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MDR gram negatives moving under the radar and across the continuum

"Our patients, wherever they are going and receiving care, are at tremendous risk."

By **Gary Evans**, Executive Editor

Emerging multidrug resistant gram negative bacteria are spreading across the health care continuum, becoming entrenched in non-acute and long term care settings and threatening vulnerable hospital patients with untreatable infections, epidemiologists reported recently in Dallas at the annual conference of the Society for Healthcare Epidemiology of America (SHEA).

Of course established heavyweights like *Clostridium difficile* and MRSA are still very much a concern, but multidrug resistant (MDR) gram negative rods like carbapenem-resistant *Klebsiella pneumonia* (CRKP) and *Acinetobacter baumannii* are a whole new threat. These pathogens are capable of pan-resistance, there are few drug options in any case, resistance-empowering plasmids can transfer among species, and infection mortality rates in the 40% range have been reported in vulnerable patient populations.^{1,2}

Not exactly what you want moving through the health care continuum, but that appears to be what's happening in a situation that could get considerably worse before it gets better. In the lessons unlearned category, we are reminded of the vancomycin resistant enterococci (VRE) outbreaks in the 1990s, when communication breakdowns between hospitals, nursing homes and other non-acute settings



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descended into accusations of who gave what to whom.

"We spend a lot of time blaming each other," said **Jon Furuno**, PhD, an assistant professor of epidemiology and public health at the University of Maryland School of Medicine in Baltimore. "If you talk to any nursing home administrator they will say that their infection control problems are primarily related to transferring residents to acute care. [Residents] come back colonized or infected with some resistant organism."

On the other hand, he told SHEA attendees, "If you talk to hospital medical directors and infection control, they tell you these nursing home patients are 'cesspools' of resistance and they spread it all over the hospital. The bad thing is that they are both right. We have to figure out how we are going to work together." Doing just that are facilities in Maryland and Vermont, two states that have established collaboratives between hospitals and non-acute settings to open the lines of communication and bring the infection control fight to the full continuum. (*See related story, p. 52*) For example, the collaborative in Vermont has linked up 14 hospitals and approximately 40 long term care sites. Sustaining such collaboratives will be the key, Furuno emphasized.

"We are starting to see these collaboratives form and everyone goes into these things with a lot of enthusiasm—everyone is really

psyched," he said. "But can they be sustained? Can we continue to work together? Can we see real change in the culture of infection control in these facilities—and stop pointing fingers at each other?"

In another major development, long term care settings will be the top priority in the next phase of the Department for Health and Human Services Action Plan to Prevent Healthcare-Associated Infections, said **Nimalie Stone**, MD, MS, the medical epidemiologist for long term care in the Centers for Disease Control and Prevention's division of healthcare quality promotion. (*See related story, p 54*)

"Infection prevention has to really be [involved] in every part of the health care continuum," she said. "There's no setting that can't be aware [of this] and not have the resources to dedicate to infection control. Our patients—wherever they are going and receiving care—are at tremendous risk."

Lost in transition

It is a risk that may frequently go unrecognized. Infection prevention is too often deemphasized in patient transitions between facilities in most states, with the colonization status with a multidrug resistant organism (MDRO) almost treated like a "don't ask, don't tell" policy as patients move through the health care continuum, said Furuno, who is researching infection control during health care transitions.

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Editorial Questions

For questions or comments, call **Gary Evans** at (706) 310-1727.



Studies of discharge plans between various types of facilities point to a disturbing lack of documentation, he noted, citing an analysis that included 73 studies of discharge data.³

"In 65% of these [discharges] the pending test results were not included on the discharge summary," he told SHEA attendees.

"This happens all the time. People will get cultures but the patient will be discharged before their culture results come back, and then the receiving facility has no idea how to handle that information. Shockingly, 88% of the discharge summaries were not sent to the outpatient provider before they had a follow-up visit, and 25% of the time they actually never received a discharge summary. A lot of you are nodding your heads—we see this all the time. It's pretty amazing."

Regardless, many infection preventionists argue that knowing the patient's colonization status may be less important than practicing rigorous standard precautions with all patients. Those who favor active surveillance for certain organisms beg to differ, saying if you detect and isolate such patients you can reduce nosocomial transmission. Interestingly, the question Furuno raised was a little different: Does knowledge of colonization benefit the patient carrying the organism?

"With infection control we are concerned about the rest of the facility and often our infection efforts aren't directed right at the individual who may be colonized," he said. "We certainly can try to improve our empiric therapy if we know they are colonized."

In addition, colonization is a known precursor to infection, so one could make both an ethical and medical argument in favor of determining MDRO status and telling the patient.

"In our effort to try to improve infection control in these transitions we are going to need to benefit the individual and the receiving facility," he said. "That's why—and we don't want to drown people in paperwork—we need to consider some of these things better. We need to improve and clarify our colonization and infection test results on our discharge summaries."

Though electronic medical records and other

system improvements may be part of the answer, the bottom line is that far too many patients are moving across the continuum with undocumented MDRO colonization.

"In the last six months of life, people that have at least one nursing home stay—that's important—will have more than three transitions [to other settings] on average," he said. "There are pretty staggering numbers about how often people are moving through these different segments of the health care system."

Colonized for years

About one in five of those coming in from long-term care facilities will be colonized with a gram negative organism, according to a study by **Erika D'Agata**, MD, MPH, an infectious disease physician at Beth Israel Deaconess Medical Center in Boston.⁴

"There are high acquisition rates—39% of our study patients acquired a new MDR gram negative [in long term care]," she said. "There is prolonged duration of colonization—on average 144 days—and that could probably apply to hospitalized patients as well. There is frequent co-colonization. One in five patients who have MDR gram negatives are harboring two or more different bugs."

