Hospital Infection Control & Prevention

For 38 Years The Leading Source Of News And Comment On Infection Prevention

February 2011 Volume 38, No. 2 (Pages 13-24)

C. diff epidemic strikes pediatric population, greatly increasing risk of death in children

Infections more than double in a decade

By **Gary Evans**, Senior Managing Editor

The national epidemic of *Clostridium difficile* is moving into the pediatric population, causing infections in children that prolong hospitalizations, increase morbidity and spell a striking increase in the risk of death.

"If kids get *C. diff* they are more likely to die," says **Cade Nylund**, MD, an assistant professor of pediatrics at the Uniformed Services University of the Health Sciences in Bethesda, MD. "They are more likely to require surgery. They are going to be having more complicated courses and stay longer in the hospital."

Nylund and colleagues analyzed national hospital discharge data using the national Healthcare Cost and Utilization Project Kids' Inpatient Database for the years 1997, 2000, 2003, and 2006.[1] The researchers reviewed records of more than 10.5 million patients, of whom 21,274 (0.2%) had *C. diff* infection (CDI).

They found that the number of cases of CDI in children increased by 15% each year, from 3,565 in 1997 to 7,779 in 2006 — which means incidence more than doubled in a decade. Some children appeared more likely to become infected, including those with inflammatory bowel disease, organ transplant or cancer. The risk of infection was also higher among those who were white, lived in the West or in urban areas, or had private insurance. That suggests exposure to antibiotics — a classic trigger for CDI — could be driving the trend, though emerging virulent strains of the spore-forming bacteria may be a bigger factor.

In particular, emerging CDI in kids is increasing in part due to the continuing spread of the same highly virulent bug that is vexing

In This Issue

❑ **Not kid stuff:** Infection control in pediatric patients presents some unique challenges . . . . . cover

❑ **CMS action:** CMS says "aggressive action" coming after fed report finds that 15,000 Medicare patients die every month due to adverse events that include infections 16

❑ **IC in the ED:** Active screening MRSA in emergency room may not be worth bang for buck 18

❑ **Flu shot mandates:** Health care worker rates rise, but pressure builds for mandatory flu vaccination 19

❑ **Cause and effect:** HCWs infected during H1N1 pandemic often were not wearing protective gear 20

❑ **Abstract & Commentary:** New CDC guidelines to prevent group B strep disease in neonates 22

AHC Media

Financial Disclosure:
Senior Managing Editor Gary Evans, Executive Editor Coles McKagen, Consulting Editor Patrick Joseph, MD, and Katherine West, Nurse Planner, report no consultant, stockholder, speaker's bureau, research, or other financial relationships with companies having ties to this field of study.

adult patients: the North American Pulse Field type 1 (NAP1) strain.

"I think personally it is coming into play," Nylund says, though noting his study did not include strain typing. "There was a different study that showed the prevalence of NAP1 in children [with CDI] is actually relatively high — almost 20%.[2] I do think that is part of the reason we are seeing an increase in *C. diff* in children."

The NAP1 strain secretes toxins and is resistant to both fluoroquinolones and third-generation cephalosporins, factors that add to virulence in any given infection and may enhance transmissibility. Making matters worse, there actually may be several other hyper-virulent strains of *C. diff*.

CDC verifies increase

"We analyzed some of the same data ourselves and saw a similar type of increase [in pediatric patients]," says **L. Clifford McDonald**, MD, FACP, a leading *C. diff* expert in the CDC's division of healthcare quality promotion. "The NAP1 strain is certainly one thing, but there may also be several more virulent strains. The other possibility is a change in antibiotic prescriptions, which is certainly a major risk factor in adults."

In Nylund's study, the risk of infection was lower among black or Hispanic children, those who lived in the South, those admitted to rural hospitals, those with Medicaid/Medicare insurance and those who had self-pay or no-pay insurance status. Asked if those findings could be surrogate markers for limited access to antibiotics, Nylund says: "That would be my hypothesis. I can't prove that in my study, but that is exactly what my thinking would be."

In terms of transmission, the longstanding view that CDI is predominantly a hospital phenomenon is being rethought as more cases arise in the community.

"It could have been acquired outpatient or inpatient in the hospital," Nylund says. "It's actually increasing in the community. It's possible that some of these patients acquired it as outpatients. There are several patients I see clinically who have never been in the hospital but have *C. diff*."

Overall, children with CDI had a greater likelihood of death, colectomy, longer length of hospital stay, and higher hospitalization charges than those without CDI.

"When pediatric patients are finally hospitalized they tend to be more complex and more

Hospital Infection Control & Prevention®, including **Infection Control Consultant**™ and **Healthcare Infection Prevention**™ (ISSN 0098-180X), is published monthly by AHC Media, a division of Thompson Media Group LLC, 3525 Piedmont Road, Building Six, Suite 400, Atlanta, GA 30305. Telephone: (404) 262-7436. Periodicals Postage Paid at Atlanta, GA 30304 and at additional mailing offices.

