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H3N2 Flu Strain Mismatch Could Hit Elderly Patients Hard

A bad season in the 'land down under' could spell U.S. trouble

By Gary Evans, Medical Writer

An H3N2 influenza A strain that has drifted via mutation from its match in the current U.S. vaccine could spell a mean flu season, particularly for elderly patients and nursing home residents.

"People 65 and over account for about 85% of the flu-related deaths that occur in this country," said **Kathleen Neuzil**, MD, MPH, FIDSA, director at the Center for Vaccine Development at the University of Maryland School of Medicine. "They also account for the majority of the hospitalizations that occur. The good news last year was that those trends [of vaccination of the elderly] appeared to be stabilizing. And what we'd like to see this year is a real

increase. Even if we're at a 65% level, that still means a third of people 65 and over still aren't getting influenza vaccine."

Neuzil joined other public health officials recently in Washington, DC, at an influenza press conference at the National Foundation for Infectious Diseases (NFID). Public health officials are urging vaccination of the elderly and long-term care staff, who are all too often the most under-immunized healthcare workers. During the 2015-2016 flu season, for example, only 68% of healthcare workers in long-term care were vaccinated, compared to 76% in ambulatory care and 92% in hospitals, the CDC reports.¹

ELDERLY AND LONG-TERM CARE STAFF ARE ALL TOO OFTEN THE MOST UNDER-IMMUNIZED HEALTHCARE WORKERS.



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While more and more hospitals are mandating flu vaccination as a condition of employment, the CDC reports that only 26% of survey respondents who worked in long-term care reported that their employer required them to be vaccinated.

“I very vividly remember a patient that I took care of who was brought in from an extended care facility with a severe influenza pneumonia,” Neuzil said. “She had been there for months, so she wasn’t out circulating in the community, exposing herself to influenza at the grocery store. We brought influenza to her. So, either the healthcare workers in that facility brought her influenza, or her family member or friends brought her that influenza.”

There is particular concern for this frail population — who typically have difficulty mounting a strong immune response even if vaccinated — because Australian public health officials recently reported that the circulating H3N2 strain is causing severe infections in the elderly. The concern is that the summer season in Australia and the Southern Hemisphere is often predictive of what flu strains the U.S. and the Northern Hemisphere will face. Health officials in Australia administered the same vaccine now being rolled out in the U.S.

Aussie Warning

Australian officials issued a September 27 statement warning that “2017 has been characterized by high levels of influenza A (H3N2) which disproportionately affects the elderly. We have seen reports of high numbers of deaths in nursing homes this year and also amongst healthy adults. These are tragic

events which underscore the message that influenza is a serious disease and that vaccination is absolutely critical for protecting individuals and the community. We do know that the 2017 vaccines have had a relatively good match with circulating strains, which provides the best opportunity for protection. There is, however, evidence that the effectiveness of the vaccines has been less than usual this year, particularly in terms of protecting the elderly against influenza A (H3N2).”²

One factor in Australia is that, apparently, some vaccines specifically designed for the elderly — including a high-dose shot and an adjuvant formula — were not cleared for use in the country this season. However, Neuzil said there is at least one high-dose vaccine available for the elderly in the U.S.

“It’s the same content of the influenza vaccine that everybody else receives, but it’s four times the dose, four times the antigen,” she said. “And it has been shown to improve the immune response in people over 65, and prevent more illness and hospitalizations in people over 65. Similarly, [we have] the adjuvant vaccine — it’s an additional ingredient that boosts the immune response.”

Those weapons should certainly be brought to bear, but the degree of drift in the circulating H3N2 strain could still spell trouble if it amounts to a clear mismatch. An H3N2 flu virus which eluded the vaccine strain caused a particularly bad flu season in the U.S. in the 2014-2015 season.

It also is unknown how widely the H3N2 strain will circulate in the U.S., but the H3N2 strain in the current vaccine should provide some protection, public health officials emphasized at the press conference.

