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INSIDE

RELIAS MEDIA

Special Report: Improving Infection Control in OR Anesthesiology

By Gary Evans, Medical Writer

(Editor's note: The Society for Healthcare Epidemiology of America [SHEA] recently issued infection control guidance on anesthesiology procedures in the operating room, an area where infection control has historically been difficult to implement. SHEA also held the first in a planned series of webinars on implementing the guidance. Coverage of this important initiative will continue in upcoming issues.)

The infection control challenges in anesthetizing patients in the operating room include longstanding problems with hand hygiene, frequent contamination of surfaces and equipment, and a work culture that drives rapid turnover of the OR after procedures, SHEA reports in recently issued guidance.[1]

"We need to reset the metrics that are measured by our hospitals. Turnover time is important, but it is equally important to ensure that an operating room that is going to care for the next patient is cleaned and disinfected," said **Silvia Munoz-Price**, MD, PhD, lead author of the guidelines and an infectious disease professor at the Medical College of Wisconsin in Milwaukee. Munoz-Price and other anesthesiology experts spoke at a recent SHEA webinar on the guidelines.

> THREATS TO PATIENT SAFETY IN ANESTHESIA ARE COMPOUNDED BY PREVAILING ATTITUDES THAT FAVOR ENTRENCHED PRACTICES AND DISCOUNT THE RISK OF INFECTIONS.

"It is unfair to our patients to place them in dirty operating rooms. Most people assume that it is a sterile environment, but it is not."

Financial Disclosure: Peer Reviewer **Patrick Joseph**, MD, reports that he is a consultant for Genomic Health, Siemens, and CareDx. Senior Writer **Gary Evans**, Editor **Jesse Saffron**, Editor **Jill Drachenberg**, Nurse Planner **Patti Grant**, RN, BSN, MS, CIC, and Editorial Group Manager **Terrey L. Hatcher** report no consultant, stockholder, speaker's bureau, research, or other financial relationships with companies having ties to this field of study.

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In addition to the environmental contamination and cross-transmission concerns, anesthesiologists routinely work with needles, syringes, and multidose vials. There are many well-documented, recurrent outbreaks involving contaminated needles, syringes, and solutions. A 1995 survey of anesthesiologists really put this issue on the map, finding that a staggering 20% of respondents "reported frequently or always reusing syringes for more than one patient."[2]

Since then, of course, awareness of injection safety has been raised considerably through such efforts as the Centers for Disease Control and Prevention's (CDC's) "One & Only Campaign."

Nevertheless, the SHEA guidelines reiterate the importance of this issue, stating: "Single-dose medication vials and flushes should be used whenever possible. If multiple-dose medication vials must be used, they should be used for only one patient and should only be accessed with a new sterile syringe and new sterile needle for each entry. Syringes and needles are single patient devices and syringes should never be reused for another patient, even if the needle is changed."

SHEA recommends using provider-prepared sterile injectable drugs "as soon as practicable" after they are prepared.

"The maximum allowable time prior to administration of provider prepared sterile injectable drugs has been controversial. It is currently under continuing discussion at a national level," said **Andrew Bowdle**, MD, a co-author of the guidelines and an anesthesiologist at the University of Washington in Seattle.

If available, commercial prefilled syringes or syringes prepared by hospital pharmacy may provide a better option. "These have a longer shelf life than provider-prepared drugs, and institutions should consider that option when possible," he added.

The threats to patient safety in anesthesia are compounded by prevailing attitudes that favor entrenched practices and discount the risk of infections. Convincing anesthesiologists "to take this seriously" is an ongoing challenge, said co-author of the guidelines **David J. Birnbach**, MD, of the American Society of Anesthesiologists. The demographic shift that is impacting healthcare in general is true for anesthesiology, as more nurse and physician clinicians are nearing retirement, he notes.

"They have worked through many years in an environment where no one thought about OR-related infections," Birnbach said.

Connecting the Dots

As with many healthcare-associated infections (HAIs), it is exceedingly difficult to link lapses in the delivery of anesthesia in the OR with a subsequent patient infection. However, anesthesia-related infections comprise some unknown portion of the tens of thousands of post-surgical infections that occur annually, many of which are thought to be preventable.

The CDC reported a total of 14.2 million operative procedures were performed in U.S. hospitals in 2014.[3] Extrapolating surveillance data from the CDC's National Healthcare Safety Network sentinel hospitals shows that some 1.9% of those procedures — more than 250,000 people — could have post-surgical infections.

"It's very hard to connect the dots and imagine that an infection that occurs two or three days after surgery was somehow due to contamination in the operating room," Birnbach said. "So, part of our efforts going forward are educational and motivational. At every level, we have got to convince everyone working in the OR to take this seriously."

