidrug-resistant *Candida auris*.

"The system is built that way,"

Srinivasan says. "It is intended to respond to whatever is next. People ask me which resistant organism worries me — the one that worries me the most is the one I that don't know about. Resistance always evolves." ■

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IPs Respond to CMS *Legionella* Directive

When CMS talks, healthcare listens

Almost a year has passed since the Centers for Medicare & Medicaid Services (CMS) issued a compliance memorandum telling healthcare systems to perform risk assessments and implement water safety programs to prevent patients from acquiring Legionnaires' disease (LD).

It's making a difference in terms of infection preventionists putting *Legionella* on their radar and hospitals seeking testing and risk assessment advice, says **Janet Stout**, PhD, president of the Special Pathogens Laboratory in Pittsburgh.

She predicted as much last year after the CMS memo was issued right before the annual APIC conference, turning Stout's relatively pedestrian *Legionella* presentation into "must-see" IC.

Facing a packed crowd seeking compliance guidance, Stout finally was no longer a voice in the wilderness.

After investigating LD since that first, titular outbreak in 1976 at a Legionnaires' convention in Philadelphia, Stout was ready to share a wealth of accumulated information.

"When I speak at something like that — there are also other sessions going on — I expect something like 50 or 100 people," she says. "It was standing room only. There must have been 500 to 600 people there. That was a dramatic visual depiction of the impact of the CMS memorandum. When CMS speaks, every healthcare facility listens."

PRIMARILY CAUSED BY *LEGIONELLA PNEUMOPHILA* SEROGROUP 1, LEGIONNAIRES' DISEASE OUTBREAKS IN HEALTHCARE ARE TYPICALLY TRACED TO THE WATERBORNE BUG BECOMING AEROSOLIZED AND INHALED IN SHOWER MIST.

The CMS outlined the situation in no uncertain terms. The compliance directive was needed because a review of the increasing number of LD outbreaks in 2000-2014 showed that 15% were in hospitals and 19% in long-term care.

"The CMS expects Medicare-certified healthcare facilities to have water management policies and procedures to reduce the risk of growth and spread of *Legionella* and other opportunistic pathogens in building water systems," the agency emphasized.[1]

Primarily caused by *Legionella pneumophila* serogroup 1, LD outbreaks in healthcare are typically traced to the waterborne bug becoming aerosolized and inhaled in shower mist. Faucets, spas and baths, cooling towers, decorative fountains, and medical equipment also have been implicated.

Hospital Infection Control & Prevention asked Stout to update the situation in the following interview.

HIC: While there often is resistance to regulation in clinical settings, you have made the case that this CMS action is a good thing.

Stout: When the memorandum came out last year, I emailed the contact person and said, "Congratulations on doing something that will dramatically

move the prevention of healthcare-acquired LD forward — forward in a way that will be much more substantive than the ASHRAE standard that came out in 2015, or even the CDC water management toolkit."

First of all, the CMS memo was short and to the point. You must have a risk assessment and water management plan to address the risk of *Legionella* in your facility, and you need to have measures that demonstrate control, including testing for pathogens like *Legionella*.

HIC: *Legionella* has come to national attention following outbreaks, but subsequently fades back again. Will this regulatory aspect finally set prevention as a priority?

Stout: The only caveat I will say is that it has the potential to dramatically reduce healthcare-acquired LD. In the Special Pathogens Lab, we do the testing for *Legionella* and other organisms, and do consultations to help people comply with CMS and other standards.

We have seen a dramatic uptick in requests for testing, risk assessments, and water management plans. Usually with these things there are early adopters, people in the middle, and later adopters. With ASHRAE, even though it was an industry best practice, it was still a voluntary standard. CMS is not voluntary.

The memo was effective immediately. That's part of why I would attribute dramatic improvement and progress in *Legionella* prevention to CMS.

HIC: What kinds of things are CMS surveyors looking for to assess compliance with the memorandum?

Stout: They are looking for evidence that you are either in compliance with their requirements or you are moving toward it. They are asking, "Have you done risk assessments? What is the evidence that shows that? Do you have a report or something that demonstrates that?"

Just like any surveyor, they want documentation.

"PEOPLE HAVE BEEN RELUCTANT TO TEST FOR *LEGIONELLA* BECAUSE THEY ARE AFRAID THEY WILL FIND IT. THEY HAVE TOLD THEMSELVES — SORT OF AS A WAY TO MANAGE THEIR FEAR — THAT *LEGIONELLA* IS UBIQUITOUS, SO THERE IS NO POINT IN TESTING. THAT IS A MYTH."

The other question is, "Do you have or are you working on completing a water safety and management plan? Again, where is documentation that supports that? What testing have you done to show you have evaluated *Legionella* and these other potential pathogens?"

If you have the documentation and evidence, CMS should not cite you.