“The proteins on the outside of

that H3N2 virus are still quite similar to what's in the current vaccine," says **William Schaffner**, MD, medical director of the NFID and a professor of preventive medicine at Vanderbilt University School of Medicine. "So, we ought to be well-prepared. This H3N2 strain is the one that usually causes more illness, more complications in older adults. So, if you needed another reason to be vaccinated, there it is. Best [to] get that protection."

Flu is nothing if not unpredictable, he adds. "As they say, if you've seen one flu season, you have seen one flu season," Schaffner says.

The World Health Organization has recommended that the next flu vaccine for the Southern Hemisphere replace the H3N2 vaccine component with an H3N2 A/Singapore/INFIMH-16-0019/2016-like virus.

The vaccine that will be used in the U.S. and the other Northern Hemisphere countries will still have the H3N2 A/Hong Kong/4801/2014-like virus. The other strains in the trivalent flu vaccine are A/Michigan/45/2015 (H1N1) and B/Brisbane/60/2008-like virus. Quadrivalent influenza vaccines will contain these three viruses and an additional influenza B vaccine virus, a B/Phuket/3073/2013-like virus, according to the CDC.³

"Clearly, it was a severe season in Australia this summer," says **Dan Jernigan**, MD, a medical epidemiologist at the CDC, who somewhat downplayed the threat. "Does that mean we'll have a bad season this fall? We don't know exactly, but we want to be prepared for that, and that's one reason why it's important to get your vaccine. There's been a little bit of drift,

some change, but there's not been a significant mutation in the H3N2."

No Mist Vaccine Again

A lack of efficacy has again sidelined the mist vaccine nasal spray, which was popular with children but was not recommended last year, and is not being recommended by the CDC for the 2017-2018 season. However, children remain a risk group for severe flu and should be targeted for the current flu season, much like the elderly.

"Unfortunately, flu is very severe and I have to remind everyone that children do die of influenza," said **Patsy Stinchfield**, RN, senior director of infection prevention and control at Children's Health Network in Minneapolis. "In the U.S. alone, last year, 105 children died of influenza — and this is well below the number of average deaths per year. Even back in the 2009-2010 season, we saw as many as 358 children die of influenza."

In addition to pediatric deaths, CDC estimates that since 2010, flu-related hospitalizations among children younger than five years of age have ranged from 7,000 to 26,000 every year, she says.

"Working in a children's hospital, as I have for 30 years, we take care of the sickest of the sick, and I can tell you I have seen way too many children in the ICU on ventilators who have died than I ever care to remember," Stinchfield said. "It's a very sad situation for everybody — those who care for them, and their families."

Severe influenza complications are most common in children younger than two years of age, but bad outcomes can occur in kids of any age, she says.

"It can be in all ages, in children with underlying chronic diseases such as asthma or neurological problems where they'll have difficulty with their secretions, but also in healthy children with no chronic diseases," she says.

Recent research shows influenza vaccine reduces the risk of flu-associated deaths by 51% in children who have underlying chronic conditions, and by 65% in healthy children, Stinchfield says.⁴

"The risk of severe outcomes among children is high, but I'm pleased to see that 76% of children in the U.S. age six to 23 months old were vaccinated last season, exceeding the national public health goal of 70% vaccine coverage as outlined in the Healthy People 2020 goals," she adds. "That is great. However, this is the only age group of children — and, in fact, the only age group overall that met the goal. With influenza vaccination, the coverage decreases as children get older."

In another key recommendation for children, the CDC advises that a child who has never received a flu vaccine and is between the ages of six months through eight years should receive two shots one month apart, she notes.

"That's a nuance just for young children — first-time vaccinated," Stinchfield says. "If you were vaccinated in the year prior, you'll only need one this year. Finally, protection should start even before babies are born. Vaccinations of moms-to-be during any trimester is important to protect both them and developing babies against influenza."

Pregnant women may receive any licensed, recommended, age-appropriate influenza vaccine, the CDC recommends.

Last season about 53% of pregnant women reported vaccination before or

during pregnancy, Schaffner adds.

“That’s a great measure of progress, but you can see roughly half of pregnant women during the influenza season still did not get vaccinated,” he says. “We all have to do more work there.”