In a January 2019 update, the CDC warns that "while advances have been made in infection control practices … surgical site infections (SSIs) remain a substantial cause of morbidity, prolonged hospitalization, and death. SSI is associated with a mortality rate of 3%, and 75% of SSI-associated deaths are directly attributable to the [infection]. SSI is the most costly HAI type, with an estimated annual cost of $3.3 billion."[3]

The new SHEA guidelines warn of "clinically significant microbial cross transmission" in the operating theater. "A growing body of literature has shown contamination in the anesthesia work area, including the anesthesia medical work cart, stopcocks, laryngeal masks, and laryngoscope blades, touchscreens, and keyboards, as well as on providers' hands, resulting in transmissions, healthcare-associated infections, and increased risk of patient mortality," the guidance states.

IP Perspective

Sue Dolan, RN, an infection preventionist at Children's Hospital Colorado in Aurora, was asked by SHEA to provide expert review of the guidelines from an IP perspective. "Anesthesia workflows can sometimes vary from usual practices IPs may be familiar with in other departments," Dolan tells *Hospital Infection Control & Prevention.* "IPs have historically not focused concerted efforts in this department due to [this] unfamiliarity."

There can be a mix of anesthesia providers, some of whom may not be employees of the facility, making it more difficult to develop consistent and sustainable practices, adds Dolan, a past president of the Association for Professionals in Infection Control and Epidemiology.

Some anesthesia staff may be reluctant to change their well-established workflows, especially when it involves critical sequences in their care delivery to the patient, she says.

"The concern is it could contribute to other risks and errors if they change what is innate in their practice," Dolan says.

One reason SHEA consulted Dolan is that she is something of a pioneer in this area, serving as lead author of a previously published paper to raise IP awareness of the infection control challenges in anesthesia. *(See sidebar, page 16.)*

While she researched the anesthesia infection control literature for her paper, Dolan says the SHEA document can really move this issue forward because anesthesiologists were among the group that wrote the guidance.

"That provides credibility in the eyes of anesthesia providers," she says. "Having their societies involved in the creation of the document can make the acceptance of the guidance easier."

That could open new lines of communication and collaboration between IPs and anesthesiology staff, particularly as the SHEA initiative continues with subsequent training and implementation advice.

"We have a lot to learn from each other, which will only make patient care safer," Dolan says.

The guidelines try to establish some continuity between infection control practices on the floor and measures taken in the OR. For example, SHEA recommends that patients on contact isolation be treated accordingly in the OR.

"Anesthesia providers should follow all institution-specific guidelines when caring for patients on contact isolation in the OR, including performing hand hygiene (HH) and using appropriate personal protective equipment," the guidelines recommend.

"Data demonstrate that microorganisms, including multidrug-resistant organisms, can be spread via anesthesia providers in the OR. Research has shown contaminated hands of anesthesia providers contaminate the anesthesia work area."

Thus, infection control measures — including environmental disinfection — "outside of the OR also apply to providers in the OR environment," SHEA emphasizes.

Monitoring and Feedback

SHEA recommends conducting regular monitoring and evaluation of infection prevention practices in anesthesia. "Systems for monitoring, evaluation, and feedback may improve practices, but there was insufficient evidence for SHEA to recommend a specific approach of, for example, automated, electronic, or video monitoring in OR," the guidance states.

"There was not specific evidence [in that respect], but there is quite a bit of literature that surrounds

safety, inpatient care, and OR care in general," said co-author **Joshua Schaffzin**, MD, PhD, director of infection control and prevention at Children's Hospital in Cincinnati. "A major theme that came out of this was that there were collaborative efforts among frontline employees and leadership."

These collaborations helped facilitate evaluations and feedback, so that would seem to be a key aspect of any strategy chosen.

"A collaboration between all of the employees who work in the perioperative area has been shown to be very effective in moving safety and other infection control efforts forward," Schaffzin said.

Regardless of the method, facilities providing feedback should avoid assigning blame in favor of a focus on improving adherence.

"Researchers have found that providers fail to adhere to infection prevention practices not out of malice or indifference but due to a complex combination of beliefs, work environment, technology, information load, and conditioning," the SHEA guidelines state.

In addition to expert consultations and panels, the SHEA guidance was informed by surveys of healthcare epidemiologists and anesthesia society members. One of the results was that more than one-third of respondents did not have infection control policies and procedures specifically for anesthesia.

