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Come COVID-19 or High Water, Influenza Will Arrive

COVID-19 makes it easy for some outside the health care system to overlook other problems patients face and that infection preventionists and other health care professionals must deal with. But at Infection Control Today® (ICT®), we certainly haven’t forgotten.

Babies are still being born (see our September cover story on challenges in neonatal intensive care units), and proper airflow mitigates the risk of infection (our July/August cover story). This is not to say that these articles don’t acknowledge the story shaping our times. They simply remind us that there’s more to health care than battling COVID-19.

It’s a point that authors Linda Spaulding, RN-BC, CIC, CHEC, CHOP, and Connie Henry, BSN, RNC, make in this month’s cover story about influenza (page 18). Will influenza be a serious problem this year?

There’s plenty about COVID-19, as well. Kevin Kavanagh, MD, examines the variants in depth on page 28. He notes that the “widespread embrace of vaccines and other public health measures” will give the pharmaceutical industry the necessary time needed to formulate new vaccines.

On page 24, Rebecca Leach, MPH, BSN, RN, CIC, relates how vaccine hesitancy can feed into compassion fatigue. Leach asks: “If the way to prevent infection is freely available and people voluntarily refuse…how can health care workers maintain professionalism and treat all patients equally?”

But are vaccine mandates the answer? Mary Jean Ricci, MSN, RN-BC, and Frances Amorim, MSN, RN, CCE, consider ethical and practical considerations on page 22.

Coauthors Syra Madad, DHSc, MSc, MCP, and Priya Dhabat, MS, MLS(ASCP), CIC, review infection prevention around the world and conclude that an effective approach depends on an engaged community (page 32).

We consider ICT®’s readers an engaged community. Send feedback to Vice President of Content Alexandra Ward at award@mjhlifesciences.com.

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hand hygiene

Still Deadly After All These Years

I am relentless. Infection preventionists and other health care professionals have been battling me for years—decades even—but with little success. They may have taken heart from recent data from the Centers for Disease Control and Prevention (CDC) showing that the estimated national burden I cause by infecting and hospitalizing people dropped by 24% between 2011 and 2012.

Good news, but don’t celebrate yet. I cause about 500,000 infections in the United States each year, and I kill around 12,800 people annually. And watch out if you’re older: One in 11 infected adults over 65 years old die within a month.

Overall, since the early 2000s, I have caused more infections. And those are more severe than they were previously. Now, you could quibble and argue that those numbers reflect the success of newer technologies in detecting me at earlier stages. And though I may be less prevalent in health care settings, I’m more prevalent in non–health care settings—communities, in other words.

The CDC’s efforts to eradicate me spring in part from their focus on battling the overprescribing of antibiotics. That’s the main thing I take advantage of.

Aside from being 65 years or older, you are at risk from me if:

- You stayed recently at a hospital or nursing home.
- You have a weakened immune system; for instance, you have HIV/AIDS or cancer or you have had an organ transplant and are taking immunosuppressive drugs.
- I have infected you before or you have been exposed to me.
- You have a recurrence within a year. This is according to Avalere Health, a health care consulting company that looked at data from approximately 268,000 people whom I infected from 2010 to 2016. And more than half of patients who have a recurrence have 2 or more recurrences after the first one. Patients with a recurrence spend around 18 days in the hospital compared with 13 days for those with no recurrence. When I infect you, I cause severe diarrhea and colitis.

You may also develop these symptoms:

- Fever
- Stomach tenderness or pain
- Loss of appetite
- Nausea

I am highly contagious. Health care professionals who work with infected patients (or even with those who may become infected) and the patients themselves need to:

- Wash their hands with soap and water every time they use the bathroom and always before they eat.
- Use a separate bathroom, if possible, if they have diarrhea.

If you have been taking antibiotics recently and have the symptoms described above, you should waste no time in seeing a health care professional. They will often order a lab test of a stool. If the test is positive—if I’ve infected you—you will receive either vancomycin or fidaxomicin for at least 10 days. Recently, bezlotoxumab was added to the armamentarium because it’s a monoclonal antibody that targets toxin B, which I produce.

Here’s where it gets tricky. If you are already taking an antibiotic for another issue, you may have to discontinue using it. If these measures fail, then it’s off to the hospital you go.