Healthcare Workers

As infection preventionists are well aware, the best way to protect vulnerable patients in the hospitals and other settings is to achieve a high vaccination rate in the staff delivering care.

“Vaccination coverage continues to be higher among healthcare personnel working in hospitals,” Schaffner said. “These large institutions are really getting it done. They’re getting all of their personnel vaccinated. However, the rates are still lower among healthcare personnel working in ambulatory and long-term care facilities. We as healthcare professionals still have work to do there.”

A recent CDC internet survey revealed that 79% of healthcare workers overall were immunized during the 2016-2017 flu season, continuing a trend that has seen vaccinations level off over the last few years. “As in previous seasons, coverage was highest among healthcare personnel (HCP) who were required by their employer to be vaccinated (97%) and lowest among HCP working in settings where vaccination was not required, promoted, or offered on-site (46%),” the CDC reported.¹

Indeed, the CDC cites studies in the literature that show that immunizing healthcare workers against flu protects patients.^{5,6}

“It’s a patient safety issue,” Schaffner said. “We don’t want to give flu to the patients for whom we are providing care.”

The plateau effect seen in worker immunizations was mirrored by a similar stall in efforts to promote flu vaccine. “While we don’t know for sure why vaccination coverage among healthcare workers has plateaued over the past four influenza seasons, we do know that workplace efforts to promote vaccination — which are associated with [higher] vaccination coverage — have also plateaued,” said **Carla Black**, MD, the lead author of the CDC paper. “By the 2016-17 season, almost all healthcare workers working in hospital settings reported either being required to be

THERE ARE
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WITH HEALTHCARE
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MISCONCEPTIONS
ABOUT VACCINE
SAFETY.

vaccinated or being offered flu vaccine at their workplace free of charge. However, healthcare settings other than hospitals have not followed suit in increasing their efforts to promote vaccination in the workplace.”

The CDC’s Healthy People 2020 goal is to achieve 90% flu vaccination coverage among healthcare workers. Specific occupational groups must be targeted if this goal is to be met.

“Fewer than 70% of assistants and aides were vaccinated, while coverage was over 90% for physicians, PAs, nurses, nurse practitioners, and pharmacists,” said Black, who was interviewed separately and was not at

the NFID press conference.

When employers had on-site vaccination clinics for more than one day, four out of five healthcare personnel took advantage of the opportunity to get vaccinated, even in the absence of a requirement, she added. “We know that comprehensive work-site intervention strategies that include education, promotion, and easy access to vaccination at no cost for multiple days can increase healthcare worker vaccination coverage,” she said.

There also are lingering issues with healthcare workers declining flu shots due to myths and misconceptions about vaccine safety.

“Approximately 30% of unvaccinated respondents in this year’s survey reported that fear of side effects or some other safety concern was the main reason that they were not vaccinated,” Black says. “Flu vaccines are among the safest medical products in use. Hundreds of millions of Americans have safely received flu vaccines over the past 50 years, and there has been extensive research supporting the safety of flu vaccines.”

This has been a long-standing issue in healthcare, and an anti-vaccination movement in the public has also cited religious beliefs and safety concerns in refusing vaccination for children. A Michigan woman was recently arrested for refusing to allow her nine-year-old son to receive vaccines, something the child’s father insisted on as part of an ongoing custody battle.⁷ ■

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Communication Failures Let Multidrug-resistant Bug Spread Between Settings

Oregon law now requires that transferring facilities flag patient status

An outbreak of extremely drug-resistant *Acinetobacter baumannii* at multiple facilities in Oregon underscores an open secret as bad bugs move across the healthcare continuum: There are disincentives to telling the receiving facility that the patient has a history of a drug-resistant bacteria or other problematic pathogens.

This has been going on in one form or another since hospitals and nursing homes were blaming each other for methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant enterococci (VRE) patients going back and forth between facilities in the 1980s and 1990s. The rise of multidrug-resistant organisms (MDRO), particularly gram negatives such as *A. baumannii* and carbapenem-resistant Enterobacteriaceae, has heightened the stakes considerably. Some of these pathogens are virtually pan-resistant and carry transmissible plasmids that can confer drug resistance in other bacteria.