This is not an insignificant population, as the number of people older than 65 years increased by 12.5% from 1998 to 2008, she said. "Currently, there are 3.2 million long term care residents [and] at any one time there are more residents in the long term care setting than in the hospital," D'Agata said.

The average resident is in long term care for about three years, and some may be colonized the entire time. "Our end-point was 349 days because we only followed them for a year, but some of these residents have been followed now for two or three years and they remain colonized with the same strain of multi-drug resistant gram negatives," she said.

There is no clearly established decolonization protocol for such patients, but D'Agata and colleagues found that about 9% will "lose" their MDR gram negative bacteria over time.

"It was a very rare event," she says. "The infrequent loss of MDR-gram negatives has implications for infection control interventions because if they are colonized for such long periods—and rarely lose it—when can we stop [isolation] precautions? Should we even stop precautions? Should we be doing active surveil-

Maryland collaborative goes after MDR-Ab

A. baumannii widespread in vent patients



In a collaborative effort that may serve as a model for other states, Maryland has linked long-term facilities and hospitals in the fight against multidrug resistant *Acinetobacter baumannii* (MDR-Ab).

In recent years so-called 'Iraqibacter' has dramatically emerged in many U.S. hospitals and nursing homes after initial cases were linked to soldiers returning from the Mideast wars. However, communication between facilities is typically lacking as these patients move across the health care continuum. Facing recurrent MDR-Ab infections, epidemiologists and infection preventionists at the University of Maryland (UM) had a basic question.

"We wanted to know are we really the only ones that are having this burden with this organism?" said **Kerri Thom**, MD, MS, a UM assistant professor of epidemiology and public health. "And for those that are seeing *acinetobacter*, what are they doing to help transmission and spread? These are the questions that really led us to join up with this collaborative that was initially formed in 2009 through the Maryland Department of Health and Mental Hygiene."

The ongoing project began with the initial challenge of assessing MDR-Ab prevalence.

"Clearly we weren't going to go [culture] every patient in every health care facility in the state, so we decided to tackle this by defining what we thought was a high risk population—patients who are mechanically ventilated," she said recently in Dallas at the annual conference of the Society for Healthcare Epidemiology of America (SHEA). "This was somewhat anecdotal from the experience of the collaborative. We felt that in our facilities and in our state that this was where we were seeing the majority of infections."

A prevalence study was undertaken that involved taking sputum and perianal cultures from all mechanically ventilated patients in the participating facilities. The voluntary effort netted 390 vent patients at 40 facilities, including nine long

term care sites.

"There were 57 health care facilities that cared for mechanically ventilated patients, including both acute and long term care, and we were able to recruit 70% to participate," Thom said. "Sixty-four percent of acute care hospitals participated and 83% of long term care facilities that care for mechanically ventilated patients also participated in the survey."

The project achieved geographic representation across the state, in part because assurances of confidentiality were in place for both sites and patients. Overall, 34% (121 out of 358) of all mechanically ventilated patients in the state grew *A. baumannii* from either the sputum or the perianal sample. Among those, 72% (87 out of 121) met the project definition of MDR-Ab: susceptibility to two or fewer classes of antibiotics.

In results by facility type, acute care had a 16% *A. baumannii* prevalence, with 36 out of 222 patients positive in at least one site. In long term care 85 (63%) out of 136 patients had the organism identified from at least one site. Of those positive in long term care, 79% had MDR-Ab.

"Looking at it [another] way, we can say that 9% of all mechanically ventilated patients in the acute setting were found to have MDR-Ab, compared to 49% of all mechanically ventilated patients in the long term care facilities," she told SHEA attendees.

A. Baumannii was found in 31% of the acute care facilities and at all nine long term care sites. Researchers did molecular typing on the isolates, finding 22 pulse field gel (PFG) groups that involved more than one patient.

"We did see some small clusters of what I will call transmission or isolates that were identical or closely related, both within health care facilities and among different health care facilities within the state," Thom said. One cluster of matching *A. baumanii* strains was found in 13 patients at 7 different health care facilities, including both hospitals and nursing homes.

Thom cautioned against assuming infection control problems in long term care were driving the trend, saying the findings "could just as easily represent the fact that the patients who are at higher risk are the patients who are chronically ill." ■

lance cultures?"

Colonization is so persistent with many gram negatives that some infection preventionists grimly describe the fate of these patients as "isolated for life" upon admission to a hospital. In any case, D'Agata was less equivocal than Furono in naming the source of the problem.

"Residents of long term care facilities are major contributors to the influx of MDR gram negatives in the hospital setting," she said. "If the patient resides in a long term care facility he or she will have 3.5-fold higher risk of harboring MDR gram negatives compared to those who do not reside in long term care facilities."

CRKP goes West

In addition to moving across the continuum, MDR gram negatives are moving across the country. Already endemic in areas in the East Coast—particularly New York City—CRKP is now widespread through health care facilities in Los Angeles County. The pathogen was thought to be rare in LA County, but since it was not a reportable disease actual numbers were unknown, said **Dawn Terashita**, MD, MPH, a medical epidemiologist at the LA County Department of Public Health. Concerned that CRKP could give rise to pan-resistant *K. pneumoniae*, Terashita and colleagues initiated a community-wide lab-based surveillance system in 2010.

"We were especially surprised to discover how high rates of CRKP were in long-term acute care hospitals (LTACs)," she said.