POSTMASTER: Send address changes to ***Hospital Infection Control & Prevention***®, P.O. Box 740059, Atlanta, GA 30374.

AHC Media is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

This activity has been approved for 15 nursing contact hours using a 60-minute contact hour.

Provider approved by the California Board of Registered Nursing, Provider #14749, for 15 Contact Hours.

AHC Media is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

AHC Media designates this educational activity for a maximum of *18 AMA PRA Category 1 Credits*™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

This activity is effective for 36 months from the date of publication.

Target audience: Infection control practitioners and infectious disease physicians.

Opinions expressed are not necessarily those of this publication. Mention of products or services does not constitute endorsement. Clinical, legal, tax, and other comments are offered for general guidance only; professional counsel should be sought for specific situations.

Senior Managing Editor: **Gary Evans**, (706) 310-1727, (gary.evans@ahcmedia.com).

Executive Editor: **Coles McKagen**, (404) 262-5420, (coles.mckagen@ahcmedia.com).

Production Editor: **Neill Kimball**.

AHC Media LLC

Editorial Questions

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

Subscriber Information

Customer Service: (800) 688-2421 or fax (800) 284-3291. Hours of operation: 8:30-6. Monday-Thursday, 8:30-4:30 Friday EST. World Wide Web: http://www.ahcmedia.com. E-mail: customerservice@ahcmedia.com.

Subscription rates: U.S.A., one year (12 issues), $499. Add $17.95 for shipping & handling. Outside U.S., add $30 per year, total prepaid in U.S. funds. Discounts are available for group subscriptions, multiple copies, site-licenses or electronic distribution. For pricing information, call Tria Kreutzer at 404-262-5482. Missing issues will be fulfilled by customer service free of charge when contacted within one month of the missing issue date. **Back issues**, when available, are $78 each. (GST registration number R128870672.)

susceptible to infections like *C. diff*," Nylund says. "At the same time, the patients, especially hospitalized children, are less able to fend off the serious effects of these infections, making them more likely to die."

The findings remained statistically significant even after controlling for CDI comorbid conditions associated with the severity outcomes, patient-level demographic variables, and a high-dimensional propensity score associated with acquiring CDI.

"So when we controlled for other diagnoses associated with death we still had an increase risk of death," he says. "Among those without *C. diff* it ranges from 2.9% to 3.7% and those with *C. diff* the mortality rate is 16.8% to 23.6%. It's a drastic increase."

Mild disease may be missed

Though the data underscore that CDI can be fatal in pediatrics, there is also a broad spectrum of disease so mild it may go undiagnosed in children, he noted. While the overall increase to some extent mirrors the well-documented upsurge of CDI in the adult population, there are distinct challenges presented by CDI in children.

"One thing in particular is that children don't tend to have as severe disease as adults," he says. "They can just have a little bit of nonbloody diarrhea, but it can be *C. diff*. In adults you have severe colitis, fevers, bloody stools. In children, you have milder symptoms, but it's still *C. diff*. In my opinion, it's under-recognized. "

That may be the case because pediatric clinicians have not typically dealt with CDI at this level.

"I think what's happening is that because *C. diff* is increasing overall in everyone, now pediatricians are seeing more," McDonald says. "Pediatricians who used to never see *C. diff* — never had any experience with it — now are seeing it. And that can be a challenge for them."

In general, the infection control principles are the same in the pediatric and adult patient populations, he adds. "The two big principles are to reduce unnecessary antibiotic use and prevent transmission," McDonald says. "But how those principals are applied may be different because the settings where these antibiotic exposures and transmissions are occurring are a little different."

Two of Nylund's major take-home points are to heighten suspicion for CDI in pediatric patients and not to rely on alcohol hand gels to interrupt transmission.

"We should absolutely increase our awareness and testing of it," Nylund says. "Also, in my opinion, if [any] patient has diarrhea, you should be washing your hands with soap and water. The alcohol rubs don't kill the *C. diff* spores."

Though many hospitals have long since switched over from soap to alcohol for most patient encounters, the Centers for Disease Control and Prevention endorsed the 2008 compendium guidelines that in an outbreak situation or in dealing with continuing *C. diff* transmission, health care workers should "perform hand hygiene with soap and water preferentially, instead of alcohol hand hygiene products."[3] More to Nylund's point, however, some hospitals are going to soap and water for even a single CDI case.

Indeed, several pediatric hospitals in Atlanta have devised new isolation signs to cue workers to use soap and water with *C. diff* — while preserving patient privacy about the diagnosis, says **Donna Peace**, RN, CPHQ, CIC, an epidemiologist at Children's Healthcare of Atlanta.

"We created a sign that says: 'Contact Precautions: Hand washing is required,'" she says. "That is just a visual cue for our staff to know they can't use the alcohol."