“We know that patients move throughout the healthcare system across the continuum,” says **Jon**

Furuno, PhD, a co-author of the recently published investigation¹ and associate professor at Oregon State University in Corvallis. “We all kind of recognize that that’s happening. There are a lot of data out there now [showing] that we are just not great at providing information to optimize care as [patients] move between these different care settings.”

The multifacility outbreak in Oregon resulted in a state law requiring a transferring healthcare institution to notify the receiving organization that the patient being transferred has a history of infection or colonization with a pathogen of concern.

“It requires that healthcare facilities provide written communication about MDROs and *Clostridium difficile* status to the receiving facility,” Furuno says. “It also includes transport [to notify] the folks transferring the patients as well.”

Other states may take similar action. At the federal level, the Centers for Medicare & Medicaid Services (CMS) issued a proposed rule last year to address the patient transfer issue. It had not

been finalized as this issue went to press.² “Given the number of facilities through which a patient might travel, [CMS] proposes to increase the involvement of hospital infection prevention and control programs [to] facilitate communication across settings,” the agency stated in the proposed rule. (See the August 2016 issue of *Hospital Infection Control & Prevention* for more information.)

While the multifacility outbreak was a primary driver of the Oregon law, the investigators were reluctant to assign blame or suggest there was any intention by healthcare facilities to mislead the receiving organization.

“You hear about it anecdotally. People do worry about how they are going to get someone to take this patient if they have this organism,” Furuno says. “There is that concern out there, but I’m not sure if that happened in this scenario. But sure, the way the healthcare system works, patients tend to move between various levels of acuity. The way the reimbursement system works, there are incentives to discharge patients and [that leads to] concern about

things that may affect your ability to do that.”

Lead author **Genevieve L. Buser**, MD, an infectious disease physician at Providence (OR) Medical Group, says the investigation revealed no effort by any facility to intentionally withhold information about a transferring patient.

“Having spoken to the skilled nursing homes, long-term care, and hospitals, everyone wants to know this information — that’s for sure,” she says. “However, prior to having more formal requirements for communication of that [with the new Oregon state law] I believe — by oversight, mostly — it was buried within the progress notes. Usually these were patients with prolonged stays, and maybe they had that infection somewhere in the middle [of care]. That may have been a multidrug-resistant organism which they were able to clear, but it’s still a part of their microbiome and needs to be part of their current history. These organisms can hang around in the gut and in wounds, and really remain a part of that person’s current history for some time. Everybody needs to know about it and share; let’s not hide it under the rug. We need to be open about it so we can have that knowledge and prepare for this.”

The investigators identified 21 cases of *A. baumannii*, most of which were highly related by molecular epidemiology and suggestive of a single clone moving between care sites. Overall, 17 patients (81%) were admitted to either long-term acute care (LTACH) hospital A (8), or skilled nursing facility (SNF) A (8), or both (1).

“Interfacility communication of patient or resident [drug-resistant] status was not performed during transfer between facilities,” the authors noted. “An entire chain of

transmission at SNF-A might have been prevented if its staff had been notified by LTACH-A of the MDRO status of one patient.”

Reviewing the epidemiologic evidence and genetic sequencing data, the authors concluded that three persistently colonized patients transmitted *A. baumannii* to at least a dozen other patients and residents. Risk factors for prolonged colonization included chronic wounds, morbid obesity, tracheostomies, and indwelling urinary catheters.

An Astute IP

The outbreak, which occurred over a period of two years, required considerable detective work to trace back the transfers and the transmission within facilities. It was originally discovered by an infection preventionist performing a routine review of drug-resistant organisms.

“The IP was reviewing isolates and sensitivities, particularly those in which this resistance was noted,” Buser says. “They actually happened to be isolates that were processed through the hospital lab, but weren’t from inpatients. Two of these resistant isolates had been sent in by the same skilled nursing facility. Not only were they an unusual gram negative resistant to carbapenems, but the specimens had been sent in by the same facility. So, with that information, she contacted county public health.”

The state health department also was performing surveillance for MDROs as part of its role as an Emerging Infections Program sponsored by the CDC.