During the study period of June-December 2010, 356 cases of CRKP were reported from 52 of the 102 hospitals in Los Angeles county. In addition, 145 cases of CRKP (41% of the total) were reported from all 8 LTACs in the county. Another 6% of CRKP cases were found in patients residing in skilled nursing facilities (SNFs). The mean age of patients with CRKP was 73 years, she reported at SHEA.⁵

There were some particularly bad characters among the isolates. One patient who had received care in Pakistan was positive for the New Delhi metallo-beta-lactamase 1, the much ballyhooed "superbug" which is thought to be rampant in hospitals in India. (See related story, p. 55) In addition, three isolates were both carbapenem-resistant and extended-spectrum β-lactamase (ESBL) positive, a combination that narrows treatment options considerably. These ESBL-CRKP infec-

tions are thought to be linked to overuse of carbapenems, which is becoming increasingly common. Another SHEA study of Veterans' Administration's acute care facilities revealed dramatically increased use of carbapenems, which are often considered the last treatment option for these infections. Using barcode medication administration data for antibiotics administered in 110 VA acute care health facilities from 2005-2009, **Makoto Jones**, MD, and colleagues identified an increasing trend in the use of broad spectrum antibiotics. In particular, over the study's five year period there was a striking 102% increase in the use of carbapenems.⁶

"The more these drugs are used, the more resistance we see," said Jones, a medical epidemiologist at the University of Utah. "Use of these antibiotics helps the patient receiving the treatment, but has future consequences for innocent bystanders."

Nursing sites, LTC implicated

And what of those bystanders, patients exposed to such pathogens as they moved through the LA county health care continuum? The question goes beyond the scope of the lab surveillance study, but there were indications of movement from the skilled nursing facilities to hospitals, Terashita told *Hospital Infection Control & Prevention*.

"Based on the address on admission of the patient, we did get a piece of information," she said. "When we cross referenced that with our SNF data base we found that 124 of the 320 cases [for which] we had an admission address—that's 39% of our cases—were from SNFs. So even if they were reported as a CRKP from a hospital they were admitted from a SNF. We can hypothesize that perhaps the patient acquired it in a SNF and it's just a kind of back-and-forth thing with the patients going between facilities. You never know for sure where they acquired it, but there is this evidence of the [transmission along the] continuity of care."

Dekata wondered about the same thing, and though warning that her findings have statistical limitations, said it appeared that long term care residency and antibiotic administration were the prime risk factors for MDR gram negative colonization.

"Not surprisingly antibiotic exposure was associated with a six-fold higher risk of acquiring multi-drug resistant gram negatives," she

said. "There was no difference in the number of hospitalizations between those who acquired [an MDR gram negative] and those who didn't. It raises that important question: Are long term care residents acquiring these resistant pathogens in the hospital or in the long term care setting? Our study strongly suggests that it is the long term care setting—not the hospital."

(Editor's note: For more information on the infection prevention collaborative in Vermont go to: <http://bit.ly/g0gMbX>)

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SHEA 2011

Long term care top priority for prevention

HHS move underscores infection threat

Long term care (LTC) settings will be the top priority in the next phase of the Department for Health and Human Services (HHS) Action Plan



to Prevent Healthcare-Associated Infections (HAIs), a public health official reported recently in Dallas at the annual conference of the Society for Healthcare Epidemiology of America (SHEA).

"I'm pleased to say that this is a national priority," said **Nimalie Stone**, MD, MS, an LTC infectious disease expert at the Centers for Disease Control and Prevention. Long term care will be the focus of the third phase of the HHS plan, which began with hospitals in 2009 and then added ambulatory care settings.

"There is national recognition that we have to look beyond hospitals," Stone said. "We have to create infrastructure, raise awareness and promote infection prevention in all of these care settings in order to keep patients safe."

In that regard, the CDC continues to partner with the Centers for Medicare and Medicaid Services (CMS) to enhance infection control measures with conditions of reimbursement, she noted. On the surveillance front, the CDC is moving to include more non-acute care hospitals in its National Healthcare Safety Network (NHSN). A primary aim is to open all lines of communication, particularly when clusters or outbreaks are suspected.

"I would like to put a plea in to promote communication of outbreaks and clusters detected during the time of transitions of care," she told SHEA attendees. "For those of you who are acute care providers when you see a cluster of anything coming into your facility, rather than saying, 'Well, this is present on admission' see if there may be a point source or a common link between those individuals."

"Communicate that to the health department," she continued, "as well as to the transferring facility from whom you received those cases so that we can start to better report and understand the scope of this problem."

Echoing the sentiments of other researchers and speakers at the conference, Stone conceded there is much to improve in the current state of infection prevention along the health care continuum.

"How well are we doing with communication of infection control issues like antibiotic use and MDRO carriage at the time of transitions of

care?," she said. "I would say that in general, we are not doing a very good job. However, we are seeing several states taking up this mantle and working on partnering acute and long term care facilities together." (See related story, p. 52)

With more national interest, Stone said "regulatory oversight is developing to address infection prevention and control measures in these non-acute care settings. What we are finally starting to come to terms with and recognize is that acute care is 'shrinking' in its role in health care delivery. This is [giving] a lot more traction to the importance of focusing beyond the borders of hospitals."

The driving demographics include continuing reductions in hospital length of stay, particularly among elderly people who may be discharged back to LTC sites.

"The decreasing length of stay for the last 15 years or so has been by about 25% in all comers," she said. "But in those people over 65 there is almost a 40% reduction in the length of stay—from almost nine days to 5.5 days. This is a population that typically takes a longer time to recover from acute illness, and may need bridge locations to receive support services until they are ready to go back to the community."

In addition, CMS is fiscally empowering a number of facilities to take post-acute patients. "Ninety percent of the skilled nursing facilities certified in this country now are taking post-acute care patients," Stone said.

