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INSIDE

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PPE use contaminates workers as training, compliance lax

Ebola sheds light on a longstanding problem

By Gary Evans, Senior Staff Writer

Research spurred by the Ebola crisis continues to reveal that healthcare workers are poorly trained in the use of personal protective equipment (PPE), frequently contaminating themselves with pathogens that can endanger their personal health and subsequent patient contacts.

On the positive side, an intervention and training program that gave workers immediate visual feedback on their level of contamination after removing PPE reduced exposures significantly.

In general, however, it appears Ebola brought to light a longstanding problem in U.S. hospitals. In West Africa, the outbreak is almost over in a conventional sense, though recent reports that the Ebola could survive in semen for nine months may lead to sporadic cases if the viral RNA discovered in the study is capable of sexual transmission.[1] As of Oct. 25, 2015, the World Health Organization reported a total of 28,575 Ebola cases with 11,313 deaths. As of Aug. 31, WHO reported a 50% mortality rate in healthcare workers, as 240 doctors, nurses, aides, and support staff have acquired Ebola and 120 of them died. A contributing factor was a shortage of PPE and improper use of the equipment when it was available, the WHO noted.

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Yet barring another introduction in a

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SENIOR STAFF WRITER: Gary Evans, (706) 424-3915, (gary.evans@ahcmedia.com).
MANAGING EDITOR: Jill Drachenberg
CONTINUING EDUCATION AND EDITORIAL DIRECTOR: Lee Landenberger

EDITORIAL QUESTIONS:
For questions or comments, call
Gary Evans at (706) 424-3915.

U.S. hospital, the teachable moment — the intense focus on healthcare worker safety — may fade out here with the epidemic in Africa. Still, a return to PPE complacency is hardly acceptable since research now shows worker contamination is a chronic problem. For example, researchers recently reported that more than half of healthcare workers contaminated themselves while removing their gloves in a simulation study.[2] Clearly, an emphasis on standardized training and competent PPE use is needed, but healthcare workers may feel little sense of urgency on the issue in the absence of a life-threatening infection.

One barrier to PPE training programs "is the current healthcare worker attitude toward PPE for routine pathogens," says **Michelle Doll**, MD, co-author of an editorial[3] on the simulation study and an infectious disease physician at Virginia Commonwealth University in Richmond. "While PPE training for Ebola was well accepted as vitally important for healthcare workers, the more routine PPE use is generally not regarded as a complicated procedure that necessitates specific training. This is likely due to a perceived low risk. In fact, compliance with PPE at all can be problematic in hospitals."

Indeed, research suggests that healthcare personnel wear PPE less than half the time when it is indicated and overall compliance is lower than that of historically difficult hand hygiene.[4]

A major factor in this trend appears to be the fundamental issue of PPE training — or lack thereof. An unpublished study recently presented in San Diego at the IDWeek conference found that many hospital workers were inadequately trained in the use of PPE and some reported no training at all.[5]

"Among the physicians, 16% denied ever receiving any sort of training," said lead researcher **Curtis Donskey**, MD, an infectious disease physician at Louis Stokes Cleveland VA Medical Center. "They were working with gloves and gowns and had never been told how to properly use them. Another thing that we assessed was how effective was the training? A lot of the training that nurses and others get is suboptimal. It primarily involves a demonstration but does not necessarily go beyond that to have them demonstrate that they are proficient in removing PPE quickly and following the recommendations."

The researchers say these findings could be generally extrapolated to indicate a similar lack of training in other hospitals.

"We focused on personnel in our facility but we have also discussed this with infection control and other people around the country and they describe similar deficiencies in training on PPE," Donskey says.

If contamination is occurring as frequently as it now appears, healthcare workers must redouble their hand hygiene practices after PPE use to protect themselves and their patients. While transient colonization of pathogens on workers' hands has been long known to spread infections between patients, employee health professionals should remind workers that they are also at risk. Ebola drove home the threat of occupational infections, but improper use of PPE also leaves healthcare workers exposed to common pathogens they may encounter frequently. *(See related story, page 138.)*

"Healthcare personnel want to protect themselves against Ebola, but they have acquired *Clostridium difficile*, norovirus and [multidrug

resistant bacteria]," Donskey says. "They don't want to acquire an infection or carry those things home on their clothing, and they also don't want to spread infections in the hospital."