HIC: You have warned IPs not to end up "chasing zero" when it comes to *Legionella* organisms in water systems. Why is that important?

Stout: "Do not chase zero" is an important concept for *Legionella*. The issue is that people have been reluctant to test for *Legionella* because they are afraid they will find it. They have told themselves — sort of as a way to manage their fear — that *Legionella* is ubiquitous so there is no point in testing.

That is a myth. It is not everywhere. In our experience, and if you look at the literature, anywhere from as low as 12% of buildings tested to 70% are colonized, but they are not all colonized with the same kind of *Legionella*. You need to know what kind is present in your water.

When you find it, the beauty of having these water management plans is that you establish a path forward to deal with that through corrective actions.

There is no reason to be afraid to evaluate the presence of *Legionella*. What gets people stuck is that they believe for some reason that you can completely eliminate a naturally occurring bacteria from complex water systems in hospitals and long-term care facilities.

You can't. You *can* control it, which is sufficient to manage or prevent disease. That is the "zero" worth looking for. We are looking for zero cases of LD, not zero bacteria.

HIC: Increased attention to *Legionella* would likely lead to increased reporting and case identification. Are you seeing that trend?

Stout: That's a great observation. They are seeing something like that in New York state and New York City right now. This is an important principle for

people to understand. Cases go up with an increase in surveillance. If people start looking for something, the doctors start ordering diagnostic tests for *Legionella*, and they find more cases.

The argument is being made by some organizations that the regulations that were put in place — after the outbreak in NYC that caused 138 cases and 16 deaths — have not resulted in a decrease in cases.

The state followed the city and additionally required hospitals and long-term care facilities to test for *Legionella* and have a water management plan.

So, the organizations that say these regulations are having no impact on reducing cases are misinterpreting what is happening. This always happens after implementing new regulations — cases go up because they are looking for it. Eventually it will go down.

I caution people not to overinterpret a spike in case detection following a new regulation or guidelines. We have seen this before, and it is to be expected. ■

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Dialysis: Overcoming Resistance and Reducing Infections

'I felt personally defeated'

Infection prevention is now years removed from the old dogma that healthcare infections are the inevitable result of treating patients with high acuity on invasive devices or suffering from underlying conditions.

There may be an irreducible minimum, but the expectation that infections would occur created a complacency and, in some cases, denial. In some quarters, that mindset still holds. This is what an infection preventionist faced when she realized almost half of patients in outpatient dialysis were developing bloodstream infections.

Perhaps given the nature of the findings — particularly the strong backlash from dialysis physicians — the facility where the infections occurred was not identified in a recent podcast on preventing dialysis infections held by the Centers for Disease Control and Prevention.

"**Sally Hess**, MPH, CIC, has many years of experience as an infection preventionist and most recently was the manager of an infection prevention team at an academic medical center," said moderator **Priti Patel**, MD, a medical epidemiologist in the CDC Division of Healthcare Quality Promotion. "She's been an integral part of our dialysis patient safety efforts since 2009."

THE CDC ESTIMATES SOME 40,000 CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS OCCUR ANNUALLY IN U.S. HEMODIALYSIS PATIENTS.

A member of the CDC's Making Dialysis Safer for Patients Coalition, Hess shared her personal story of trying to reduce dialysis-related infections.

She stressed the importance of physician leadership in dialysis centers and developing a culture of safety as an essential part of any infection prevention initiative.

Hess contrasted the resistance she faced in dialysis with the openness and transparency of a "Getting to Zero" campaign that successfully reduced central line-associated bloodstream infections (CLABSIs) in hospital ICUs.

The CDC estimates some 40,000 central line-associated bloodstream infections occur annually in hemodialysis patients in the U.S.

The ICU "Zero" initiative was marked by transparency and a blame-free process, encouraging full accountability to drive down infections. "We had a great physician-led team that worked on implementing and improving the insertion and removal of central lines, and a team of nurses focused on improving the care and maintenance of the lines," she said.

An IP attended weekly rounds and if there had been an infection, the case was presented and discussed, Hess said.

"It was refreshing that the culture allowed for open and transparent discussion without blame," she said. "This led to an honest discussion of the challenges and prompted many improvement opportunities."

The process was marked by an impressive commitment and zeal for the task at hand that increased as the days out from the last infection grew longer.

"They really wanted to have zero infections," she said. "When an infection occurred after several months of zero infections there was always alarm, followed by renewed effort to understand what really happened at the bedside."

The ICUs went on to have stretches of more than a year without a single CLABSI, she said.

Impasse

In contrast, her experience with dialysis infections was marked by resistance and denial by some of the clinicians involved.

"I was the person responsible for surveillance of bloodstream infections throughout our healthcare system," Hess said. "Even with the drop in our ICU cases, there were still a lot of positive blood culture results being sent to me for review on a daily basis. Where were they coming from? Were they healthcare-associated?"