As part of that, non-acute facilities are admitting more patients with well established infection risk factors like the presence of central lines, she noted. "We have a very device-exposed population now in these nursing homes," she said. "And we know from data in the VA system that device exposure carries a three-fold increased risk of nursing home associated infections."

At the same time, infection prevention expertise is notoriously limited beyond the hospital, though 40% of LTC sites in one survey said they had a "trained" infection preventionist, Stone said. "I put that 'training' in quotes because that is not CIC [certified in infection control] training," she said. "That's any kind of training they might consider—state based, etcetera. Less than a third of them do the position on a full-time basis, so they're wearing multiple hats. Anyone who has worked in

the LTC setting has a feeling for how stretched people doing infection control really are."

The problem—and thus the new national priority—is that this lack of expertise and resources is facing an unprecedented wave of multidrug resistant infections, including a nasty lineup of emerging gram negative bacteria.

"You contrast that [limitation] with this highly complex and growing post-acute care population that they are serving, and you have to worry about the disconnect between the resources and the resident needs," Stone said. ■

GUEST COLUMN

A post-antibiotic era? Resistant bugs go global

By **Stan Deresinski**, MD, FACP, Clinical Professor of Medicine, Stanford University. *Dr. Deresinski does research for the National Institutes of Health, and is an advisory board member and consultant for Merck.*

The headlines warn again of a new superbug threatening mankind.

New Delhi carbapenemase-1 (NDM-1) is increasingly seen in media reports as the organisms that produce metallocarbapenemase, which are most prevalent in South Asia but have now appeared in many parts of the world—including the United States. While the first cases all had contact with medical care in south Asia, some recent cases have had no such contact.

In addition to being resistant to β -lactam antibiotics, including carbapenems, NDM-1-producing organisms carry genes encoding additional resistant mechanisms, including a 16sRNA methylase that renders them resistant to all available aminoglycosides. To date, they remain susceptible to colistin and tigecycline.

NDM-1 has reached the popular press again as a result of a new publication reporting the finding that organisms carrying this resistance mechanism have been identified in not only environmental water, but also in tap water in New Delhi.¹ Furthermore, it has been identified for the first time in 11 additional species in which it had not previously been detected, including *Shigella boydii* and *Vibrio cholerae*.

Coming out of Asia

The overall problem of antibiotic resistance is extensive in many parts of the world, including parts of the United States and Europe, as well as parts of Africa, Latin America, and Asia. The problem in Asia was extensively highlighted at the 8th International Symposium on Antimicrobial Agents and Resistance held in Seoul, Korea, in early April 2011. A Chinese national surveillance program (CHINET) found that 56% of *Escherichia coli* and 41% of *Klebsiella pneumoniae* were ESBL-producers, most of which were CTX-M, while approximately 60% of *E. coli* are resistant to ciprofloxacin.

In addition, approximately 50% of *Acinetobacter baumanii* are resistant to carbapenems, although less than 25% of *Pseudomonas aeruginosa* are. The proportion of *A. baumanii* resistant to all antibiotics tested except tigecycline and colistin (which are not available in China) increased from 2.8% in 2007 to 17% in 2009. In India, 90% of *A. baumanii* are resistant to carbapenems. In addition, 23% of *K. pneumoniae* isolated from patients with intra-abdominal infections in the Asia/Pacific region in 2009 were ESBL+ and, in the SMART study, 45%-50% of *E. coli* from intra-abdominal infections were resistant to levofloxacin and ciprofloxacin.

These data provide a vision into what may be facing us all—a global post-antibiotic era. As a consequence of a perceived lack of sufficient financial incentive, large pharmaceutical companies currently show little or no interest in developing novel antibiotics active against these multidrug resistant (MDR) resistant Gram-negative rod (GNR) pathogens. Antibiotics, of course, are administered for relatively short periods of time, in contrast to antihypertensives, for example, and, relative to cancer chemotherapeutic agents, are generally low cost. Furthermore, if a dramatic breakthrough in the development of a novel antibiotic for treatment of MDR GNR infections were to occur, as responsible stewards, we would discourage its use in order to “save it.” Factors such as this appear to make a solution to the problem of lack of new advances in antibiotic therapy almost impossible.

A bridge too far

We can, however, extend the usefulness of antibiotics by responsible stewardship. The

continued introduction of rapid point-of-care diagnostic testing, as well as susceptibility testing, will help in this endeavor, as will the use of biomarkers to assist in decisions regarding the timely discontinuation of antibiotic therapy.

However, antimicrobial stewardship programs in the United States are largely centered on acute care hospitals, while many more antibiotic doses are administered in chronic care facilities and the community at large. Furthermore, antibiotic resistance—as demonstrated by the data from Asia described above—is a global problem. Antibiotic resistance is a huge problem in the lesser developed world, where circumstances generally do not allow for sophisticated stewardship programs, and where antibiotics are generally readily available to patients in the absence of a prescription.

The Infectious Disease Society of America (IDSA) has stated that “current data document the impending disaster due to the confluence of decreasing investment in antibacterial drug research and development concomitant with the documented rapid increase in the level of resistance to currently licensed drugs.”²

The problem is huge, extremely complicated, and requires urgent action. Think of the potential consequences to cancer chemotherapy and organ transplantation in a world in which infections due to organisms for which there is no effective therapy become increasingly common!

In their “10 by ‘20” effort, the IDSA has called for the development of 10 new antibiotics by 2020, calling for a global commitment. This commitment would require active participation by governments, the pharmaceutical and diagnostics industry, health care providers, policy and legal communities, universities, philanthropic organizations, and patient advocacy groups.