Training deficiencies

In the IDWeek study, the VA Medical Center personnel were surveyed to assess the type and frequency of PPE training they received and their confidence in avoiding contamination.

"We were looking at physicians, nurses, and ancillary staff, most of whom are regularly going in and out of isolation rooms," Donskey says.

Those three healthcare worker groups were equally represented in the survey participants, comprising about one-third each of the 222 respondents. Overall, 25% of personnel reported that they had received no PPE training in their current position, and 9% reported never receiving such training during their career. Only 1% of nurses had received no PPE training, as opposed to the aforementioned 16% of physicians. Of the physicians that reported prior training, only 13% said they received "formal training" that requires the trainee to demonstrate correct technique.

"These [physicians] were staff members at our hospital — residents or fellows," he says. "They weren't people who would have been trained somewhere outside our facility, but we were asking about training in our facility and outside as well."

Of overall respondents that had been trained, 46% received formal training, 42% reported informal on-the-job instruction, and 41% completed computer-based instruction. Of 222 personnel, 80 (36%) did not feel confident that they could avoid contamination with their PPE technique.

"We implemented an intervention that was in part inspired by the Ebola crisis, which led us to think that we really need to do more to train personnel in the use of PPE," he tells *Hospital Employee Health*. "We are incorporating a lot of our training tools that we developed into our [routine] training. We would like to make this something done on an ongoing basis that includes [all] physicians and allied health personnel."

> "PART OF THE PROBLEM IS THAT IF WE ASKED HEALTHCARE PERSONNEL ABOUT THIS I SUSPECT MOST WOULD BE UNAWARE OF THE SIGNIFICANT RISK OF CONTAMINATION DURING PPE REMOVAL."

The new training initiative is based on an intervention Donskey and colleagues developed during a study that quantified the frequency of contamination of workers removing PPE, using surrogate markers to show where pathogens would be found on the skin. In that recently published study,[2] contamination of the skin and clothing of healthcare workers happened frequently during the removal of gloves or gowns as shown by fluorescent lotion under black light.

"Part of the problem is that if we asked healthcare personnel about this I suspect most would be unaware of the significant risk of contamination during PPE removal," he says. "These deficiencies in our PPE practices create a potential recipe for disaster when we ask personnel with limited training in use of PPE to provide care for patients with Ebola and other highly transmissible pathogens."

Study participants included a convenience sample of healthcare personnel from four northeast Ohio hospitals who conducted simulations of contaminated PPE removal using the fluorescent lotion. An intervention was conducted in one medical center, where healthcare workers received education and practice in removal of the contaminated PPE. Importantly, they received immediate visual feedback showing the fluorescent lotion contamination of their skin and clothing.

"The sessions included a 10-minute educational video and 20 minutes of demonstrations with practice in PPE donning and doffing using the florescent lotion to identify sites of contamination," Donskey says.

The PPE donning and doffing technique was considered correct if the following four criteria were met:

- correct donning order, with gown first followed by gloves;
- gloves extended to cover the wrist of the isolation gown;
- gown doffed by pulling away from the neck, shoulders, and body
- gloves removed by peeling off the gloves at the same time as the gown or using a glove-in-glove technique wherein gloves are removed one at a time, making sure that bare skin does not touch the contaminated outside surface of the glove.

Contamination in 46% of PPE use

Overall, of the 435 glove and gown removal simulations, contamination of skin or clothing with fluorescent lotion occurred in 200 (46%), with a similar frequency of contamination among the four hospitals (range, 43%-50%). Contamination occurred more frequently during removal of contaminated gloves (53%) than gowns (38%) and when lapses in technique were observed (70%) than not (30%).

In the intervention group, skin and clothing contamination during glove and gown removal fell from 60% to 19%. This reduction fell further to 12% at one-month and three-month checkpoints after the initial training. These findings suggest that simulations using fluorescent lotions can improve techniques for standard glove and gown removal and for training in removal of full-body coverage PPE used in the care of patients infected with pathogens such as Ebola virus, the authors concluded.