In addition, 41% of institutions did not provide feedback on hand hygiene compliance. Among the major barriers to hand hygiene compliance during anesthesiology were emergency situations, lack of time in general, and skin factors. Alcohol hand rubs often were not easily accessible, and some said the work culture did not support

Tips on Infection Control and Anesthesiology

A leading infection preventionist (IP) provided expert review on anesthesia infection control for recent guidelines issued by the Society for Healthcare Epidemiology of America (SHEA).[1]

Sue Dolan, RN, an IP at Children's Hospital Colorado in Aurora, is a past president of the Association for Professionals in Infection Control and Epidemiology. Dolan had previously developed an infection control assessment tool[2] for anesthesiology, which was cited by SHEA but not formally included in its recommendations.

Aware that many IPs are unfamiliar with anesthesia practice, Dolan emphasizes common sense measures that include the following:

Environment (clean vs. dirty)

• "Clean and dirty spaces are clearly defined and treated as such. Staff responsible are trained on steps involved in the process. What to discard and where, surface cleaning, and disinfection.

• Method is in place that indicates the OR/procedure room is complete for the environment and medications and room is ready for next patient. (A technician may be responsible for room turnover and the anesthesia staff for the medications).

• Sharps containers and trash bins are easy to access, not overfilled, and are located away from clean areas.

• Laryngoscope blades are bagged in storage."

Disinfection

• "Proper disinfection with hospital-approved product at end of case includes but is not limited to: anesthesia med/supply cart, anesthesia machine (knobs, surfaces, cords, keyboard, monitor, adjustable pressure limiting (APL) valve, IV pole, laryngoscope handle).

• Single patient use items are discarded at the end of each case (e.g., circuits, airway bags, suction tubing).

• Stethoscopes are disinfected per hospital policies and procedures.

• Are anesthesia staff responsible for cleaning and high-level disinfection and/or sterilization of any reusable equipment? If yes, competencies in place and all quality control measures performed and documented."

Exposure management

• Staff can articulate when and how to handle and report exposures to blood/body fluids (HIV, Hepatitis B, Hepatitis C) or other contagious diseases (e.g., tuberculosis, pertussis). ■

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interruptions for recurrent hand hygiene.

Washing Eight 'Hands'

"This is a very difficult area because the anesthesiologist at certain times in a case — especially induction — appears to be an octopus doing eight things simultaneously," Birnbach said. "Some of these things involve moments that would ideally require hand hygiene."

SHEA recommends that, at a minimum, hand hygiene be performed before aseptic tasks such as "inserting central venous catheters, inserting arterial catheters, drawing medications, [and] spiking IV bags." In addition, hands should be disinfected after removing gloves, "before touching the contents of the anesthesia cart," and when entering or leaving the OR.

Accomplishing this in the real world is exceedingly difficult, Birnbach notes.

"Imagine that the anesthetic is induced intravenously, the anesthesiologist grabs a laryngoscope, puts it in the patient's mouth, and takes an endotracheal tube — clearly at this point both hands and some of the environment are contaminated," he said.

This process continues as various anesthesiology equipment is touched, handled, and removed, leaving the OR field increasingly contaminated, Birnbach said.

Indeed, if held to the gold standard of the "WHO 5 Moments for Hand Hygiene," anesthesia providers would have to be disinfecting hands as much as 54 times per hour, SHEA noted in the guidelines.

To assess the level of

Can Novel Use of Gloves Overcome HH Problems?

With appropriate hand hygiene (HH) compliance extremely challenging during anesthesiology practice in the OR, some are considering double gloving or disinfecting gloves while still wearing them as has been done in Ebola outbreaks.

The Society for Healthcare Epidemiology of America (SHEA) recently issued guidance[1] on infection control during anesthesiology procedures in the operating room that raised the possibility of using the unorthodox practices.

"Double gloving may be an option to a least reduce some of the risk, which for example would mean that as soon as the laryngoscopy is complete, the outer set of contaminated gloves is removed, and contamination of other areas is dramatically reduced," said co-author of the guidelines **David J. Birnbach**, MD, of the American Society of Anesthesiologists.

The SHEA guidance recommends, "To reduce risk of contamination in the OR, providers should consider wearing double gloves during airway management and should remove the outer gloves immediately after airway manipulation. As soon as possible, providers should remove the inner gloves and perform HH."

The primary rationale for this practice is that the upper-airway patient secretions contaminate the gloved hands during airway access and endotracheal intubation. If hand hygiene cannot be immediately performed, the contaminated gloves can contaminate the OR environment. Thus, the outer glove acts as a sheath that can be removed until a full glove change with hand hygiene.

"A small fraction of anesthesiologists believe very strongly, as I do, that using alcohol rubs on gloved hands also has a place," Birnbach said. "At this point, there is really inadequate evidence to go one way or the other on whether that should be done routinely during these very task-intense periods in the operating room."