The goal of the IDSA may prove to be “a bridge too far,” but we will face a very different world of medicine if a major effort is not made in antibiotic development.

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Hold your water: Faucet study spurs controversy

APIC, engineering group challenge findings

Researchers at Johns Hopkins University School of Medicine have determined that electronic-eye faucets, which presumably lower bacterial hand contamination via hands-free use—may actually endanger high-risk patients with *Legionella* infection.

Presented recently in Dallas at the annual meeting of the Society for Healthcare Epidemiology of America (SHEA), the findings were subsequently challenged by infection control and engineering groups that advised caution in interpreting them.

Electronic-eye, non-touch faucets have been increasingly utilized in healthcare settings to lower water consumption and in an attempt to reduce recontamination of the hands of healthcare personnel. But do they carry a hidden risk of their own?

Emily Sydnor, MD, an infectious disease fellow at Hopkins, and colleagues examined bacterial growth from faucets of two clinical wards within the hospital from December 2008 through January 2009. The study included 20 manual faucets and 20 electronic faucets, each receiving water from the same source.

Cultures obtained from the faucets showed that 50% of water cultures from electronic faucets grew *Legionella* species, compared to 15% of water cultures from manual faucets. Overall, 54 (50%) of 108 water cultures from electronic faucets grew *Legionella* spp. compared to 11 (15%) of 75 water cultures from manual faucets.¹ Sydnor also found that 26% of water cultures from electronic faucets had significant growth on heterotrophic plate count (HPC) cultures—an estimate of the number of bacteria in the water—compared to 13% of water cultures from manual faucets. Overall, 15 (26%) of 58 electronic faucet HPC cultures grew with greater than 500 colony forming units per ml as compared to 6 (13%) of 45 manual faucet cultures.

While the HPC rates were not statistically different, Sydnor said the differences were worth noting. Additionally, following a flush of the water system using chlorine dioxide the disparity between electronic and manual faucets

persisted. After the cleaning, 29% of electronic faucet cultures were still contaminated with bacteria compared with 7% of manual faucet cultures. Overall, after chlorine dioxide remediation, 4 (14%) of 28 electronic faucet and 1(3%) of 30 manual faucet water cultures grew *Legionella*. Eight (29%) electronic faucets and two (7%) manual faucets cultures had HPC growth.

Sydnor speculated that the increased bacterial growth in electronic faucets may be due to contamination of the numerous parts and valves that make up the faucet. During the course of collecting water samples, researchers discovered that all of the electronic faucet parts grew *Legionella*. However, the study's findings should not create cause for concern over the use of electronic faucets by the general public, Sydnor emphasized. The levels of both *Legionella* and bacterial burden on HPC were still within the range that is well tolerated by healthy individuals, she noted.

"The levels of bacterial growth in the electronic faucets—particularly the *Legionella* species—were of concern because they were beyond the tolerable thresholds determined by the hospital," Sydnor said. "Exposure to *Legionella* is dangerous for chronically ill or immune compromised patients because it may cause pneumonia in these vulnerable patients."

In light of the findings, Johns Hopkins Hospital is replacing electronic faucets in clinical areas with manual faucets, and has decided not to install electronic faucets in clinical areas of its new hospital building now under construction.

APIC, AHSE response

After the SHEA meeting, the American Society for Healthcare Engineering (ASHE) and the Association for Professionals in Infection Control and Epidemiology (APIC) urged healthcare facilities to review additional literature before making policy changes regarding hands-free faucets.

"This has been presented as an oral session at a scientific meeting," said ASHE and APIC in a statement posted on the organizations' websites. "It has not been published in a peer-reviewed, scientific journal. As such it is an interesting study, but any major changes in policy or actions by others should await publication as more details will be revealed, and peer-review always improves the context and

significance of findings. This study also needs to be considered in the context of other published studies and evidence-based guidelines."

ASHE and APIC pointed out that there have been several studies which found that manual, handle-operated faucets were the source of bacterial infections in patients, as well as another study of electronic faucets which did not find these to be a source of bacteria. Previous investigations of electronic controlled faucets have raised the issue of infection control and prevention. ASHE and APIC responded to the study in part because of on-going revisions and updates that will be included in the 2014 edition of the "Facility Guidelines Institute's Guidelines for Design and Construction of Health Care Facilities."

Highlights from the joint statement include:

- APIC and ASHE endorse and support the use of the Infection Control Risk Assessment (ICRA)—a multidisciplinary, documented assessment process intended to proactively identify and mitigate risks from infection that could occur during design and construction activities. A key element of an ICRA is identifying the design and location of hand-washing stations. The 2010 ASHE guidelines permit electronic faucets. It is recommended that health care facilities implement an ICRA early in the planning phase of a construction or renovation project, when it serves as the forum for assessing risks and implementing design elements aimed at preventing of infection.
- Several studies have found that manual, handle-operated faucets were the source of bacterial infections in patients, including Legionella.²⁻⁶ This demonstrates there is no single design feature that can mitigate all risk of cross transmission. Another study of electronic faucets did not find these fixtures to be a source of bacteria. In fact, a sample from a manual, handle-operated faucet was the only one that detected bacteria⁷ Electronic faucets do help with water conservation, which is important as hospitals are an industry noted for high use of water.⁸
- Why do some studies find a higher likelihood of recovery of bacteria from electronic faucets? This is a complex question, but some feel this is due to the reduced water flow in electronic faucets which makes the flushing effect less pronounced than in a manual, handle-operated faucet. One strategy to minimize risk of contaminants inside the faucet is to ensure the length of the pipes connecting the valve and

water outlet is as short as possible. Also, the frequency of use is important. Faucets, whether electronic or manual, that are not used on a regular basis will have stagnant water and low levels of bacteria will increase over time. There may also be some unique aspects to electronic faucets as they have more parts, including a magnetic valve made of rubber, plastic, and polyvinylchloride. These materials are more likely to develop a biofilm, which protects bacteria in the film from disinfectants that have been added to the water.