In the overall study, a sobering detail is that even when no lapses in technique were observed, contamination occurred in approximately one-third of the simulations. Even the highly successful intervention could get no lower than a 12% contamination rate. Additional measures used for Ebola — disinfecting gloves during the removal process or having a partner observe doffing technique — would be difficult to implement in day-to-day patient care. A study in press by the same group of researchers found that glove disinfection with bleach wipes after care of *C. diff* patients reduced the spore levels on worker hands, but gowns were still frequently a source of contamination.[6]

There may be a need for a PPE redesign to create products that are easy to remove while minimizing the risk for self-contamination. For example, Donskey and colleagues found that only one size of cover gown was available at each hospital in the contamination study, leaving small, large, and tall personnel in ill-fitting gowns.

In the accompanying editorial to the study, Doll and her co-author emphasize that a standardized PPE training protocol is long overdue and suggest use of standard precautions in some cases instead of patient isolation for so many pathogens. The immediate feedback method used in the Donskey study should be part of any standard training, but questions remain about sustaining the gain. Healthcare worker "fatigue" with contact precautions has been widely evidenced, and thus any training program may face subsequent compliance problems.

These concerns and conclusions echo those made in another recent PPE study[7] by **Nasia Safdar**, MD, PhD, infectious disease epidemiologist at William S. Middleton Veterans Hospital in Madison, WI. *(See* HEH*, September 2015.)*

"There's no national benchmark for PPE compliance and there's no requirement to routinely collect this sort of information," she noted. "It just never reached anyone's radar until Ebola."

Editor's note: The CDC last updated its guidelines for PPE use for Ebola on August 27, 2015. The updated guidance is for both confirmed Ebola patients and clinically stable persons under investigation. It includes a frequently asked questions section and is available at http://www.cdc.gov/vhf/ebola/healthcare-us/ppe/index.html.

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Ebola, chronic PPE woes give OSHA momentum for infectious disease rule

APHA warns of 'unimaginable' impact if next threat easily spreads

Whether you are pro regulation or not, it is hard to imagine that the Occupational Safety and Health Administration will find a better time than the present to issue its long-awaited infectious disease rule to protect healthcare workers.

Consider that this murderers' row of novel pathogens — some of which caused fatal occupational infections — have all emerged in the last dozen years: Severe Acute Respiratory Syndrome (SARs), H1N1 pandemic influenza A, Middle East Respiratory Syndrome (MERS) and Ebola. In addition, multidrug-resistant bacteria are increasing, a virulent strain of *Clostridium difficile* has reached epidemic levels, and millions of baby boomers are carrying hepatitis C virus.

OSHA has been considering regulating worker protection against infectious diseases in healthcare settings for several years. Thus the timing with Ebola was coincidental last year when OSHA released details of a proposed rule that would make infection control measures mandatory and add new requirements for hazard identification, exposure control, and documentation. *(See* Hospital Employee Health*, Dec. 2014.)*

As we reported, an OSHA spokesperson said, "Workers currently face a number of infectious diseases, and there are always new threats over the horizon. The infectious disease standard would require employers to have a plan to protect their employees from any infectious disease, rather than going on a disease-by-disease basis."

OSHA included "enhancements to current infectious disease protocols in healthcare and other high risk environments" as a regulatory priority for 2015 and is projected by some insiders to issue proposed rulemaking on the infectious disease standard in 2016.

While small business groups and other stakeholders said the standard would be redundant with existing requirements, the American Public Health Association emphasized that the Ebola outbreak in Dallas underscored the "urgent need" for an OSHA infectious disease standard.

> OSHA HAS BEEN CONSIDERING REGULATING WORKER PROTECTION AGAINST INFECTIOUS DISEASES IN HEALTHCARE SETTINGS FOR SEVERAL YEARS.

"The guidance provided by the Centers for Disease Control and Prevention failed to adequately address worker exposures, resulting in two healthcare workers becoming ill and fostering stigma and fear," the APHA stated.[1] "Had this been a widespread outbreak involving a pathogen easily transmitted between humans, the loss of life and the economic and social impacts would have been unimaginable. These experiences and threats … support the urgent need for an infectious disease standard to be promulgated by the Occupational Safety and Health Administration."