The SHEA recommendations reflect this sentiment, stating, "changing gloves with HH between doffing and donning is the preferred method of disinfection. Current data are inadequate for the authors to either support or discourage the procedure of using [alcohol-based hand rub] on gloved hands or to determine whether application of foam or gel affects glove integrity. However, application of [alcohol-based hand rub] to gloved hands might be better than to not perform any HH when doffing and donning are not feasible." ■

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contamination that can occur, Birnbach and colleagues conducted a clinical simulation study using a mannequin. Unbeknownst to the study participants, a luminescent solution was placed in the dummy's mouth to simulate microbial contamination. After anesthesiologists went through six minutes of simulated procedures, a black light revealed widespread contamination in the OR.

"All of this florescent dye managed to find itself in the operating room," Birnbach said, showing slides of the contamination in the webinar. "The laryngoscope contaminated the top of the anesthesia cart, there is a thumbprint on the anesthesia operating dial, and, perhaps more scary, we had the contamination of the IV hub. There was contamination of the computer keypad as well."

Clearly, hand hygiene must be performed frequently, and the SHEA guidelines cite studies that show increasing access to alcohol dispensers boosts compliance. Other studies suggest that "wearable" hand rub dispensers — some with electronic reminders — can increase adherence. Wearable dispensers in one study led to an eightfold increase in hand hygiene over the rate with wall-mounted units, but not all of these devices are currently commercially available, SHEA added.

"There doesn't seem to be any reason why an anesthesiologist cannot have a dispenser or carry a small hand rub in their pocket — or even better [secure it to] their waist to [disinfect] at frequent intervals," Birnbach said.

Given the handwashing challenges, some anesthesiologists are exploring the option of double gloving, with the outer glove serving as a sheath that can be removed to minimize contamination at a key point in anesthesiology induction. There also is interest in periodically disinfecting gloved hands with alcohol solutions during OR procedures. *(See sidebar, page 17.)*

The SHEA guidelines recommend that alcohol rubs be placed at the entrances to the OR and at key stations inside the room.

"We note in several of our observations that anesthesiologists can often enter the OR without using alcohol-based hand rubs, even if they are covering two or three operating rooms and go back and forth between them," Birnbach said. "If we want to promote frequent hand hygiene, we've got to make it easy and readily accessible."

Cleaning and Disinfecting

In the aftermath of this contamination, cleaning and disinfecting equipment is problematic given the complex machine design and time constraints — as little as 10 to 15 minutes — to turn over the OR.

The SHEA guidelines underscore that the equipment can become contaminated with a variety of pathogens, but there has been little thorough review of cleaning processes and practices.

The cleaning and disinfecting challenges are best appreciated firsthand, said Bowdle.

"I strongly encourage people to actually get into scrubs and go in there," he said. "Take a close look at the front and back of anesthesia machines and carts. Put yourself in the place of somebody trying to clean these things. I think you will quickly grasp that these are decades-old designs that evolved in an era when we didn't have an appreciation of the risk of transmitting infectious diseases."

While redesign of some of this equipment may be the long-term solution, in the interim SHEA recommends focusing on cleaning the areas most likely to be contaminated.

"Monitoring equipment such as reusable blood pressure cuffs, pulse oximeter probes, electrocardiogram leads, twitch monitor leads and sensors, and cables that are in physical contact with patients should receive high priority for thorough cleaning," the SHEA guidelines note.

Likewise, "the anesthesia machine work surface, gas flow controls, vaporizer dials, IV stands, fluid warmers, supply cart, and computer keyboard and mouse are all at risk of becoming contaminated," SHEA warns.

Laryngoscopes, common devices used by anesthesiologists, are semicritical devices, and as such both the blades and the handles should undergo high-level disinfection or sterilization between use, Bowdle notes.

Reusable laryngoscopes — which often are used during intubation — typically require disassembly before disinfection, and there is increasing interest in single-use scopes.

"There are now a number of these products available that are relatively inexpensive and function as well or in some cases even better than reusable laryngoscopes," he said. "In some cases, they are recyclable. When the cost of cleaning a reusable laryngoscope is taken into account, it turns out single use may actually have a lower cost. I think this is something that institutions should seriously consider."

With regard to infection control during line insertion, SHEA

recommends full maximal sterile barrier precautions for placement of central venous catheters, and axillary and femoral arterial line insertion.

"Tracheal line insertion should be performed using aseptic technique and a small drape," Bowdle said. "Kits containing the necessary supplies for these procedures greatly facilitate proper technique. Most institutions now use central line placement kits to facilitate the application of this central line bundle, but I think it is important to recognize that arterial line placement kits, which are less frequently used, are also available." ■

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Hoffmann Takes the Helm at APIC

'We want IPs to be recognized for their leadership potential'

An infection preventionist with three decades of experience in the field will serve as the 2019 president of the Association for Professionals in Infection Control and Epidemiology (APIC).