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ACIP: Vaccinate all HCWs against pertussis

Monitoring OK for some exposed HCWs

Hospitals should provide pertussis vaccines to their health care workers free of charge, but should still treat employees with antibiotics if they have unprotected exposure to patients with pertussis and work with patients at high risk, such as young infants, a federal vaccine

advisory panel says.

This recommendation represents a re-emphasis of the importance of vaccination and post-exposure prophylaxis of health care workers. "I think the big message to hospitals is to get your health care personnel vaccinated against pertussis. It's a very effective vaccine," says **Alexis Elward**, MD, assistant professor of pediatrics at the Washington University School of Medicine in St. Louis and a representative of the Healthcare Infection Control Practices Advisory Committee (HICPAC) to the Advisory Committee on Immunization Practices (ACIP).

CNE/CME Questions

13. Emerging multidrug resistant gram negative bacteria include with of the following?

- A. *Clostridium difficile*
- B. methicillin resistant *Staphylococcus aureus*
- C. carbapenem-resistant *Klebsiella pneumonia*
- D. All of the above

14. Held up as good examples for other states, health care continuum collaboratives between hospitals and nursing homes were cited for which two states?

- A. Alabama and Georgia
- B. California and Texas
- C. Vermont and Maryland
- D. New York and Florida

15. According to a study in a Boston long term care setting, what was the average number of days that residents were colonized with gram negative bacteria?

- A. 144
- B. 38
- C. 562
- D. 101

16. Under new federal regulations, central lines are prohibited in non-acute and long term care settings due to the risk of infection.

- A. True
- B. False

Answers: 13. C; 14. C; 15. A; 16. B

ACIP had previously expanded its Tdap recommendations to include children aged 7 to 10 who aren't fully immunized and adults 65 and older who care for children. The idea is to "cocoon" infants among people who are all immunized against pertussis.

In addition, the American Nurses Association launched an awareness effort and rallied a coalition of nine leading professional organizations, including the American Medical Association and the American College of Pediatrics. They are urging family members, caregivers and health care providers of infants to receive the pertussis vaccine.

A study of two outbreaks in Minnesota found that health care workers are at risk from exposures, as well. In one outbreak, only 12% of cases were among health care personnel, but many of the exposed employees had received prophylaxis. In another outbreak, 52% of cases were among health care workers who con-

CNE/CME instructions

Physicians and nurses participate in this CNE/CME program by reading the issue, using the provided references for further research, and studying the questions. Participants should select what they believe to be the correct answers, then refer to answer key to test their knowledge. To clarify confusion surrounding any questions answered incorrectly, please consult the source material. After completing the semester's activity, you must complete the evaluation form that will be provided and return it in the reply envelope to receive a credit letter. ■

CNE/CME objectives

Upon completion of this educational activity, participants should be able to:

- Identify the clinical, legal, or educational issues encountered by infection preventionists and epidemiologists;
- Describe the effect of infection control and prevention issues on nurses, hospitals, or the health care industry in general;
- 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. ■

COMING IN FUTURE MONTHS

■ Joint Commission toughening flu shot standard

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tracted the disease from co-workers or patients. There were no cases identified of transmission from health care workers to patients.¹

Pertussis epidemics are cyclical, and the disease is particularly dangerous for neonates who have not yet had their first pertussis vaccine. The Centers for Disease Control and Prevention noted the "continued resurgence of pertussis" in a February "Health Alert" that advised health care providers on using PCR tests to confirm the diagnosis. In 2010, there were 8,383 cases in California alone, including 10 deaths of infants. There also were significant outbreaks in Michigan and Ohio.

The expanded recommendations encompass all health care workers, regardless of age or when they received their last tetanus booster. Vaccination should include volunteers, especially those working in pediatric hospitals or with pediatric patients, says Elward. Tdap is recommended for women who are immediately postpartum but not for pregnant women.

Yet even vaccinated health care workers need to be evaluated for post-exposure prophylaxis, ACIP decided. An exposure is defined as being within six feet of coughing patients with pertussis for five minutes without wearing a mask.

Exposed, vaccinated health care workers can be monitored daily for 21 days for signs and symptoms rather than receiving post-exposure prophylaxis if they do not have contact with at-risk patients. Even slight respiratory symp-

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toms should be considered a possible symptom of pertussis, says Elward. The employee would then need to be furloughed from work for five days and put on antibiotics, ACIP said.

Many hospitals may find it simpler to provide post-exposure prophylaxis to anyone who has an unprotected exposure, says **William Schaffner, MD**, an infectious disease expert who is chairman of the Department of Preventive Medicine at Vanderbilt University in Nashville, TN, and an ACIP representative from the National Foundation for Infectious Diseases.

There's no booster for Tdap, and it's not clear how long immunity lasts after vaccination, he notes. The bottom line: "Vaccinate everybody and if you have an exposure, give prophylaxis," Schaffner says.

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The Joint Commission Update for Infection Control

News you can use to stay in compliance

Reality Check: Joint Commission drops 90% hand hygiene compliance expectation

Leading hospitals had a shocking 48% baseline



The Joint Commission has amended an infection control standard that called for hand hygiene compliance of more than 90%, conceding that the expectation was too high after a group of eight leading hospitals could muster only an 82% rate in a performance improvement project.