Other occupational health leaders and advocates have joined the chorus, saying "It is time for unanimous congressional support for promulgation of the OSHA's long-awaited Infectious Disease Rule. … The rule narrows safety gaps by expanding the work that has already been done related to bloodborne pathogens such as HIV and hepatitis B and C."[2]

Despite such political momentum, there is some question when and if OSHA will proceed with an issue that is sure to be controversial after the stiff resistance the agency faced trying to get a TB standard approved in the 1990s. One OSHA legal advisory group noted, "By the end of 2016 … OSHA plans to issue a proposed rule creating an infectious disease standard. Whether this proposal materializes remains to be seen."[3]

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Healthcare workers on antibiotics at risk of *Clostridium difficile*

Employee health should inform workers of infection risk

A 24-year-old nurse prescribed antibiotics during dental care develops severe diarrhea that does not respond to initial treatment, knocking her out of work in an oncology ward for two weeks. What happened? Occupational *Clostridium difficile*.

With *C. diff* at epidemic levels, workers may acquire the bug from patients if they take antibiotics that wipe out the commensal bacteria in the gut and open a path for the pathogen.

"I think it would be a good idea for employee health to inform personnel about this risk if they are prescribed antibiotics," says **Curtis Donskey**, MD, an infectious disease physician at Louis Stokes Cleveland VA Medical Center. "I do that routinely if I prescribe antibiotics to someone working in a healthcare setting."

With no active surveillance system for such occupational infections, there are almost certainly more occurring than the cases sporadically documented in the medical literature.

"When I give presentations and comment on the risk to healthcare personnel taking antibiotics, it is common for a physician or nurse to come up afterwards and say that they or one of their coworkers got a *C. diff* infection while they were working," he says.

Donskey previously investigated some of these *C. diff* infections, reporting one case of a patient transporter who developed symptomatic *C. diff* and vancomycin-resistant *Enterococcus* (VRE) colonization after taking clindamycin for another condition.[1] The researcher subsequently reported four additional cases of *C. difficile* infection in healthcare workers, all of whom were in good health with the exception of the conditions for which antibiotics were prescribed.[2] All subjects developed diarrhea during antibiotic treatment or within two weeks after completing it. The cases underscore that even healthy workers may be at risk of *C. diff* infection after receiving short courses of relatively narrow-spectrum antibiotics. Of course, healthcare staff with underlying conditions that impair immune response are at greater risk of more serious infections.

C. diff infections can sideline healthcare workers for a prolonged period in some cases, as with the aforementioned nurse furloughed for a fortnight after taking clindamycin related to dental care.[3] Her *C. diff* infection did not respond to initial treatment with metronidazole, but she fully recovered when switched to vancomycin.

Patients with *C. diff* typically have diarrhea and are indicated for contact isolation precautions requiring gloves, gowns, and other measures because the spore-forming pathogen can linger in the environment and spreads via the fecal-oral route. Thus, the PPE problems with training and compliance described in this issue of *Hospital Employee Health* do not bode well for control of *C. diff* and protection of workers.

C. diff has become one of the most prevalent and deadly healthcare-associated infections in the country, directly attributable for some 15,000 patient deaths annually, according to the Centers for Disease Control and Prevention.[4] A confluence of events has led to the current *C. diff* epidemic, including the emergence of the highly virulent and toxigenic NAP1 strain in 2000, the misuse and overuse of antibiotics, and the difficulty of removing *C. diff* spores from contaminated surfaces and healthcare worker hands.

Gloves critical

In that regard, appropriate glove use by healthcare workers caring for *C. diff* patients is critical because the safety net of hand hygiene is much less protective. The problem — and it's a big one — is that the alcohol hand rubs now ubiquitous in healthcare are largely ineffective against *C. diff* spores. Traditional soap and water fares little better. As a result, the CDC and a consensus of infection control and occupational health experts advise in compendium guidelines that glove use is critical. "Although *in vivo* studies demonstrate that *C. difficile* spores are resistant to alcohol, they also show poor log reductions (less than 2) for hand washing with soap and water," the compendium guidelines state.[5] "A 2013 study[6] showed that only atypical products (e.g., ink and stain remover) could remove more than 1 log."

The CDC currently recommends that healthcare workers "wear gloves and gowns when treating patients with *C. difficile*, even during short visits. Hand sanitizer does not kill *C.*

difficile, and although hand washing works better, it still may not be sufficient alone, thus the importance of gloves."[7]

C. diff can become a life-threatening infection if its toxigenic effects begin to attack the digestive system.

"Unfortunately, the type of *C. diff* circulating in the U.S. today produces such a powerful toxin that it can cause a truly deadly diarrhea," says **Michael Bell**, MD, a medical epidemiologist in the CDC division of healthcare quality promotion. "[It's an] intense illness that can include damage to the bowels so painful and severe that part of the colon needs to be surgically removed, a condition called megacolon."