The hand washing reminder is not included in other isolation signs, meaning, for example, that staff know it is safe to use the alcohol hand rubs with a patient with MRSA. Failure to wash hands with soap and water may have contributed to transmission of *C. diff* in one instance, she tells *Hospital Infection Control and Prevention*.

"We found an individual who did not realize that they could not use the alcohol foam with a *C. diff* [patient]," she says. "They were foaming, but for whatever reason did not put two and two together [to use soap and water]. We were able to do some education and some targeted cleaning and prevented a potentially huge problem. I think the biggest thing we do on any thing like this is education."

Though she emphasizes that her program is preventing CDI successfully, Peace dreads the thought of a single hospital-associated case. "The ones that really scare me are when we know it's health care acquired," she says. "The child is a week into the visit and they develop *C. diff*. And I know it occurred because of something we did or didn't do."

'Kids need to socialize'

In general, infection control in pediatrics presents some unique challenges, whether the pathogen is *C. diff* or some other bug.

"Kids need to socialize, so we have a mechanism in place — with certain ground rules — to allow children with various types of isolation including *C. diff* to get out and about," Peace says. "Adults can talk on the phone. With kids, their socialization is through play. It does make it a little bit more difficult for children to stay in isolation."

Children that come out of isolation are confined to a wagon which is covered with a sheet or blanket so they can be wheeled out to the hospital Koi ponds and see the elaborate entrance-way murals, she says. The wagons are then thoroughly cleaned and the covering material laundered.

"If a kid who has *C. diff* is not having profusive diarrhea we might let them go into a specific play area — by themselves or with their siblings — then clean very thoroughly after that," she says. "The bottom line is that most of the time the siblings either have the *C. diff* or the MRSA or whatever else. They have already been exposed at home, but they are not sick and more than likely it will not make them ill. But again, we have to tailor things for children considerably different than we do for an adult population."

In that regard, environmental services does not use bleach to clean rooms of patients because it may cause respiratory problems for children with asthma. The hospital uses alternative non-bleach products and is not having any problems with environmental contamination, says Peace, chair of the pediatric committee at the Association for Professionals in Infection Control and Epidemiology.

"The CDC recommends using bleach only in an outbreak situation," she says. "Bleach is very hard on equipment, it pits surfaces. And on top of that, from a pediatric standpoint, there are a lot of kids with asthma. If you use a lot of bleach it is very difficult — it's a very strong bleach smell. Our numbers support the fact that what we are doing is efficacious."

References

1.Nylund CM, Goudie A, Garza JM, et al. Clostridium difficile Infection in Hospitalized Children in the United States. *Arch Pediatr Adolesc Med*. Published online January 3, 2011. doi:10.1001/archpediatrics.2010.282

2.Toltzis P, Kim J, Dul M, et al. Presence of the epidemic North American Pulsed Field type 1 Clostridium difficile strain in hospitalized children. *Jrl Pediatr.* 2009;154:607-608.

3.Society for Healthcare Epidemiology of America. Infectious Disease Society of America. Compendium of Strategies to Prevent Healthcare Associated Infections in Acute Care Hospitals. *Infect Control Hosp Epidemiol*. 2008;29:S81–S92. ■

Medicare deaths report cites fatal infections

CMS says "aggressive action" coming

A recent federal report that included the highly publicized finding that some 15,000 Medicare patients die every month due to adverse events and hospital-acquired conditions (HAC) may ratchet up pressure on hospitals to prevent infections, which represented some 15% of the HACs. In addition, hospital care associated with adverse and temporary harm events cost Medicare an estimated $4.4 billion annually, the report by the Department of Health and Human Services' Office of Inspector General (IG) estimated.[1]

The IG report urged action by the Center for Medicare and Medicaid Services (CMS), noting that based on the findings the "CMS stated that it will 'aggressively pursue' broadening the scope and definition of patient safety efforts to be more inclusive of various types of adverse events and more closely monitor and address hospital quality of care."

That could mean more pressure on reducing HAIs in the form of withheld CMS reimbursements, but the IG report also acknowledged that not all infections are preventable.

"I don't know how it is going to [affect] policy, but I think that this is in line with what many of us already feel," says **Eli Perencevich**, MD, MS, an epidemiologist at the University of Iowa Healthcare in Iowa City. "Basically the report suggested that some of the medical errors are hospital acquired infections and a certain percent of those — some 60% — were preventable.

However, since the report was based on extrapolated data, only 19 infections (three of which were fatal) were actually subject to analysis, Perencevich notes. That makes any broad extrapolations about preventability somewhat suspect in any case, but the bottom-line is that HAIs and other adverse events must be reduced to the extent possible.

"The key thing is that errors are still occurring in hospitals," he says. "Too many are occurring and more efforts need to be made. They found 134,000 adverse events in a single month — that's obviously too many. A subset of those — only 15% of the errors — were attributable to infections."