The original goal of the project was to achieve and sustain 90% compliance. Collectively, the hospitals came up short, causing the Joint Commission to rethink the wording in its hospital standards. Previously, the standard called for hos-

pitals to demonstrate hand hygiene compliance at a rate greater than 90%. A hospital that failed to comply would receive a Requirement for Improvement (RFI) and have 90 days to show improvement to 90%.¹

"Because of this project, we now know how difficult it is to reach 80% — let alone 90%," says **Melody Dickerson**, RN, MSN, a Robust Process Improvement (RPI) Black Belt at the Joint Commission. "Now the standard says the hospital `needs to work to improve compliance.'"

Though ultimately a success story to a large degree, the Joint Commission project had one other rather startling footnote: the baseline hand hygiene compliance rate at the hospitals was a collective 48%.

"When we first started this project all the organizations thought that they were around 80%—85%," she says. "It was only when we did a true non-biased measurement that we found exactly where we were. It was surprising and shocking,

Hospitals picked hand hygiene as top patient safety challenge

Hand hygiene was chosen as "the number one patient safety challenge" by eight leading hospitals for the first Robust Process Improvement (RPI) project by the Joint Commission Center for Transforming Healthcare.

The eight hospitals that participated in the Joint Commission hand hygiene project are:

- Cedars-Sinai Medical Center, West Hollywood, CA: 950 beds, teaching

- Exempla Lutheran Medical Center, Wheat Ridge, CO: 400 beds, nonteaching
- Froedtert Hospital, Milwaukee, WI: 486 beds, teaching
- The Johns Hopkins Hospital, Baltimore, MD: 1,041 beds, teaching
- Memorial Hermann The Woodlands, TX: 252 beds, nonteaching
- Trinity Health-St. Joseph Mercy Health System, Ann Arbor, MI: 537 beds, teaching
- Virtua, New Jersey: 270 beds, nonteaching
- Wake Forest University Baptist Medical Center, Winston-Salem, NC: 872 beds, teaching

Top 10 reasons HCWs fail to wash hands

A distracted worker with hands full

In a hand hygiene improvement project by the Joint Commission's Center for Transforming Healthcare, the following common barriers to compliance were observed across the eight participating hospitals.

- Ineffective placement of dispensers or sinks
- Hand hygiene compliance data are not collected or reported accurately or frequently
- Lack of accountability and just-in-time coaching
- Safety culture does not stress hand hygiene at all levels
- Ineffective or insufficient education
- Hands full
- Wearing gloves interferes with process
- Perception that hand hygiene is not needed if wearing gloves
- Health care workers forget
- Distractions

but when you look at the literature that's about where most people are."

Historically, the odds of a health care worker having washed their hands before touching a patient have been roughly equivalent to a coin flip. Heads the patient wins, tails they could be joining the 100,000 souls lost every year to health-care-associated infections (HAIs). However, many hospitals in the project have reported a decline in HAIs as their hand hygiene compliance rate dramatically increased, the Joint Commission reported. Though the compliance level jumped an impressive 34% at the hospitals overall, the reality is that a disturbing number of patient encounters are still carried out with unwashed hands.

"It begs the question: Was greater than 90% even an obtainable goal when you consider where you're starting from?" says Dickerson, one of the project leaders. "What we found through this process is that some organizations are greater than 90%; others have not had as great of success. A lot of that depends where you start from."

Hand hygiene the top problem

Though the baseline levels—assessed through using non-biased hand hygiene observers or "secret shoppers"—were disappointing, the participating hospitals were not complacent. They all listed hand hygiene compliance as their top patient safety problem after agreeing to collaborate on The Joint Commission Center for Transforming Healthcare's first Robust Process Improvement (RPI) project by. (See list of hospitals, p. 1.)

The project started in December 2008, when representatives from the eight hospitals met to define the scope of the project, which is the first step in the five-step Six Sigma methodology: define, measure, analyze, improve, control. From April 2009 through August 2010, the participating hospitals defined and measured hand hygiene, according to a Joint Commission report on the project.

The hospitals identified the major barriers to hand hygiene and worked on developing targeted solutions for each root cause or contributing factor.

"Probably the big three are hands full, distractions and gloves," Dickerson says. Concerning the latter, a recurrent problem is non-clinical staff members going from room to room without changing gloves.

"A big part of it is an education problem," Dickerson says. "And part of it is changing people's perception. They perceive that if they put on gloves they don't need to wash their hands and that is, in fact, not the case. So it is education, but it also requires change management."

Project solutions were developed and change enacted according to the Joint Commission's Targeted Solutions Tool (TST), which allows organizations to customize solutions to address their specific barriers to excellent performance. (See related story, p. 3.) Hand hygiene was defined as washing or cleaning hands with an alcohol based foam or gel or soap upon entry and exit of a patient care area or environment. Information was gathered by using the hand hygiene observers and "just-in-time" coaches.

"The just-in-time coaches give immediate feedback to someone when they see them not washing their hands," Dickerson says. "In the early stage of the project we did have them collect data because there are contributing factors that we can't see, like distractions or [a worker's] perception that hand hygiene is not required."

Although any staff member in an organization could be trained to be a hand hygiene observer,

members of the leadership teams were encouraged to participate as just-in-time coaches. Ultimately, the goal was to engage all staff to do just-in-time coaching, which will lead to sustained improvements.

"You need to work with the staff to implement solutions so they feel like they have been a part of the process," she says. "Then you see this whole culture shift within the unit. Now all of a sudden everyone is a just-in-time coach. If somebody from another department comes on the floor -- and it's not just nurses, it's laboratory, dietary, environmental services, volunteers -- and they are not washing their hands they, are reminded by [all] staff."