Karen Hoffmann, RN, MS, CIC, FSHEA, FAPIC, is currently an infection prevention consultant for the Survey and Certification Group at the Centers for Medicare & Medicaid Services (CMS). Since 1988, she has been a clinical instructor in the division of infectious diseases at the University of North Carolina School of Medicine in Chapel Hill. For 23 years, she served as the associate director for the North Carolina Statewide Program for Infection Control and Epidemiology.

Hoffmann discussed some of the current issues and challenges facing IPs in the following interview with *Hospital Infection Control & Prevention*. The exchange has been edited for length and clarity.

HIC: What are some of the major areas you expect to focus on as APIC president?

Hoffmann: Increasing the value of IPs in their practice setting. We are doing that through editorials and education to the C-suite, encouraging their support for infection control programs. We are working with our strategic partners, the CDC, regulatory agencies, as well as other associations that we work collaboratively with like SHEA, AORN [Association of periOperative Registered Nurses], and so forth. We want IPs to be recognized for their leadership potential. To do that, we are offering leadership courses in a collaboration with SHEA. That has been really well-received, and we expect to continue to do that to add IP value and leadership opportunities for them.

Our membership is expanding and becoming more diverse. We have a lot of alternative practice settings now that we are working within, including long-term care, ambulatory surgery centers, and dialysis. We have done a practice analysis for those settings, and we are looking at creating more manuals and training available for people working in them.

HIC: Will you continue to underscore the value of IPs being certified in infection control?

Hoffmann: We want to keep up the momentum for more CIC [Certification in Infection Prevention and Control] requirements. There are three state legislatures that already have some requirements to be certified in infection control, but we want to push that with other legislatures. We are working with some states that we think will be accepting of that and hope to get the ball rolling for more states, too.

Another area that IPs really need to think about is increasing data management, research, and leadership competencies. APIC is planning to publish a revised IP competency model before June. Part of that will be expanding the IP leadership program offerings for IPs and epidemiologists. We are doing some of that through the course we have begun with SHEA.

Also, we want to be sure to remain focused on recruiting and maintaining a new generation of IPs. I'm part of the generation that will be retiring in the next five to 10 years, so we need to be focused on that.

HIC: An ongoing challenge has been securing program resources for the expanding array of IP responsibilities. What can IPs do to make the business case, and will your background at CMS shape your

message about the effect of infections on the bottom line?

Hoffmann: My CMS consulting work does not involve the value-based programs that began in 2008, but I do think there are a lot of pros and cons to this national reimbursement strategy that CMS has mandated. Value-based programs reward healthcare facilities with incentive payments for the quality of care — for people who perform well. Some hospitals are going to do better, and some hospitals won't in terms of Medicare reimbursement, but certainly payment issues get the attention of the C-suite. IPs need to leverage that pressure and use that opportunity to promote HAI reductions.

In terms of the business case in general, it is hard to say that resources are continuing to dwindle, but they are. But many of my IP colleagues tell me about dramatically increasing resources and the number of FTEs because of the business case they are able to present.

For some IPs, it can be intimidating to think about creating a business case. It really involves several straightforward steps. First, use a HAI calculator tool. That can help IPs estimate the costs of infections in their own facility. It is really important to present data that relates to their facility and not just national rates. They can then interpret those results and statistical models to build their customized business case. Present that to your healthcare administration leadership. The goal of that is really to create a compelling proposal so they can increase resources in infection prevention and control. This demonstrates their value to their board, stakeholders, and everyone.

Most of us who are clinical specialists, whatever our background is in infection prevention, don't generally have the skills for making a business case. I really suggest that IPs educate themselves by reviewing what we consider the authoritative publications on the topic, [1,2] both of which were published in 2007. Also, find a financial expert to help you as the IP — having the expertise can really help.

HIC: The CDC is drafting guidelines to prevent healthcare worker infections, calling for more collaboration between IPs, employee health, and administration. Can you comment on the challenge of preventing occupational infections in addition to keeping patients safe?

Hoffmann: First, there is the challenge of hazardous workplace conditions. The exposures to the environment of care and equipment and the high-risk patient exposures. Regardless of the job category, healthcare workers have the potential to be exposed to bloodborne pathogens via needlesticks, TB exposures, laser and electrosurgical plumes, MDROs [multidrug-resistant organisms], and even bioterrorism and other emerging infectious diseases. These hazards are manageable through the use of policies and practices as well as engineering controls. A well-defined prevention program includes work-related illnesses, injury, education of staff, monitoring the environment, engineering controls, and work practices.