In general, the report focused on adverse events defined as harm to a patient as a result of medical care, including HACs such as catheter-associated urinary tract infection, vascular catheter-associated infection, blood incompatibility, pressure ulcers and falls. The report included adverse events from relatively minor patient glycemic control problems to serious events that prolonged hospital stay, or caused permanent harm or death. The fatal infections cited included two bloodstream infections and a ventilator associated pneumonia.

The reports used a nationally representative random sample of 780 Medicare beneficiaries from all beneficiaries discharged during October 2008. An estimated 1.5% of hospitalized Medicare beneficiaries experienced events that contributed to their deaths. Among the 128 adverse events that we identified in the sample, 12 events (9% of 128 events) contributed to the deaths of beneficiaries. That projects to an estimated 1.5 % of hospitalized Medicare beneficiaries experiencing events that contributed to death or approximately 15,000 beneficiaries during the study period. In addition to the aforementioned fatal infections, seven patient deaths were related to medication, either the result of improper administration of medication (wrong drug or wrong dosage) or inadequate treatment of known side effects. The most common type of medication-related death (five deaths) involved excessive bleeding from blood-thinning medication. The two other medication-related deaths involved inadequate insulin management resulting in hypoglycemic coma and respiratory failure resulting from over-sedation. Two patient deaths involved aspiration, which led to pneumonia in one case and cardiac arrest in another.

Overall, the IG report used physician reviewers to conclude that 44% of all events were preventable and 51% were not preventable. (For the remaining 5% of events, physicians were unable to make determinations.)

"Events related to surgery or procedures were less likely to be preventable than other types of events, such as hospital-acquired infections," the report concluded. "Preventable events were linked most commonly to medical errors, substandard care, and lack of patient monitoring and assessment. Physician reviewers assessed events as not preventable when they occurred despite proper assessment and care or when the patients were highly susceptible to the events due to health status."

Because many adverse events we identified were preventable, hospitals must reduce their incidence, the IG concluded. "A number of agencies within HHS share responsibility for addressing this issue, most prominently the Agency for Healthcare Research and Quality (AHRQ) as a coordinating body for efforts to improve health care quality and CMS as an oversight entity and the Nation's largest health care payer."

Recommendations for action

The IG report recommended the following:

• AHRQ and CMS should broaden patient safety efforts to include all types of adverse events. This broader definition would apply to a number of activities, including setting priorities for research, establishing guidelines for hospital reporting, developing prevention strategies, measuring health care quality, and determining payment policies.

• AHRQ and CMS should enhance efforts to identify adverse events. Identifying adverse events assists policymakers and researchers in directing resources to the areas of greatest need, setting clear goals for improvement,

assessing the effectiveness of specific strategies, holding hospitals accountable, and gauging progress in reducing incidence.

• AHRQ should sponsor periodic, ongoing measurement of the incidence of adverse events.

• AHRQ should continue to encourage hospital participation with Patient Safety Organizations, entities intended to receive adverse event reports from hospitals, and forward the information to a national AHRQ database.

• CMS should use Present on Admission Indicators in billing data to calculate the frequency of adverse events occurring within hospitals.

• CMS should provide further incentives for hospitals to reduce the incidence of adverse events through its payment and oversight functions.

• CMS should strengthen the Medicare HAC policy, such as by expanding the policy to include more events that harm beneficiaries.

• CMS should look for opportunities to hold hospitals accountable for adoption of evidence-based practice guidelines.

Reference

1.Office of Inspector General. Adverse Events in Hospitals: National Incidence Among Medicare Beneficiaries. OEI-06-09-00090 Nov. 2010. On the web at: http://bit.ly/gSfe64 ■

Testing for MRSA in ER: Not worth bang for buck?

Enhanced focus on hand hygiene favored

When it comes to MRSA infection control in the chaotic emergency department (ED), enhanced attention to standard precautions and hand hygiene is a more cost-effective approach than active screening cultures, researchers report.

"Ours is one of the first studies to test patients in the ED for MRSA regardless of their reason for being there," says **Kalpana Gupta**, MD, chief of infectious diseases at the Veterans Administration Healthcare System in Boston. "While the percentage of patients who tested positive for MRSA was small — only 5% — more than half of them carried MRSA in multiple sites on their bodies. It would be very costly to make testing of all emergency patients for MRSA standard practice, but very inexpensive to institute enhanced hand washing precautions."

More than 117 million health care visits are made to EDs in the United States every year. The ED is a unique clinical environment characterized by close quarters, crowding, rapid patient turnover, and a high frequency of invasive procedures, Gupta and colleagues report.[1] Additionally, comprehensive health history is often unavailable before patient contact. Prevention of transmission of infectious pathogens, particularly when they are clinically silent, is challenging in this setting, the authors emphasize.