Norovirus, MRSA

Adding symptoms of vomiting to the bowel woes is norovirus, which can spread rapidly in explosive outbreaks that include both healthcare workers and patients. Though generally not as life threatening as *C. diff*, one study reported norovirus mortality rates as high as 20% in patients age 65 and older.[8] The most common cause of healthcare outbreaks, norovirus frequently leads to closed hospital wards and furloughed workers. In one norovirus outbreak, 316 healthcare workers (8% of the total hospital staff) — including the only employee health professional at the facility — acquired the nasty bug.[9] In another outbreak that included 265 healthcare workers and 80 patients, 13 infected workers (4.9%) required emergency department visits or hospitalization.[10] Costs associated with the outbreak were estimated to be $657,644 due in part to furloughed workers and significant disruptions in patient care.

To cite one more example that underscores the importance of compliance with PPE, healthcare workers have been infected with MRSA, are frequently transiently colonized, and can become chronic carriers if the pathogen finds refuge in a body site. Transient contamination of worker hands is considered a prime source of transmission of MRSA between patients, making hand washing and PPE use critical. In 1998 healthcare personnel guidelines that are in the process of being updated, the CDC recommends that if workers have a draining lesion suspected to be MRSA, cultures should be taken and they should be excluded from patient care or food handling until the infection has been ruled out or personnel have received adequate therapy and the infection resolves.[11]

However, the CDC notes that employee health professionals should not routinely exclude personnel with colonization with MRSA (in the nose, hands, or other body site) from patient care or food handling unless they are linked to transmission of the pathogen. MRSA colonization is common in the anterior nares, but other sites, such as the hands, axilla, perineum, nasopharynx, and oropharynx, may also be involved. In some cases, healthcare workers become chronic MRSA carriers and can spread the bacteria to patients until their condition is detected.

One such case reported this year traced a series of MRSA surgical infections to an OR worker who was asymptomatically but chronically colonized.[12] The investigation began when three surgical patients were infected with MRSA within a two-month period.

"Every time we have a surgical site infection we swab all staff that were part of the surgery, even on anyone who entered the operating room," says lead investigator **Lorraine Maze Dit Mieusement**, RN, MN, CIC, an infection preventionist at Mount Sinai Hospital in Toronto.

One healthcare worker, who was present during all three SSI cases, tested positive for MRSA that matched the infecting strain by pulsed-field typing. For confidentiality reasons, the hospital is not releasing the worker's duties in the OR and other identifying details. "The swabs we did to detect it on the healthcare worker were groin swabs, and once the healthcare worker received decolonization [treatment] the MRSA was gone," she says.

Decolonization included a week-long treatment with mupirocin and chlorhexidine.

"So the person did the treatment for seven days — the follow-up swabs were negative and we continue to do follow up swabbing every month to make sure that they remain negative," Dit Mieusement says. Following this discovery, previous isolates that were closely related to the infecting MRSA strain were identified from the lab database. The investigators found two additional patients with surgical site infections linked to the same worker, despite no clear evidence of breaches in PPE use and infection control precautions in any of the cases.

"We know that in the operating room [healthcare workers] can shed skin cells," she says. "Yes, they are wearing masks and gloves, but there are parts of your face that are still exposed. You can shed some skin cells and if that gets into the air in the OR — one colony of bacteria in the surgical site can be catastrophic."

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EPINet relaunch: New leadership, expanding mission to go beyond hepatitis, HIV exposures

Now includes C. diff, MRSA exposures

The International Healthcare Worker Safety Center — one of the original surveillance systems for healthcare worker needlesticks — has made a dramatic transition to an independent non-profit center that is widening the net beyond bloodborne pathogens to include worker exposures to *Clostridium difficile* and MRSA.

"This is a great way to branch out while keeping bloodborne pathogens at our core," says **Amber Mitchell**, DrPh, MPH, CPH, the new president and executive director of what is now called the International Safety Center. "We will be focusing on the healthcare-based and the community-based pathogens that are becoming more and more prevalent."