“We discovered that [long-term care] residents had common healthcare contacts in that skilled

nursing facility, and that turned this into a larger investigation,” Buser says. “Ultimately, by tracing it back [it involved] many healthcare facilities. Chronologically, it appears that this carbapenem-resistant *Acinetobacter* initially appeared at the LTACH in January of 2012, related to a patient before we started doing the investigation. That’s as far as we can trace it back.”

That linked not only other facilities, but a neighboring state, as that patient had been previously treated in Washington.

“Then one of the patients, as care improved, was transferred [from the LTACH] down to the skilled nursing facility and she likely took the bug with her,” Buser says. “A couple of months later, we ended up with the two cases that came to the infection preventionist’s attention.”

Infection control lapses at the facilities involved included lax bronchoscope reprocessing and poor handwashing compliance. In addition to placing the identified patients under contact precautions, the patients received chlorhexidine baths and their surrounding environments were rigorously cleaned and disinfected.

“*Acinetobacter* is a very hardy bacteria,” she says. “It can remain on fomites and hands. It probably became endemic in each facility and then popped up every once in a while as clinical cultures, and those are what we saw as the cases.”

Carbapenem resistance typically means providers are reduced to last-line drugs such as colistin, which was used in at least one of the cases of invasive infection. There was one patient death retrospectively identified, but *A. baumannii* was not definitively implicated as the cause of death.

In addition to improving

communication, the authors are trying to raise awareness and emphasize the need for education to prevent such incidents in the future.

“These skilled nursing facilities and other non-hospital facilities need to be comfortable managing this and caring for these patients,” Buser says. “That’s another piece that Oregon is trying to work on. What we can see with [the new law] is that

it is becoming part of the hospital discharge notation. With electronic medical records there is better flagging [of transmissible pathogens] in the chart.” ■

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‘Mystery Patient Drills’ Test Hospital Readiness

Actors posed as patients with MERS, measles

Middle East Respiratory Syndrome (MERS), Ebola, and measles — or something completely different that arrived via air travel from across the globe — could be festering in an undiagnosed patient in your ED right now. How quickly can you recognize the signs and symptoms and get the patient in isolation before other patients and healthcare workers are exposed?

To test this hypothetical question, the New York City Department of Health and Mental Hygiene (DOHMH) recently conducted elaborate “mystery patient drills” that used in-house collaborators to evaluate clinical readiness in ED staff.

Overall, 95 drills were conducted in 49 NYC hospital EDs. Drill scenarios included patients reporting signs, symptoms, and travel history consistent with possible MERS or measles. In reality, patients with either of these infections have resulted in costly and labor-intensive follow-ups to determine which patients and healthcare workers were exposed. The scenario was somewhat tricky, as the patients reported they had a fever but had taken an over-the-counter fever reducer — meaning the caregiver couldn’t immediately verify

their story by taking a temperature. In addition, the measles scenario had actors presenting as patients with some fake rash spots applied with a commercially available kit. The MERS patients presented with respiratory symptoms and also said they had a history of fever.

“Overall, patients were masked and isolated in 78% of drills,” the investigators reported.¹ “Masking and isolation occurred significantly more frequently when travel history was obtained (88%) than when it was not (21%). Overall, the median time from patient entry to masking was 1.5 minutes (range = 0–47 minutes) and from entry to isolation was 8.5 minutes (range = 1–57 minutes).”

The exercises were halted and considered failed if the ED wait time exceeded 30 minutes without triaging the patient. Factors assessed during the drill included compliance with hand hygiene and use of personal protective equipment. In addition, screening for travel was noted, as the general expectation in the wake of the Ebola outbreak is to ask patients with unspecified illness if they have recently been in another country. “The exercise was considered successful ... if the patient was given a

mask and isolated from other patients and staff members,” the authors noted. “Overall, 76 (80%) patients were asked about recent fevers, and 81 (85%) were asked about recent travel. Questions about a rash or unusual skin lesions or respiratory symptoms were asked of 47 (50%) and 69 (68%) patients, respectively. Overall, 84 (88%) patients were given a mask, including 45 (85%) patients in the measles scenarios, and 39 (93%) patients presenting with MERS scenarios.”