This asymptomatic carrier state is important because it is the reservoir for MRSA transmission, which then leads to an increased risk of invasive infections in patients, as well as their close contacts. Moreover, recent reports have suggested that ED staff and health care workers have a high prevalence of asymptomatic MRSA colonization, ranging from 4.3% to 15%, they reported.[2-5] In addition, the ED is frequently used by patients with complaints of skin and soft tissue infections, many of which are caused by methicillin-resistant *Staphylococcus aureus* (MRSA).

Gupta and colleagues performed active surveillance for methicillin-susceptible *S. aureus* (MSSA) and MRSA colonization on 400 adult patients across sex and all socio-economic and racial lines presenting to an urban ED. Culture testing was conducted on anterior nares, oropharynx, palms, groin, perirectal area, wounds, and catheter insertion sites. Multiplex polymerase chain reaction was used to identify the USA300 clonal types, the most predominant strain of MRSA in the community.

MRSA in multiple sites

In general, patients who tested positive for MRSA were more likely to have diabetes, be HIV positive, live in a nursing home or long-term care facility, have a recent hospitalization, have a recent incarceration in jail or play contact sports. However, 20% of the MRSA-positive subjects were otherwise healthy and had no known risk factors.

The prevalence of colonization with MSSA was 39%. The 5% prevalence of MRSA colonization found in the study more closely resembles that reported in the general ambulatory U.S. population (2%) than for health care–exposed populations (3% to 40%).[5,6] The MSSA

nasal colonization prevalence was also similar (22%) to that reported in the ambulatory U.S. population (29%).[5] This is consistent with the fact that the study primarily included patients who presented from the community rather than institutions such as rehabilitation facilities and nursing homes. Conversely, the prevalence of extranasal colonization with MRSA and MSSA in the study was relatively high compared with that of other populations. Of the subjects with MRSA, 80% had extranasal MRSA and 45% had exclusively extranasal MRSA. That means facilities that decide to screen ED patients for MRSA colonization should consider testing other body sites in addition to nasal swabs, Gupta says.

References

1.Schechter-Perkins EM, Mitchell PM, Murray KA, et al. Prevalence and predictors of nasal and extranasal staphylococcal colonization in patients presenting to the emergency department. *Ann Emer Med*. Published online January 18, 2011 at http://www.annemergmed.com/.

2.Klein E, Smith DL, Laxminarayan R. Community-associated methicillin-resistant Staphylococcus aureus in outpatients, United States, 1999-2006. *Emerg Infect Dis*. 2009;15:1925-1930.

3.Elie-Turenne MC, Fernandes H, Mediavilla JR, et al. Prevalence and characteristics of Staphylococcus aureus colonization among healthcare professionals in an urban teaching hospital. *Infect Control Hosp Epidemiol.* 2010;31:574-580.

4.Suffoletto BP, Cannon EH, Ilkhanipour K, et al. Prevalence of Staphylococcus aureus nasal colonization in emergency department personnel. *Ann Emerg Med.* 2008;52:529-533.

5.Gorwitz R, Kruszon Moran D, McAllister S, et al. Changes in the prevalence of nasal colonization with Staphylococcus aureus in the United States, 2001-2004. *J Infect Dis*. 2008;197:1226- 1234.

6.Mermel LA, Eells SJ, Acharya MK, et al. Quantitative analysis and molecular fingerprinting of methicillin resistant Staphylococcus aureus nasal colonization in different patient populations: a prospective, multicenter study. *Infect Control Hosp Epidemiol.* 2010;31:592-597. ■

Pressure builds for flu shot mandates

'Logical, ethical, administrative pitfalls'?

More health care workers responded to this season's push for influenza vaccination by rolling up their sleeves and getting the vaccine. By mid-November, 56% reported having gotten the vaccine and 7% said they definitely planned to get the vaccine, according to a web-based survey conducted for the Centers for Disease Control and Prevention. About 68% of hospital employees had received the vaccine, and another 5% said they definitely intended to be vaccinated, for a total of 73%.

But while that vaccination level was similar to last year and higher than rates that hovered near 40% in recent years, it wasn't enough to stem the call for mandatory programs, particularly within the infection control community. Unions and occupational medicine physicians continued to press for voluntary programs as the best way to boost vaccination.

Although some hospitals have been able to get vaccination rates above 80%, it requires such an intense focus and strong leadership involvement that a hospital must create an expectation that all employees will be vaccinated, says **William Schaffner**, MD, an infectious disease expert who is chairman of the Department of Preventive Medicine at Vanderbilt University in Nashville, TN. Most hospitals, however, can't reach that level, he asserts.

"[The survey] affirms my notion that the era of voluntary compliance is over. I think influenza immunization for all health care workers ought to be mandatory," he says. "We have been promoting health care workers immunization in a very intense way for 10 years. We have seen the national proportion of health care workers inch up but we're not making great progress. The thing that seems to get health care workers almost completely immunized is a mandatory policy."