Making HH a part of work flow

A prime objective was helping workers blend hand washing into their routines, making it a part of the process rather than a separate task.

"One thing a lot of hospitals found when they were going through this project is that you may have a lot of alcohol based hand rubs in the patient care areas, but [they are not] where they need to be," Dickerson explains. "They need to be in your line of work flow. You track the path that they take when they enter the room and you want

to have a hand hygiene dispenser at the place where they stop, which might be next to a computer where they do their charting."

Visual reminders—including posters on walls in units, on elevators and by dispensers, and stickers on dispensers—were used to some extent by all the hospitals. It's a familiar approach, but one take home point is that signage needs to be switched out regularly so it doesn't become lost in the woodwork. In addition, visual cues and reminders also can help workers who become distracted.

"Some places will implement a code word, a phrase that is code for 'wash your hands,' she says.

The lingering question after such efforts is whether the gain can be maintained rather than slowly lapsing toward baseline levels.

"The last step is in the control phase -- unlike other projects that organizations may have gone through for hand hygiene and other things," Dickerson says. "They do this great project -- focus on this one aspect of care for weeks or months -- and then all of a sudden you're working on something else. That's a really strong message to the staff that it was 'the flavor of the week' and now we are on to something else."

Thus it's critical to maintain observations,

A tool to target the solution

From getting started to holding the gain

In a hand hygiene improvement project by the Joint Commission's Center for Transforming Healthcare, participating hospitals used a Targeted Solutions Tool (TST). Available to all accredited organizations, the Joint Commission TST model provides the user with the data collection tool, data entry programming, self-supported observer training module and real-time reporting of compliance rates complete with charts that can be downloaded and printed for display.

The TST includes a six-step process:

Step 1: Getting Started. This first step includes determining who will be on the team and understanding stakeholders involved in the process. For example, in the ICU the hospital's dietary staff does not see patients, so their buy-in would be low. But on the medical/surgical unit, they deliver trays to every patient.

Step 2: Training observers entails training hand hygiene data collectors, or observers, and just-in-time coaches. It involves giving them the tool to begin collecting data and documenting contributing factors and compliance. The tool has a structured education program and a test at the end.

Step 3: Measuring compliance comprises collecting data and entering in data tool, a Web-based application that is part of the TST.

Step 4: Determining factors includes getting charts, which includes compliance charts, analysis charts and means chart.

Step 5: Implementing solutions by analyzing data from charts to identify the top three contributing factors for failure to wash hands. For each contributing factor, the TST provides a set of implementation guidelines.

Step 6: Sustaining the gain, which means rethinking the data collection plan to continue to monitor the process. Keeping compliance at a high rate requires continuous reinforcement.

(Editor's note: The Joint Commission TST and related materials are available at: <http://bit.ly/91ODmt>)

though at a lower rate than during the active phase of the project. "It won't be the 10 to 20 observations that you were collecting during the active phase of the process but it might be 10 observations a week," she adds. "Continue to share that information with staff and [make sure you] continue to see improvement in your numbers over the long term. It seeds the message to staff that this has an ongoing importance to our organization."

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Joint Commission pushing for flu shot improvement

Expanded standards under field review

As this issue went to press, more stringent standards for influenza immunization of hospital workers were under consideration by the Joint Commission. As proposed in a field review open to comment through May 17, hospitals would have to document and report flu immunization efforts more completely and strive for continuous improvement.

Infection control standard 02.04.01 currently requires that hospitals establish an annual influenza vaccination program that is offered to licensed independent practitioners and staff. The Joint Commission is proposing adding the following stipulations and performance aspects to the standard:

- The hospital includes in its infection control plan the goal of improving influenza vaccination rates.
- The hospital sets incremental influenza vaccination goals, consistent with achieving the 90% rate established in the national influenza initiatives for 2020.
- The hospital develops a written description of the methodology used to determine influenza vaccination rates. All hospital staff and licensed independent practitioners are to be included in the methodology for determining the influenza vaccination rates.
- The hospital evaluates the reasons given by

staff and licensed independent practitioners for declining the influenza vaccination at least annually.

- The hospital improves its vaccination rates according to its established goals and at least annually.
- The hospital provides influenza vaccination rate data to key stakeholders including leaders, licensed independent practitioners, nursing staff, and other staff at least annually.

(For more on the Joint Commission field review on flu immunization in hospitals and other settings go to: <http://bit.ly/ew1yv2>) ■

Joint Commission ready to partner up

TJC center to link with Partnership for Patients

The Joint Commission has pledged its full support for the recently formed Partnership for Patients, a public-private effort to make hospital care safer by reducing health care associated infections and other preventable adverse events.

The Joint Commission applauded the Centers for Medicare & Medicaid Services' leadership in developing a multi-faceted framework for addressing critical safety and quality issues. The framework is unique because the federal government recognizes that hospitals need to be given assistance with innovative and customized tools in order to achieve effective and sustainable solutions to these difficult problems, TJC noted.

"We hope that The Joint Commission and its Center for Transforming Healthcare will play a vital role in the Partnership for Patients by identifying and testing solutions for preventing patient harm and improving the continuity and effectiveness of care, as well as providing technical assistance to health care organizations as they seek to implement these solutions," TJC said in a statement.

By the end of 2013, the Partnership for Patients aims to decrease preventable hospital-acquired conditions by 40% and reduce by 20% hospital readmissions caused by preventable complications during a transition from one care setting to another.

(For more information on the partnership go to: <http://1.usa.gov/gj8iFV>) ■