“Although the majority of drills were completed successfully by masking and isolating the patient, approximately 40% of hospitals failed at least one drill, and there was considerable variation in the length of time each hospital took to perform these steps,” the authors concluded. (*A toolkit is available to assist healthcare facilities and health departments that wish to conduct similar drills at: <http://on.nyc.gov/2jzMOhY>.*)

Hospital Infection Control & Prevention asked lead investigator **Mary Foote**, MD, senior medical coordinator for communicable disease preparedness at NYC DOHMH, to provide more details on this unusual

project. The Q&A session with Foote is presented as follows:

HIC: Looking at the glass half empty for a second — with 40% failing at least one drill, does that mean MERS or measles could have spread in these facilities?

Foote: It definitely leaves them vulnerable because it only takes one miss to facilitate the spread of infection. With MERS there was the case of one super spreader who was left in a crowded emergency room in a Korean hospital. I think he spread to at least 70 to 80 people. So, certainly, we aim for 100%. We want to get as close to that as we can, and anything less than that leaves us vulnerable.

HIC: Will these results be used as a baseline for similar future drills?

Foote: Yes, part of the value of this is that it does give us a baseline. We had done a previous project with Ebola drills. But that wasn't nearly as rigorous of an evaluation. The format of these drills was based on that, but we plan to repeat this program [with this baseline] in the next year or two and track our progress.

HIC: It's interesting, because infection prevention has a history of using "secret shoppers" or inconspicuous observers to track hand hygiene and compliance with other infection control measures.

Foote: I think if you talk to any infection preventionist, they will tell you that compliance is one of the biggest struggles — just the most basic practices like hand hygiene and when to use a mask. That is something that we struggle with, and a lot of it has to do with changing behavior and culture. We had 36% hand hygiene compliance — that is definitely low. I expected it to be low, but that was on the lower end of my expectations. But I can't say I am shocked by those findings. I am also

a clinician and I will not point any fingers, but I am surprised sometimes when I see colleagues [whom] I know are very well-educated and very conscientious not wash their hands when they walk into a room.

HIC: Did you see any kind of work culture differences that would explain the hospitals that were recognizing the patients quicker or complying more readily with infection control?

Foote: We didn't do that analysis and I don't know if we had the numbers to support a robust look at the association between success with isolation and handwashing. We modified the toolkit for future use to make it a little more rigorous in evaluating these types of questions. The other thing is, we were looking not just at the doctors and nurses — we were looking at the security guards and rest of the staff. I certainly did see that there was a noticeable pattern where those nonclinical staff had much lower rates of hand hygiene. That was just observational. We need to include them in the infection control training, and definitely we need to do more of competency-based training when it comes to these skills. I always tell people if we can get this down better and ingrained in the culture, then a nurse knows when to hand somebody a mask during regular flu season. It's that same process that you then use if you have pandemic flu. Strengthening these everyday practices can prepare us for a pandemic and other emerging infections.

HIC: Were you surprised that some healthcare workers were not asking about travel history? There was some thought that it may become a routine question after there was so much emphasis on it during the Ebola epidemic.

Foote: That's something that was

a huge focus when we shared our findings with the hospitals. I will say in the months after the Ebola epidemic in West Africa, I had about three phone calls from my colleagues in infection prevention and the emergency room. [The attitude was] "OK, the epidemic is over, can we stop screening for travel history now?"

HIC: How did you present your findings to the hospitals after the drill?

Foote: Once the exercise was called, there was a gathering where we debriefed all of the people involved, including the hospital staff. There was a "trusted agent" [collaborator] who was often the infection preventionist at the hospital. They would review what was missed and what they thought could be done better. It was a real teachable moment for those that participated. After that, each hospital that had a drill received an after-action report, which included our recommendations for improvement.

HIC: Just to clarify, the patients presenting with measles-like symptoms were to say they had recently been to Germany if asked about travel?