The center will continue to offer free standardized recording and tracking of sharps injuries and blood and body fluid contacts through the forms and database that comprise the Exposure Prevention Information Network (EPINet) database. The original Healthcare Worker Safety Center was housed at the University of Virginia in Charlottesville as founded in 1991 and directed by needlestick prevention pioneer **Janine Jagger**, PhD, MPH, a professor of medicine at UVA. In turning the reins over to Mitchell and colleagues, Jagger said in a statement that with emerging infectious diseases like Ebola and resurging ones like measles, the work of hospital employee health professionals has never been more important.

As part of the transition the center is no longer based at UVA, instead operating as an online collaborative effort and a new website (http://bit.ly/1BqbDpG).

"This type of advocacy center is really best run as an independent nonprofit," Mitchell explains. "Contributions to an academic center have a tremendous amount of overhead — sometimes as high as 45%. We thought that if 100% of contributions could go toward protection of healthcare workers, that was money well allocated."

The International Safety Center will be an extension of the original center, with an enhanced focus on collecting and analyzing data that better identifies healthcare worker safety hazards. The new center is designed to help hospitals, clinics, and other healthcare facilities measure blood and body fluid exposures, sharps injuries, and needlesticks to help prevent worker exposures to dangerous pathogens

like HIV, hepatitis C, measles and methicillin-resistant *Staphylococcus aureus* (MRSA).

That infectious disease threats in occupational health have changed with hepatitis B vaccine being administered in childhood and HIV now a chronic disease for those under appropriate care.

"People are living longer with HIV," Mitchell says. "There is an enormous amount of comorbidities and coinfections like MRSA and *C. difficile*. So while the high-risk exposures may still be the bloodborne pathogens, the contact with these coinfections is what we really want to get at."

To be clear, EPINet tracks exposures, not actual infections. In 2000 the center played a key role in passage of the Needlestick Safety and Prevention Act, which expanded needle safety requirements and oversight by the Occupational Safety and Health Administration. Mitchell collaborated with the UVA center at that time as a key point person at OSHA working to get the law enacted. ■

Expert report: PPE changes, confusion preceded Dallas nurses' Ebola infections

CDC was 'learning alongside the actual providers'

Healthcare workers trying to save a patient dying of Ebola last year at a Dallas hospital were confused and "lost confidence" trying to protect themselves with PPE guidelines that were in flux at that critical time, an expert investigative panel concluded.

Before he died on Oct. 8, 2014, at Texas Health Presbyterian Hospital in Dallas, Thomas Eric Duncan transmitted the virus to two of his nurses — both of whom survived. The investigation did not determine exactly how the transmission occurred, but describes a chaotic scene where any number of factors could have led to the occupational infections.

"Nurses there cared for him following the CDC-directed procedures for use of personal protective equipment; however, healthcare workers had areas of exposed skin that were not fully covered or shielded by the CDC-prescribed level of protective equipment," investigators found. "In Mr. Duncan's case, the volume of liquid gastrointestinal efflux was massive, and these fluids were known to be highly infectious."

The independent expert panel was convened by Texas Health Resources (THR) — the parent company of Texas Health Presbyterian — to investigate the incident. In releasing the report on Sept. 5, 2015, THR stated it has implemented several steps to improve the quality of care provided to patients at the Dallas hospital and the system's other North Texas facilities.

"We welcome this panel report and believe that it will lead us to better diagnoses of diseases in our emergency rooms, better care for our patients overall, and better coordination with local, state and federal officials in the event another rare event like this unfolds," THR CEO **Barclay Berdan**, FACHE, said in a statement. "We're hopeful that these findings will also help hospitals and health systems across the country be better prepared for future novel events."

In that regard, the expert panel report concluded that "in retrospect, THR learned that reaching an appropriate level of preparedness requires addressing two important issues: preparing a community hospital for the arrival and diagnosis of a patient infected with Ebola or any other emerging infectious disease, and making sure the staff and the facility are ready to treat a patient who is infected. These are two distinct dimensions of preparedness that community hospitals must drill for to ensure their staff is ready to diagnose, stabilize and treat a patient [with a novel infection]."