However, **Melanie Swift**, MD, medical director of the Vanderbilt Occupational Health Clinic at Vanderbilt University in Nashville, TN, remains unconvinced about the merits of mandatory vaccination. In fact, studies have failed to demonstrate the benefits of vaccination on patient outcomes, even in long-term care settings, she says.

"Employer-mandated vaccinations are fraught with logical, ethical, and administrative pitfalls and constitute a false sense of security even though they may create the impression of strong action," Swift said as an author of recent comments to the U.S. Department of Health and Human Services on its draft Flu Action Plan from the American College of Occupational and Environmental Medicine (ACOEM). Swift is vice

chair of ACOEM's Medical Center Occupational Health section.

Resources spent on vaccination programs "should not drain resources from other important programs to protect the health of workers," she cautioned.

Ironically, the most persuasive message to send to health care workers may be one of self-interest. According to the CDC survey, 85% of health care workers received the flu vaccine because they didn't want to get the flu. About 58% said they wanted to protect their family and friends. Transmission to patients was a concern for just 38% of health care workers, according to the survey, which is unpublished.

How high can you go?

One thing is clear: The pressure continues to grow for hospitals to improve health care worker immunization rates.

In Iowa, hospital rates of health care worker influenza immunization are publicly reported, along with health care associated infections. A number of hospitals have adopted mandatory vaccination programs, and the state touted a 91% vaccination rate in 2009-2010.

Wisconsin opted to promote voluntary programs that require health care workers to sign a declination form if they don't want to be vaccinated. The state's median rate rose to 72%. About 40 hospitals reached the state's target of 80% or more. The state provided feedback to hospitals and nursing homes and offered recommendations to improve rates.

"We want health care workers to do this because it's the right thing, and so far, it's working," **Gwen Borlaug**, CIC, MPH, infection control epidemiologist with the Wisconsin Division of Public Health, said in a statement.

The Maryland Partnership for Prevention in Baltimore has been promoting health care worker influenza immunization for about six years, with an emphasis on education and making vaccinations free and convenient. The partnership offers a free online toolkit to assist hospitals and other health care employers. (See www.immunizemaryland.org.)

Hospital vaccination rates range from a low of about 30% to 100%, says **Tiffany Tate**, MHS, executive director of the partnership.

"We have been reluctant as an organization… to make that recommendation that [health care employers] should make it mandatory," she says. "But we do think people should really push for vaccinations and ask people to sign a declination form if they don't have the vaccine."

Meanwhile, the list of hospitals requiring influenza immunization continues to grow, says **Deborah Wexler**, MD, executive director of the Immunization Action Coalition in St. Paul, MN, which tracks mandatory programs on its "honor roll." (Those include institutions that allow declinations or exemptions for personal reasons.)

"We need every health care worker who can be vaccinated to be vaccinated," says Wexler. "That's how we're going to optimally protect the patients we take care of." ■

Infected HCWs shunned protective measures

Few H1N1 infected wore N95s, goggles, gowns

In the H1N1 influenza A pandemic, many infected health care workers failed to wear personal protective equipment. They became sick after caring for infected patients. In addition, they were infected after socializing with co-workers who came to work sick.

The bottom line: Health care workers need to improve their adherence to infection control precautions and they need work policies that encourage them to stay home when sick. Those are findings from analyses of cases in which health care workers acquired H1N1 in the early weeks of the pandemic.

From May 4 to June 1, 2009, the Centers for Disease Control and Prevention received 81 reports of health care workers with confirmed or probable pandemic H1N1 in 25 states. Two were hospitalized, including one health care worker with other underlying medical conditions. On average, the ill health care workers missed a week of work.

Half of the cases involved likely transmission in the health care setting, according to detailed information on 70 of the cases. About two-thirds of those occurred in inpatient care or an emergency room. In 20% of cases, there was no known exposure, either in the hospital or in the community.[1]

"One commonality we saw is that uniformly people who acquired H1N1 infection were not wearing respiratory protection of any sort when

caring for patients," says **Matthew Wise**, PhD, epidemiologist with CDC's Division of Healthcare Quality Promotion and lead author. "This really points to a need for a comprehensive approach to infection control in these settings. We're not going to be able to promptly identify every patient who walks through the door."

A Health Hazard Evaluation of four hospitals affiliated with the University of Utah School of Medicine in Salt Lake City found similar gaps in the use of personal protective equipment.[2] In part, that might have been because residents rotated among hospitals with different policies, says **Marie A. de Perio**, MD, medical officer in the Hazard Evaluations and Technical Assistance Branch for the National Institute for Occupational Safety and Health in Cincinnati and co-author of the Health Hazard Evaluation.

"The four medical centers all had four different recommendations for appropriate PPE when taking care of flu patients. That caused a lot of confusion among the house staff," she says.