Noticing they were coming from outpatients, she investigated further and found that the common thread was that many were patients at one of six hospital-owned outpatient dialysis centers.

"In addition, some of the blood cultures were obtained in the emergency room or on admission to the hospital," she said. "I spoke with the hospital epidemiologist about the trend and we decided it was worth a closer look. For the remainder of the year, I saved all the positive reports from the locations of interest."

> "I WAS FEELING A BIT OVERWHELMED BY ALL THIS DISBELIEF. HAVING WORKED WITH ICU PHYSICIANS, I REALIZED THAT IF THEY DON'T RECOGNIZE THAT THERE'S A PROBLEM, THEN NOTHING WILL HAPPEN TO CHANGE THE SITUATION."

Hess collected information on the cases and entered the events into CDC's NHSN Dialysis Event Surveillance module.

"At the end of the year, I did a deep dive analysis of the accumulated reports, and my suspicions were correct. The majority of cases were coming from outpatient dialysis," she said. "There were about 130 positive blood cultures in dialysis outpatients."

With the total census of the six dialysis centers around 300 patients, "it looked like just shy of half of our dialysis patients had a positive blood culture during the past year. I knew we could do better than that."

Hess found a concerned ally in the nurse manager of the dialysis centers.

"She shared with me that when she mentioned her concerns to the physicians, she frequently got the feedback that infections were to be expected in this patient population," Hess said. "From their perspective, it didn't seem out of the ordinary."

Hess, the hospital epidemiologist, and the nurse manager presented the surveillance data at a large, multidisciplinary team meeting that included all the facility's nephrologists, fellows, nurse leaders, and pharmacists.

The data showed that the bloodstream infection rates were high for all six centers, compared to national rates.

After she presented the local data, the physicians in the audience discounted its value. Saying dialysis patients have much higher acuity, they questioned the CDC metric of the number of infections per 100 patient-months.

"One very vocal nephrologist felt the data didn't reflect a problem," Hess said. "I was feeling

a bit overwhelmed by all this disbelief. Having worked with the ICU physicians, I realized that if they don't recognize that there's a problem, then nothing will happen to change the situation."

Feeling a bit "exasperated," Hess rallied and told the physicians, "There were about 130 infections in 300 patients during the past year. This impacted almost half of your patients and their loved ones. Many were hospitalized and some died. We can do better than that."

Despite this powerful conclusion, the meeting ended without action. "I felt personally defeated," Hess recalled. "The nurse manager, however, did not give up. She arranged for a smaller work group to look further into the problem."

The Comeback

The group included several medical directors, nurse managers, assistant nurse managers, pharmacists, and the hospital epidemiologist. Most of this team had been at the large meeting, and began to review the data, with the hospital epidemiologist concluding that no matter how one looked at it, having one-third to one-half of dialysis patients infected was "not acceptable."

The group reviewed the surveillance criteria and rate definitions, with more emphasis on understanding and explaining it in terms the clinicians would find meaningful.

"We discussed the risks of infection for patients, their gut feeling as to what was happening, and the expected standards of practice, especially at the chairside," Hess said.

Looking at what had been successful in the ICUs, the work group talked about the importance of engaging all team members in the outpatient settings.

"At the end of the meeting, there seemed to be a shared sense of urgency and the nurse manager felt empowered to actively pursue opportunities for reducing risks," she said. "We had the start of an action plan."

With the buy-in and support from the physician leaders, Hess and colleagues started working directly with the nurses and patient care technicians in the centers. Process improvements were made and dialysis nurses and technicians were urged to be infection prevention advocates.

"They received enhanced infection prevention education and were encouraged to share their knowledge," she said. "They developed infection prevention 'eyes,' always on the lookout for challenges and improvement opportunities. Following these changes, infections dropped significantly and were sustained with less than 10 infections per year for multiple years."

Saying she was "floored" by Hess's description of the initial reaction to the infection data, moderator Patel asked Hess if she had advice for other clinicians in a similar situation.

"Have a vision for where you want to be, such as 'getting to zero,'" Hess said. "Use local data and recognize that there is always room for improvement. Most of all, remember that you can't do this on your own. Having a way to measure and compare your progress is essential."

One key in any setting is to establish a work culture that is transparent about errors without focusing on blame.

"Staff don't want to be blamed for an infection, especially when their potential role in a patient infection is not always obvious," Hess said. "A culture that refrains from accusing behavior and supports positive feedback is important."

The culture of safety should include patients, staff, and leaders. "Each team member must have knowledge, skills, motivation, and support to actively prevent infections," she said. ■

APIC, SHEA: IC Critical to Antibiotic Stewardship

Update of 2012 position paper

The nation's leading infection control associations have reaffirmed their contention that infection preventionists and healthcare epidemiologists are critical to the success of antibiotic stewardship efforts.