There is the challenge of compliance. Personnel are more compliant with a program if they understand its rationale. The knowledge of what it costs in illnesses, injuries, and even disabilities can help them understand their responsibility in complying with the policies. Policies that are clearly written, coordinated between departments, and [applied] consistently with employee input have the best chance of being used by employees. Having this updated CDC guidance will be really helpful. ■

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Almost One-Third of Homecare Workers Think Flu Vaccine Unsafe

Study finds attitudes more predictive of compliance than knowledge

We continue to be beset with misinformation that undermines uptake of the annual flu vaccine, and that may explain why almost one-third of homecare nurses report that they think the shot is unsafe.

The attitudinal survey did not assess whether the workers were actually immunized, but few likely were because attitudes were generally predictive of compliance with infection control measures.

"Only 70% of the sample felt that the influenza vaccine was safe," said lead author of the study **David Russell**, PhD, a sociology professor at Appalachian State University in Boone, NC. "I worked with an agency

on their influenza vaccine, and this was a constant battle. There are a lot of misperceptions. People think they could get sick from the vaccine or that it is ineffective. It's exactly those kinds of attitudes we are going to have to change to move the needle on infection control."

This study's flu shot finding follows similar discouraging trends, including previously reported findings that long-term care workers have very low immunization rates, misinformation about vaccinating pregnant women, and reports that social media trolls target vaccine safety to stir controversy.

For example, the CDC recently clarified that it was not instructing pregnant women to consult with their doctors before getting the flu shot, although they are advised to get the traditional shot and not the live attenuated mist version. For the record, pregnant healthcare workers also should be vaccinated, says a nurse who continued to work for much of her pregnancy.

"I absolutely received the flu shot last year, and every year," says **Laura Kinsella**, BSN, RN, CEN, an emergency room nurse in Washington, DC. "Getting a flu shot is one of the most important ways a pregnant woman can protect herself and her baby. Infants cannot receive the flu shot until they are six months old, so they rely on passive immunity from their mothers. It is completely safe for a woman to get a flu shot while she is pregnant."

The flu shot finding in homecare came out of the initial phase of an ongoing study on nurses' knowledge, attitudes, and compliance with infection control.

The second phase, in which homecare nurses were observed delivering care, is under analysis and expected to be published this year. The next phase of the study also will include a tool developed by a biostatistician to predict which patients discharged to homecare are more likely to develop infections, Russell says.

Homecare is an increasing infection control issue, as patients are being rapidly discharged after the briefest of hospital stays.

"You have a lot of people coming home from hospitals with wounds, potentially with an existing infection," Russell says. "There is a lot of responsibility placed on homecare. Almost one out of five rehospitalizations that occur among homecare patients is due to an infection. It is one of the leading causes of why homecare patients go back to the hospital."

The study analyzed survey responses from 369 nurses working at two certified home healthcare agencies. A series of questions assessed self-reported compliance with infection control measures, knowledge of infection control, and their attitudes toward recommended practices.

Most homecare nurses reported a high level of infection control compliance, correct knowledge, and favorable attitudes. However, "in addition to gaps in knowledge for some [infection control] precautions," the authors "observed unfavorable attitudes toward certain infection prevention practices," such as flu vaccination and not reporting to work if sick.

"Given the strong association observed between infection control attitudes and compliance, these results suggest that home healthcare agencies may benefit from offering their staff educational programs on influenza vaccination and employee sick leave policies," the authors concluded.

Attitudes Predictive

In general, attitudes toward practices were more predictive of compliance than knowledge, meaning in part that even if nurses knew the core information they were unlikely to comply with measures if they perceived them as unimportant or unnecessary. This finding was somewhat surprising.

"We thought knowledge — how much nurses knew about infection control — would be the main driver of how well they complied with all the practices," Russell says. "But, interestingly, it wasn't. It was their attitude toward infection control. We found that appropriate attitudes toward infection control were predictive of greater compliance. That is consistent with the theory of planned behavior, which suggests that it is not so much what we know about something, but how strongly we feel about it."

While a knowledge question could include correctly naming a recommended practice, an attitudinal question, for example, was "How serious a problem do you think infection control is in homecare?"

On a scale of zero to 10, with the latter being the highest level of importance, homecare nurses generally answered in the seven to eight range, he said. Lower scores were less likely to comply, and vice versa.

Adding another twist, self-reported compliance with recommended measures typically runs higher than behavior in actual practice, thus the follow-up study of nursing observations, says co-author **Jingjing Shang**, PhD, assistant professor of nursing at Columbia University School of Nursing in New York City.