Medical residents were most likely to report that they used PPE if they were present during aerosol-generating procedures or in the Intensive Care Unit. "That suggests to us that emphasis on PPE was strong in these high-exposure settings," she says.

Rare use of respirators, goggles

The spotty use of infection control precautions is striking, particularly considering that H1N1 was still emerging in the spring of 2009.

In 20 cases of probable or possible patient-to-health care worker transmission reported to CDC, less than half of the health care workers (9, or 45%) reported wearing gloves most or all of the time. Only two reported wearing respirators always or most of the time, and only five reported wearing a surgical mask always or most of the time.

Goggle or face shield use was virtually nonexistent, although CDC had recommended eye protection (as well as respiratory protection, contact and standard precautions) when caring for pandemic H1N1 patients. Sixteen, or 89%, reported that they never used eye protection.

CDC's infection control guidelines recommend "protection of the eyes, nose and mouth by using a mask and goggles or face shield alone" when caring for a patient with a respiratory illness in which there is a risk of a splash or spray of respiratory secretions or bodily fluids.[3]

The findings were similar in the Utah evaluation. About two-thirds of the physicians were considered to have "low adherence" to protections based on their reports of PPE use.

Why didn't the physicians wear protective equipment? More than half of them (55%) said they didn't know the patient had pandemic H1N1 or an influenza-like illness. Lack of availability was identified as a common reason, as well, in the Utah survey.

In fact, even in those early weeks of the pandemic, three of the four hospitals reported having supply shortages of N95s and facing high prices to obtain more N95s, powered-air purifying respirators, or fit-testing kits.

Co-workers infected HCWs

Personal protective equipment wasn't the only problem. Health care workers faced an exposure risk from co-workers who came to work sick.

"That was a relatively common route of transmission among health care workers who were infected," says Wise.

He notes that about 20% of health care workers who became infected with H1N1 were non-clinical personnel — a receptionist in an outpatient clinic, a pharmacy technician, and a front office manager, for example.

"Those people didn't [seem to be] infected by contact with patients, but they were infected by ill health care workers," he says.

In the Utah evaluation, about three-quarters (77%) of physicians with influenza-like illness reported working while ill, and about half (52%) of all physicians surveyed reported having contact with a co-worker who was ill.

In dramatic evidence of the potential for transmission, a cluster of eight cases of influenza-like illness occurred among the residents and fellows within 48 and 96 hours of a resident dinner. Six of them had attended the dinner.

De Perio suggests that programs should be clear about how absences will be handled so that residents don't feel pressured to come into work because they don't want to burden their colleagues.

References

1. Wise ME, de Perio M, Halpin J, et al. Transmission of pandemic (H1N1) 2009 influenza to health-

care personnel in the United States. *Clin Infect Dis* 2011;52:S198–S204.
2. de Perio M, Brueck SE, and Mueller CA. Evaluation of 2009 pandemic influenza A (H1N1) virus exposure among internal medicine housestaff and fellows. *Health Hazard Evaluation Report* (HETA 2009-0206-3117). Available at www.cdc.gov/niosh/hhe/reports/pdfs/2009-0206-3117.pdf. Accessed on Dec. 14, 2010.
3. Siegel JD, Rhinehart E, Jackson M, et al. CDC Healthcare Infection Control Practices Advisory Committee. 2007 Guideline for isolation precautions: Preventing transmission of infectious agents in healthcare settings. Available at ww.cdc.gov/ncidod/dhqp/pdf/isolation2007.pdf. Accessed on Dec. 14, 2010. ■

New CDC guidelines to prevent neonatal strep

Group B strep leading cause of neonatal sepsis

By **Hal B. Jenson**, MD, FAAP, Professor of Pediatrics, Tufts University School of Medicine, Boston, MA.

Dr. Jenson reports no financial relationships relevant to this field of study.

Synopsis: The 2002 guidelines for prevention of perinatal group B streptococcal disease have been updated with expanded recommendations on laboratory methods, revised algorithms for screening and intrapartum chemoprophylaxis, a change in the recommended dose of penicillin G, updated prophylaxis regimens for women with penicillin allergy, and a revised algorithm for management of newborns.

Source: Centers for Disease Control and Prevention: Prevention of perinatal group B streptococcal disease. Revised guidelines from CDC, 2010. *MMWR* 2010;59(RR-10):1-32.

Group B streptococcal (GBS) disease is the leading cause of early-onset neonatal sepsis (within the first week of life) in the United States. Since the initial recommendations for perinatal prophylaxis in the 1990s, the incidence of GBS has declined by 80%. There are approximately 1,200 cases of early-onset GBS invasive disease each year in the United States, with 70% of cases among newborns ≥ 37 weeks' gestation.