Foote: Yes, the expectation is that if they come in reporting a fever, you ask about travel history. If they report a travel history then you follow up with questions about the rash, respiratory symptoms, gastrointestinal symptoms. You do the infection control measures first and then ask more questions.

HIC: The rash was visible. Did it fool healthcare providers?

Foote: They applied it on the neck mostly so they could just pull down their shirt and show them. We went through [a few practice runs] and looked at it. It was a commercial [product] it and looked like sort of an epoxy rash. We found that it was better if they washed off the latex

layer and left the red marks kind of faded. That was the best way to get a more authentic-looking rash. It was good enough to get them through to triage. ■

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Unannounced Mystery Patient Drills — New York City, 2016. *MMWR* 2017; 66(36):945–949.

IDWeek: Antibiotic Use in Dentistry Driving Up *C. diff* Rates

Drug stewardship programs need to bring in dentists

Antibiotic stewardship programs designed to preserve drug efficacy and stem the tide of multidrug-resistant bacteria are being emphasized in hospitals, nursing homes, and other care delivery points across the continuum. However, dental offices are slipping under the radar in many areas. Dentists prescribe a surprising amount of antibiotics, and this can lead to adverse patient consequences in the community.

Minnesota investigators recently underscored this finding in San Diego at the annual IDWeek meeting. They found that many otherwise unexplained *Clostridium difficile* infections in the community were in patients who had a recent dental visit. The Minnesota Department of Health tracked community-associated *C. diff* infections — meaning those in patients who did not have an overnight stay in a hospital or nursing home — in five counties in the state, the investigators reported. During a six-year period, they found that 15% of people with *C. diff* had taken antibiotics prescribed for dental procedures.

The investigators found 2,176 presumptive community-acquired *C. diff* cases in reviewing records from 2009 to 2015.¹ Of those, 1,626 (75%) were interviewed. Overall, 926

(57%) were prescribed antibiotics and 136 (15%) were for dental procedures.

“[Overall], 46 (34%) had no mention of antibiotics in their medical chart, illustrating the disconnect between dental and medical facilities,” said **Stacy Holzbauer**, DVM, MPH, lead author of the study and career epidemiology field officer for the CDC and the Minnesota Department of Health.

“The primary reasons for receiving these antibiotics were either to treat an oral infection or prophylaxis for oral surgery,” she said.

Speaking at an IDWeek press conference, Holzbauer emphasized that dentists should be educated about the adverse effects of antibiotic prescriptions, including selecting out drug-resistant bacterial strains and killing off commensal gut bacteria that keep *C. diff* at bay. Dentists write some 25 million prescriptions for antibiotics annually, she added.

While it may be appropriate to prescribe antibiotics for infections like an abscessed tooth, many drugs are being prescribed as prophylaxis prior to dental work under guidelines that have been revised. For example, the American Dental Association no longer recommends that dental patients with prosthetic joints take antibiotics prophylactically before a

dental procedure. The risk-benefit equation has shifted, and it is now considered that spurring a *C. diff* infection by prescribing antibiotics is a potentially greater harm than the unlikely event of getting a prosthetic joint infection through routine dental care.

“In many cases, the best treatment for an oral infection may not actually include an antibiotic at all,” Holzbauer said.

Communication and education are needed, she said, urging patients to tell their primary care physicians if they have been prescribed an antibiotic related to dental care.

“We found that 15% of our community-associated *C. diff* cases had taken antibiotics for dental reasons prior to the infection,” she said. “Dentists need to be included in antibiotic stewardship programs. They are often overlooked and it is absolutely critical that they are included to improve prescribing.” ■

REFERENCE

1. Bye M, Whitten T, Holzbauer S, et al. Antibiotic Prescribing for Dental Procedures in Community-Associated *Clostridium difficile* cases, Minnesota, 2009-2015. Abstract 78. IDWeek Oct. 4-8. San Diego, CA.

Unintended Consequences: Steps to Fight Sepsis Increase *C. diff*

Uptick in antibiotic use sets up C. diff infections

A hospital effort to rapidly identify potential sepsis cases and initiate antibiotic treatment led to an unintended consequence: an increase in *Clostridium difficile* infections.