The percentage of home health nurses who self-reported compliance with infection control practices exceeded 90% for most of the measured behaviors. "Self-reporting overestimates the true effect," she says. "I think that the main message from this paper is we find that the knowledge does not translate to the self-reported compliance. We find that

their attitude is more important. If they believe infection control is important, it is more likely to translate to action."

A caveat to that is that knowledge is easier to change than attitudes, she adds.

Questions on PPE revealed, as has been well documented in hospital workers, lack of compliance with eye and face protection was frequently reported. A mere 6% said they wear goggles or an eye shield when there is a possibility of exposure to bloody discharge or fluid. Only 9% said they wear a disposable face mask "whenever there is a possibility of a splash or splatter." However, 79% said they "wear a gown if soiling with blood or bodily fluids is likely." Almost one-third of respondents did not know "that hand hygiene should be performed after touching the nursing bag" homecare givers bring into house.

"They carry all of their supplies into the home in the nursing bag, so that can be a potential source of transmission," Shang says. "The policy is to put a barrier down to make sure the bag is not touching the patient environment. Every time they touch the bag they should clean their hands."

While compliance with most measures was self-reported as high, the findings in the new in-home observation study are confirming that self-assessments have some bias that can inflate results.

"When we go in with nurses to a patient's home and observe what they do, the infection control compliance rate is much lower than what they self-reported," Shang says.

In this unpublished portion of the study, researchers followed 50 nurses working with eight patients each, resulting in 400 care observations.

"We also interviewed the nurses after the observations to ask them questions," Shang says. "What can help them improve compliance? What are the barriers? It is fascinating to know what nurses are doing in patients' homes in terms of infection control," she adds, noting that some of these new data are slated for presentation at the 2019 conference of the Association for Professionals in Infection Control and Epidemiology.

"In hospitals, the environment is more controlled, so that way it means the homecare environment can pose more risk to patients for infections," she says. "On the other hand, hospitals have a lot of antibiotic-resistant bacteria, so they also pose a different risk to patients. The hospital is a supervised setting, but in homecare usually only one nurse goes to see the patient and their family members. It is easier not to follow the rules." ■

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1. Russell D, Dowding DW, McDonald MV, et al. Factors for compliance with infection control practices in home healthcare: findings from a survey of nurses' knowledge and attitudes toward infection control. *AJIC* 2018;46(11):1211-1217.

The Zombie as a Metaphor for Pandemics

CDC training uses the living dead as an emerging infection

Looking for interesting ways to enliven annual inservices and training on infectious diseases?

The Centers for Disease Control and Prevention (CDC) is drawing attention to emerging infectious disease outbreaks and other mass casualty events through creatures often depicted with voracious appetites and a relentless, limping pursuit of the living: zombies.

For example, the CDC has posted a "Zombie Pandemic"[1] graphic novel that includes this opening warning from a news commentator: "Several people have been hospitalized after a strange virus began spreading rapidly through the Southeast. Scientists haven't identified the virus yet, but symptoms include slow movement, slurred speech, and violent tendencies. The [CDC] is recommending that people distance themselves from anyone displaying these symptoms."

Our protagonist couple and their dog gather supplies and shelter in place. The news media announce that "the CDC is working with local health departments on a vaccine. Until then, hunker down and don't go outside unless you have to."

Public health communication can be tricky, as the CDC tries to engender urgency and action by warning about an emerging infectious threat like Ebola without setting off panic that will undermine the response. Indeed, we saw the latter with the Ebola outbreak in Africa in 2014, when some returning U.S. healthcare workers were locked down and quarantined rather than being allowed to return home and monitor their symptoms as the CDC recommended.

A Peer-Reviewed Zombie Report

The well-established metaphor of the zombie, a misbegotten mainstay of horror books and films, provides a way to underscore the threat of a contagion and deliver a few preparation messages without setting off a panic. How serious is this effort? In an unusual move for a

clinical journal, the CDC's *Emerging Infectious Diseases* publication recently ran an article by authors who study and teach zombie literature and film.[2]

In an accompanying CDC podcast, the zombie education approach to infectious disease was discussed by lead author **Joanna Verran**, BSc, MSc, PhD, a professor emeritus in the microbiology department of Manchester Metropolitan University in the United Kingdom.

"As a microbiology teacher, I always felt that it was important that my students didn't just learn about microbiology, but were able to talk about [it] to other audiences, even their families," she said.

With film and fiction using zombies as surrogates for infectious disease, Verran livened up her lectures with the walking dead.

"The zombie is sort of a visible embodiment of, essentially, an invisible agent," she says. "In many cases now, it's some sort of biological infection, [often] a virus. So, lots of different zombie books start with virus infections."

The many correlations between zombies and viral infections include, for example, that once the victim is attacked, he or she becomes a carrier.