GBS colonization is best determined by collecting both vaginal and rectal (through the anal sphincter) specimens at 35-37 weeks' gestation. Nucleic acid amplification tests (NAAT), such as PCR assays, can be used for GBS identification after an enrichment step. Enrichment increases sensitivity of detection from 54% to 92%-100%; the increased accuracy is much more important than the additional time required to obtain the result. Optical immunoassays and enzyme immunoassays are not sufficiently sensitive to detect GBS colonization reliably.

The double-disk diffusion method (D-zone test) or another validated test is recommended to identify isolates that are erythromycin-resistant and clindamycin-susceptible, which are presumed to have inducible resistance to clindamycin.

Intrapartum GBS prophylaxis is indicated for pregnant women with:

- Previous infant with invasive GBS disease;
- GBS bacteriuria during any trimester of the current pregnancy (except if cesarean delivery is performed before onset of labor with intact amniotic membranes);
- Positive GBS vaginal-rectal screening culture in late gestation (optimally at 35-37 weeks' gestation);
- Unknown GBS status at the onset of labor and any of the following:
- Delivery at < 37 weeks' gestation;
- Amniotic membrane ruptures ≥ 18 hours;
- Intrapartum temperature ≥ 100.4°F (≥38.0°C); and
- Intrapartum NAAT positive for GBS
- Intrapartum GBS prophylaxis is not indicated for pregnant women with:
- Colonization with GBS during a previous pregnancy;
- GBS bacteriuria during a previous pregnancy;
- Negative GBS vaginal-rectal screening culture (optimally at 35-37 weeks' gestation), regardless of intrapartum risk factors; and
- Cesarean delivery performed before on set of labor with intact amniotic membranes, regardless of GBS colonization status or gestational age.

Penicillin G (5 million units IV initial dose, then 2.5-3.0 million units [using the dosing readily available on the hospital formulary] every four hours until delivery) remains the drug of

choice for intrapartum antibiotic prophylaxis, with ampicillin (2 g IV initial dose, then 1 g IV every four hours until delivery) as an acceptable alternative. Penicillin-allergic women who do not have a history of anaphylaxis, angioedema, respiratory distress, or urticaria following administration of a penicillin or cephalosporin should receive cefazolin (2 g IV initial dose, then 1 g IV every 8 hours until delivery).

Antimicrobial susceptibility testing is necessary for GBS from penicillin-allergic women at high risk for anaphylaxis. These women should receive clindamycin if the GBS isolate is susceptible to clindamycin and also erythromycin (e.g., does not have inducible resistance to clindamycin). These women should receive vancomycin if the isolate demonstrates resistance (including inducible resistance) to clindamycin, or if susceptibility to clindamycin and erythromycin is unknown. Erythromycin is no longer an acceptable alternative for intrapartum GBS prophylaxis for penicillin-allergic women.

The management of newborns has also been updated:

- Newborns with signs of sepsis should receive a full diagnostic evaluation (blood culture, CBC including white blood cell differential and platelet count, chest radiograph if abnormal respiratory signs are present, and a lumbar puncture if the newborn is stable) and antibiotic therapy;
- Newborns of mothers with signs of chorioamnionitis should receive a limited evaluation (blood culture, and CBC with differential count and platelet count) with antibiotic therapy pending culture results;
- Newborns of mothers who received intrapartum prophylaxis for ≥ 4 hours before delivery should be observed for ≥ 48 hours; and
- Newborns who are well-appearing and born to mothers who had an indication for GBS prophylaxis but received no or inadequate (incorrect regimen, < four hours before delivery) prophylaxis:
- Newborns ≥ 37 weeks and 0 days' gestation and duration of membrane rupture < 18 hours should be observed be for ≥ 48 hours, and no laboratory evaluation is recommended unless symptoms develop; and
- Newborns < 37 weeks gestation or duration of membrane rupture ≥ 18 hours should have a limited evaluation and ob served for ≥ 48 hours.
- Antibiotic therapy for newborns should include ampicillin for GBS as well as coverage for gram-negative pathogens, pending culture results. ■

CNE/CME answers

5. D; 6. A; 7. D; 8. A

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

- Next issue: Our Joint Commission supplement
- Best practices report on hand hygiene
- What new guidelines are coming from HICPAC?
- Infection prevention research underway nationwide
- HAIs a prime target of health care reform

CNE/CME Questions

5. In surveillance data for *Clostridium difficile* in pediatric patients, children with what condition were more likely to be infected?
A. inflammatory bowel disease
B. organ transplant
C. cancer
D. All of the above

6. After an analysis that controlled for other conditions, children with *C. diff* infection had a mortality rate of 16.8% to 23.6%.
A. True
B. False

7. A federal report on Medicare patients included details on 12 patient deaths. Seven of the patient deaths were related to which of the following?
A. infections
B. aspiration problems
C. cardiac arrests
D. medication errors

8. A study of MRSA in the emergency department found what percentage of incoming patients were colonized with the pathogen?
A. 5%
B. 7%
C. 11%
D. 15%