The administration of broad spectrum antibiotics has been previously shown to wipe out commensal bacteria in the gut and allow *C. diff* to multiply and set up as an enteric infection. From there, it can spread to other patients and is exceedingly difficult to remove from the hospital environment.

The order set used to rapidly intervene for suspected sepsis recommends broad-spectrum antibiotics, which can be administered without preauthorization from the hospital's antibiotic stewardship team, explains **Jashvant Poeran**, MD, PhD, assistant professor of medicine at Icahn School of Medicine at Mount Sinai in New York City.

"The main message is when you implement any healthcare intervention, always think of the unintended consequences," he says. "Because here, this sepsis protocol calls for early screening. The earlier you screen for sepsis, the more nonspecific your symptoms are going to be. You are going to have a lot of false positives, meaning you are going to label someone potentially with sepsis who doesn't have sepsis. Based on that labeling, they may get [unnecessary] antibiotics."

As IPs are well aware, there is a national effort to rein in antibiotic use and overuse, moving to the narrowest spectrum drug as soon as possible

because bacteria are becoming too resistant to treat the resulting infections.

"You see this is with other screening [protocols] as well. It is a double-edged sword," Poeran says. "You may overtreat and that's exactly the case here with this sepsis protocol. You're going to find people who will not be developing sepsis and you

"THE MAIN MESSAGE IS WHEN YOU IMPLEMENT ANY HEALTHCARE INTERVENTION, ALWAYS THINK OF THE UNINTENDED CONSEQUENCES."

are treating them with unnecessary antibiotics."

By the same token, an indistinct presentation may trigger the use of broad-spectrum antibiotics, which are more likely than narrow-band drugs to spur *C. diff*.

Poeran and colleagues found that antibiotic use spiked after implementation of a sepsis care bundle. Though *C. diff* rates were decreasing before the sepsis care bundle was implemented, the infections began to increase as more antibiotics were used in the intervention.

"On the one hand, you want to give these broad-spectrum antibiotics because you don't necessarily know

what is the nature of the bug that is causing the sepsis," he says. "On the other hand, broad spectrum antibiotics increase the risk for *C. diff*."

Interestingly, the effect diminished as the sepsis bundle became "normalized" in other units of the hospital. This suggests that as clinicians acquire more experience in implementing the bundle, they are able to better identify cases and curtail unnecessary antibiotic use.

"My team's thinking behind this was that with any new thing you implement in a hospital, people need to get used to it," Poeran said. "There is a whole work flow involved, and it takes time to get adjusted to this. So, what you see when it goes hospitalwide is that [it] starts to normalize. I think that is because people get better used to the new system. There are going to be a lot of false positives [at first], but then they start anticipating the false positives better and then you see it normalize a bit."

It may be well to learn these lessons now, as sepsis bundle programs may become more common as CMS moves to link them to their pay-for-performance incentives. ■

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1. Hiensch R, Poeran J, Saunders-Hao, et al. Impact of an electronic sepsis initiative on antibiotic use and health care facility-onset *Clostridium difficile* infection rates. *Am J Infect Control* 2017;45(10):1091-1100.

CME/CE QUESTIONS

- 1. What was the reported flu vaccination rate for workers in long-term care?**

 - 45%
 - 68%
 - 76%
 - 92%
 - 2. Recent research shows influenza vaccine reduces the risk of flu-associated deaths by 51% in:**

 - healthcare workers with HIV.
 - those over 75 years of age.
 - children with underlying chronic conditions.
 - premature infants.
 - 3. A multifacility outbreak of extremely drug-resistant *Acinetobacter baumannii* in**
 - 4. A hospital effort to rapidly identify potential sepsis cases and initiate antibiotic treatment led to what unintended consequence?**

 - Multidrug-resistant CRE
 - An increase in *Clostridium difficile* infections
 - Rapid progression of sepsis
 - All of the above
- Oregon resulted in a state law requiring transferring healthcare institutions to certify that the patient or resident has been decolonized and no longer harbors the pathogen.**
- True
 - False

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- Describe the effect of infection control and prevention issues on nurses, hospitals, or the healthcare 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.

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