Having been infamously turned away by the hospital emergency department two days prior, the rapidly deteriorating Duncan was brought back to the hospital by ambulance Sept. 28, informing the hospital of his Ebola symptoms in route. He was cared for in a separate, isolated area of the ED for approximately 30 hours and then transferred to a medical ICU. The 24-bed unit was vacated and dedicated solely for the care of this single patient.

After the initial concern about having exposed skin after donning protective gear, the nursing staff and hospital leadership decided to upgrade to more rigorous PPE that include Powered Air Purifying Respirators (PAPRs) and Tyvek suits.

"Based on a review of the timeline of events, it is clear that the CDC's focus in early conversations with the hospital was on contact-tracing and notification," the investigative panel reported. "It does not appear that issues such as personal protective equipment, waste management, and other challenges that would emerge as critical were addressed by CDC at the onset of this event. The first representative of the CDC did not arrive on-site until three days after Mr. Duncan entered the emergency department the second time, and only after there was a confirmed positive Ebola test."

Two ICU nurses were diagnosed with Ebola on October 12 and October 15, respectively. "Despite careful analysis of the timeline and fact pattern, it is impossible to know for certain exactly when or how the virus was transmitted to them," the panel concluded. "It was clear that these nurses — and other nurses and hospital staff caring for Mr. Duncan — took seriously their responsibility to follow all protocols and guidelines, including working collaboratively with CDC to refine personal protective equipment technique from shift to shift."

Although this was not included in the report, CDC Director **Tom Frieden**, MD, stated at the time — after the first nurse was reported infected — that, "I wish we had put a team like this on the ground the day the first patient was diagnosed. That might have prevented this infection. But we will do that from today onward with any case, anywhere in the U.S."

However, even when CDC was on site at the Dallas hospital, there was confusion among staff about the role of the various federal advisors. This misunderstanding led to some uncertainty about what standards to follow and who would provide the most up-to-date guidance on managing infection control and personal protective equipment, the expert panel said.

"This challenge was most evident as noted by the clinicians and their leadership concerning the evolving standards in the use of personal protective equipment," the panel found. "Consistent with published CDC guidelines, the staff used contact and droplet precautions at the onset, and evolved to the use of PAPRs. On arrival of CDC and following the initiation of PAPRs, the team worked with CDC to continue to evolve the approach to personal protective equipment. The sequence of new PPE and training meant that staff had to adapt, train, and relearn PPE donning and doffing from shift to shift. This constant learning and relearning eroded the staff's confidence that they were fully up-to-date and competent on the latest modifications that were being developed in real-time. The doffing process was particularly difficult and required more training to build efficacy."

> "THIS CHALLENGE WAS MOST EVIDENT AS NOTED BY THE CLINICIANS AND THEIR LEADERSHIP CONCERNING THE EVOLVING STANDARDS IN THE USE OF PERSONAL PROTECTIVE EQUIPMENT."

The removal of contaminated PPE has been theorized as the source of transmission to the two nurses, but again the expert panel did not draw any conclusions on what specific exposures may have led to the infections. They took the CDC to task and reminded hospitals it is better to be prepared to deal with a crisis independently by making the following two points:

- It was evident during this process that the CDC and others were learning alongside the actual providers. In retrospect, it appears that there was a lack of effective and efficient collaboration prior to the event between the hospital, THR, the CDC, HHS, and the Department of Transportation as well as city and state public health resources.
- When preparing for future disease outbreaks, hospital administrators, doctors, and nurses must understand that the CDC serves only in an advisory role and it is up to the institution to take care of individual patients and ensure quality, safety, and high reliability of clinical operations. It is also critical for CDC to better communicate its role and to work collaboratively with health systems prior to, during, and after an event like Ebola.

In addition, staff stress management suffered during the Ebola incident because workers were initially directed to the Employee Assistance Program. These programs are frequently

perceived as a resource for staff with workplace behavior issues and are therefore viewed negatively by some workers, the panel reported. To support staff collectively, Critical Incident Stress Management (CISM) should be activated to look at the organization more broadly and support groups of staff affected by an event, the report recommended.

"The movement from the EAP to the CISM appeared to be hindered by situational awareness, a system gap in terms of training, and a preferred focus on the role of the EAP leading to a slow activation and limited reliance on CISM," the report concluded.

Why was the patient sent home?