In updating their 2012 joint position paper, the Association for Professionals in Infection Control and Epidemiology (APIC) and the Society for Healthcare

Epidemiology of America (SHEA) were joined by the Society of Infectious Diseases Pharmacists (SIDP).

That rounds out a full team, every element of which is necessary if antibiotics are to be reined in, and infections identified rapidly if they cannot be prevented.

Indeed, these forces are "intrinsically linked," said lead author **Mary Lou Manning**, PhD, CRNP, CIC, FSHEA, FAPIC, in a statement.

"The vital work of infection prevention and control and antibiotic stewardship cannot be performed independently."

In the years following the last paper, there have been major national developments and increasing regulatory attention on the rise of antibiotic-resistant pathogens and the need for prudent use of antibiotics to stem the tide.

A series of national "watershed events" has raised awareness about antibiotic stewardship, including public health reports and presidential commissions that sounded the alarm.

The most important of these actions may be one that is not yet finalized.

The Centers for Medicare & Medicaid Services (CMS) has proposed new requirements for participation by hospitals that would require antibiotic stewardship programs.

Although the measure has yet to be finalized, it is seen as inevitable.

"Effective in 2016, the CMS requires long-term care facilities to update their IPC program, including requiring an IPC officer in 2019, and an AS program that includes antibiotic use protocols and a system to monitor antibiotic use to be implemented in 2017," APIC and SHEA reminded readers in the paper.

In addition, The Joint Commission (TJC) has adopted an antibiotic stewardship standard for hospitals.

TJC standard MM.09.01.01, effective Jan. 1, 2017, requires hospitals to establish stewardship programs based on current scientific publications, and to form a multidisciplinary team that includes IPs.

"If you can't be accredited by either CMS or the Joint Commission, you will not have access to patient [reimbursements]," says co-author of the paper, **Edward Septimus**, MD, FIDSA, FACP, FSHEA, medical director of infection prevention and epidemiology at HCA Healthcare in Houston. "Then, of course, we have value-based purchasing, where if you are in a lower quartile you may lose 1% or 2% as time goes. It really hits the hospitals' bottom line."

These factors are major incentives for antibiotic stewardship, which is one of the best clinical interventions to reduce the selection of resistance and reduce the scourge of *Clostridium difficile*.

"There is no question that having a regulatory lever helps to heighten awareness and convince the C-suite that this is a value-added to the institutions," he says.

The human costs have been previously estimated by the CDC, but the toll likely has more than doubled by now, Septimus says.

"The CDC report that came out in 2013 talked about information from 2008," he says.

"They estimated there were 23,000 people that died of [multidrug-resistant organisms annually]. More recent estimates are probably closer to 50,000."

The CDC also determined conservatively that resistant infections lead to direct healthcare costs of $20 billion.

"That is the business case," he says. "But the business case for me is really to provide better, safer care."

"It's true you can talk about cost avoidance, but those resources are already being spent," he adds. "If you prevent infections or you pick them up early so you don't have transmission to other patients, you have better throughput of patients. It is throughput and revenue that are really the big drivers."

The Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria previously convened a forum emphasizing the one-health aspect of the problem, meaning it includes human, animal health, and farm use of antibiotics.

"We have to look at the interaction between humans, animals, and the environment," he says.

"In India, the New Delhi NDM organisms are in streams and drinking water. What we feed animals gets excreted and gets into topsoil and streams."

The value of infection control to antibiotic stewardship is, in essence, no longer a subject of discussion and the failure to include it is no longer an option. ■

REFERENCE

1. Manning L, Septimus EJ., Dodds LS. APIC/SHEA/SIDP Antimicrobial Stewardship Position Paper. Antimicrobial stewardship and infection prevention – leveraging the synergy: A position paper update. *Am J Infect Control* 2018; 46(4). DOI: https://doi.org/10.1016/j.ajic.2018.01.001.

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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CME/CE QUESTIONS

1. **A hospitalized patient in Reno, NV, died in 2016 of a CRE strain resistant to how many antibiotics?**

   a. None
   b. 9
   c. 17
   d. 26

2. **The level of carbapenem-resistant Enterobacteriaceae was down to 3.6% in 2015. According to the CDC, what was this percentage in 2007?**

   a. 15%
   b. 10%
   c. 7%
   d. 20%

3. **The 221 isolates with novel resistance mechanisms were described by the CDC as "non-KPC" carbapenemase producers.**

   a. True
   b. False

4. **Edward Septimus, MD, said which of the following estimates by the CDC related to antibiotic resistance has probably more than doubled since it was issued?**

   a. Antibiotics overprescribed
   b. Outpatients hospitalized
   c. Patient mortality
   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.