"Typically, you become a zombie, so there is the transmissibility of infection," Verran said. "There may be incubation periods, and so you can get some idea of the epidemiology of a particular type of zombie infection."

The zombie metaphor uses a cultural horror icon to allow rapid general understanding and visualization of a condition threatening the populace. This, in turn, highlights the public health reaction, disease immunity and progression, and the behavior of survivors.

"How do they contain, or can they contain the infected?" she says. "Can they prevent the infection spreading — can they control it? Can they kill it, can they inactivate it? So, the zombie does allow you to explore many aspects of the epidemiology of disease."

Fittingly, the CDC zombie story ends with "To be continued…." ■

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1. CDC. Preparedness 101: The Zombie Pandemic. Available at: https://bit.ly/2FElpez.
2. Verran J, Reyes X. Emerging Infectious Literatures and the Zombie Condition. *Emerg Infect Dis.* 2018;24(9):1774-1778. https://dx.doi.org/10.3201/eid2409.170658.

The Joint Commission Warns of 'Silos' in CDC Guidelines

Comments on CDC draft on preventing occupational infections

While lauding the CDC for its efforts to protect healthcare workers from occupational infections, The Joint Commission (TJC) took the agency to task for draft guidelines that may have the unintended effect of limiting collaboration and creating "silos" in the work culture.

The CDC's draft guidelines for protecting healthcare workers from occupational infections "may inadvertently reinforce siloing of safety issues, which is increasingly recognized as contradictory to promoting a safety culture," TJC warned in comments on the document.

"The document could be strengthened, however, by greater emphasis on collaboration with infection prevention and control (IPC) staff and the interrelationship between worker safety and patient safety," according to TJC comments.

"To strengthen the guideline, CDC might consider adding a new section devoted to the intersection of worker safety and patient safety."

The section could include infectious diseases, sharps injuries, as well as exposure reporting systems and example tools for communication, risk assessment, and incident analysis, the commission recommended.

Other sections will be added to the CDC guidelines, including one expected to be published for comment this year on specific pathogens that pose occupational threats to workers.

The infrastructure draft acknowledges the massive shift in the delivery of care, emphasizing that occupational health must be extended across the continuum.

"[We] suggest that you add a section for frontline staff," TJC comments stated.

"Communication and collaboration with frontline healthcare workers, including medical staff and other licensed independent practitioners, are critical for effective interventions."

The accreditation group also recommended that consideration be given throughout the guideline to add "assessments of competence" in addition to training and education.

"It is well known that training does not always result in proper implementation," TJC stated.

"Exposures will continue to

HOSPITAL INFECTION
CONTROL & PREVENTION

happen unless expectations related to engineering controls and use of PPE are standardized," TJC warned.

"It is imperative that healthcare workers follow the same practices to prevent exposure as they move through the continuum of care." ■

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1. CDC. HICPAC: Infection Control in Healthcare Personnel: Infrastructure and Routine Practices for Occupational Infection Prevention and Control Services (Draft Guideline). Oct. 15, 2018. Available at: https://bit.ly/2JsbUPF.

CME/CE QUESTIONS

1. **SHEA guidance for anesthesia infection control cited new evidence in reporting that provider-prepared sterile injectable drugs can be safely used for up to eight hours.**
   a. True
   b. False

2. **According to SHEA, if the "WHO 5 Moments of Hand Hygiene" were followed in anesthesia, providers would have to disinfect their hands as much as how many times per hour?**
   a. 27
   b. 39
   c. 44
   d. 54

3. **In guidance for infection control during anesthesiology, what did SHEA recommend regarding the practice of disinfecting gloves with alcohol hand rubs if there is not time to change gloves and perform hand hygiene?**
   a. Given the low risk to the patient, the practice should be encouraged.
   b. The practice is clearly risky and should be avoided at all costs.
   c. There is insufficient evidence to support or recommend against the practice.
   d. Allow only highly experienced providers to adopt this practice.

4. **Karen Hoffmann, RN, MS, CIC, FSHEA, FAPIC, said in making the business case for your program, it is important to present data that:**
   a. represent the national cost of infections.
   b. emphasize the cost of litigation for fatal outcomes.
   c. show the cost of infections in your facility.
   d. show costs that can be reimbursed.

CME/CE OBJECTIVES

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

1. Identify the clinical, legal, or educational issues encountered by infection preventionists and epidemiologists;
2. Describe the effect of infection control and prevention issues on nurses, hospitals, or the healthcare industry in general;
3. Cite solutions to the problems encountered by infection preventionists based on guidelines from the relevant regulatory authorities, and/or independent recommendations from clinicians at individual institutions.