It is tragic but true that Duncan might have survived had an Ebola diagnosis been made during his initial visit to the hospital. We'll never know. As employee health professionals are no doubt aware, Duncan had been seen and sent home two days before his subsequent admission by emergency department personnel at Texas Health Presbyterian. On Sept. 25, 2014, Duncan went to the hospital emergency department complaining of dizziness, abdominal pain, nausea, and headache. Later, an ED physician added symptoms of rhinorrhea and nasal congestion following a physical exam.

"After a wait of approximately an hour, the patient was taken back to the treatment area and assessed separately, first by a nurse and then by a physician," the investigators reported. "During the nursing assessment, when questioned as part of the influenza screening process, the patient identified that he had recently travelled from Africa. This information was documented in the patient record; however, it was not communicated verbally to the physician as directed by a prompt in the electronic health record (EHR). According to the record, the physician or scribe noted in a separate area of the EHR that the patient stated that he was from the Dallas area."

Though entered into the EHR, Duncan's information was not verbally communicated among the staff and the electronic record was not configured to provide for automatic alerts on questions related to travel history. "Once the information was entered, there were no systems in place that would trigger a review or re-asking of critical travel information," the panel found.

In addition, a recently implemented patient diagnostic tool called the Systemic Inflammatory Response Syndrome Score (SIRSS) should have raised a red flag, but was missed or ignored by clinical staff. The SIRSS can range from 0 to 4, with a higher score indicating a possible need for further diagnostic work to determine if the patient is septic. When the SIRSS is 2 or above, an electronic board visible to ED staff is highlighted in red, indicating a need for further intervention. The care team responsible for Mr. Duncan did not take action, though the score had increased to 3.

"The nurse who noted the increase did not verbally communicate that increased score to the physician or the discharge nurse," investigators found. "In addition, although displayed on an electronic board visible to all members of the care team, the alert related to the increase of the SIRSS was not acknowledged by the discharging physician or others involved in the discharge of the patient. This indicates the physician's and clinical teams' potential unfamiliarity with the electronic board and SIRSS score display and in retrospect appears to show a limited focus on the entire care encounter by the clinical team."

Other report findings that contributed to the misdiagnosis and discharge of Duncan included that training for Ebola preparedness had not been fully implemented in the ED and the awareness of risk factors for Ebola across the entire clinical team had not been sufficiently stressed. Instead, the ED was highly focused on the launch of a Level II Trauma Program and was trying to improve "patient satisfaction workflow" with an abbreviated triage process, the investigators reported.

"The Expert Panel Report to Texas Health Resources Leadership on the 2014 Ebola Events" is available at the THR website: http://bit.ly/1R7j0oP. ■

COMING IN FUTURE MONTHS

- The doctor is sick — but he showed up at work
- Fatigue: Know the risks and countermeasures
- Ergonomics: If the chair fits, sit in it
- Healthcare reform: Is employee health still in a winning position?

CNE INSTRUCTIONS

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CNE QUESTIONS

1. A training program that used fluorescent lotion to give workers immediate visual feedback on their level of contamination after removing PPE reduced exposures to what low point at one- and three-month follow-up?

A. 19%
B. 23%
C. 5%
D. 12%

2 .In a PPE survey, 16% of which worker group said they had received no training in use of the equipment?

A. Physicians
B. Nurses
C. Ancillary staff
D. Housekeeping

3. Curtis Donskey, MD, recommended that employee health professionals advise workers of the threat of *Clostridium difficile* infection if they:

A. wash hands only with alcohol solutions.
B. have a cut or wound on the hands.
C. are taking antibiotics for another condition.
D. are considering elective surgery.

4. An expert panel found that both Dallas nurses infected with Ebola last year had reported problems removing double gloves without contaminating themselves, suggesting that scenario is the most likely source of transmission from the patient.

A. True
B. False

CNE OBJECTIVES

After reading each issue of *Hospital Employee Health*, the nurse will be able to do the following:

1. Identify particular clinical, administrative, or regulatory issues related to the care of hospital employees;
2. Describe how the clinical, administrative and regulatory issues particular to the care of hospital employees affect health care workers, hospitals, or the healthcare industry at large;
3. Cite solutions to the problems faced in the care of hospital employees based on expert guidelines from relevant regulatory bodies, or the independent recommendations of other employee health professionals.

HOSPITAL EMPLOYEE HEALTH

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Wellness

Work Culture

Workplace Violence