Who am I?
The effectiveness of infection prevention and control programs on hospital units depends on the oversight of an engaged management team, according to a study in the American Journal of Infection Control. Although the data gathering by investigators with Ohio State University occurred before the COVID-19 pandemic, the lessons learned about better control of health care–acquired infections (HAIs) such as catheter-associated urinary tract infections (CAUTIs) and central line–associated bloodstream infections (CLABSIs) can be applied to other pathogenic outbreaks, the study states.

“As clinical practices continue to evolve during the COVID-19 pandemic, hospitals should not lose sight of the importance of management practices in the context of infection prevention,” the investigators wrote. “Adapting these management strategies for leaders to accommodate the restrictions of hospital environments during the COVID-19 pandemic can ensure that focus on HAI prevention is maintained.”

Investigators interviewed 420 managers and frontline staff in 18 hospitals across the United States from September 2017 to November 2019 to better understand management’s role in preventing and controlling CAUTIs and CLABSIs. The exchanges were held in hospital conference rooms and unit break rooms, either 1-on-1 or in groups, during normal work hours and lasted an average of 28 minutes. All interviews were audio recorded, transcribed verbatim, and de-identified.

The transcripts were coded using a deductive dominant thematic analysis. Investigators first developed a preliminary coding method based on goal setting and support, leadership, strategic alignment and communication, and information sharing. The coding system was revised as new themes were located in the transcripts.

“Across hospitals and interviewees, 3 management practices were characterized as important facilitators of HAI prevention: (1) engagement of executive leadership, (2) information sharing, and (3) manager coaching,” the investigators wrote. “We found that visible executive leadership, efficient communication, and frequent opportunities to provide and promote learning from feedback were perceived to promote and sustain HAI prevention efforts.”

Because publicly available HAI data are available at the level of the hospital, not the hospital unit, the investigators were not able to judge the variable performance of the units and hence the management techniques involved.

The study includes excerpts from interviewees, all of whom testified to the importance of an engaged management team in preventing and controlling HAIs.

**Hospital Administrators Should Tap Infection Preventionist HAI Data**

In terms of tracking and containing health care–acquired infections (HAIs), infection preventionists (IPs) might not be considered management, but hospital administrators would be wise to lean on IPs in the never-ending battle against HAIs. Ann Scheck McAlearney, ScD, MS, is the lead author of a recent study that discusses the need for hospital management to get more involved in HAI control. A distinguished professor of family and community medicine at Ohio State University College of Medicine in Columbus, McAlearney recently offered advice in an email exchange with ICT® on how hospitals can become high-performing organizations.

**ICT**: The management strategies outlined in the study for hospital managers to better help infection prevention seem to be somewhat common sense, yet hospitals’ problems with hand hygiene adherence and HAIs indicate that those management techniques aren’t used enough. Is that a fair assumption?

**McAlearney**: Yes, indeed. The real challenge with these strategies is getting people to do the right thing 100% of the time. If we can help managers make it easier for everyone to do the right thing, then we can succeed with infection prevention.

**Why did you decide to conduct the study?**

**McAlearney**: My background is in management and leadership, and one
of the studies I was leading some time ago looked at what are called high-performance work practices in health care organizations. We were looking for things that higher-performing organizations did well and might not be present (or as consistently done) in lower-performing organizations. I was interested in translating this research into the area of infection prevention, and this led to additional study of hospitals’ HAI prevention practices. Examining those practices among higher- and lower-performing hospitals in central line–associated bloodstream infection performance led to the creation of a list of management strategies that we have been elaborating on in our current study. Funded by the Agency for Healthcare Research and Quality, this study is called Searching for management approaches to reduce HAI transmission (SMART).”

What surprised you the most about your findings?
**McAlearney:** Perhaps not a surprise but a great thing to emphasize is that everyone really wants to do the right thing around infection prevention. No one wants patients to get infections, and they are genuinely eager for additional insight about how to address this challenge in health care.

Does it help that the Centers for Disease Control and Prevention has targeted HAIs as a problem that must be addressed?
**McAlearney:** Absolutely. As HAI data must be submitted by hospitals, this makes hospitals very motivated to improve their numbers and prevent infections.

**Our core readership comprises IPs. What role might they play here?**
**McAlearney:** IPs clearly play a critical role in HAI prevention. In this context, they would not necessarily be considered management, but they can provide managers with the guidance provided by this type of research, as well as the data to support infection prevention efforts and tools to help with education and reeducation of staff as needed.

Is there anything that you would like to add?
**McAlearney:** In addition to articles such as this one, an important product we are developing as part of this study is an HAI prevention tool kit. The SMART Toolkit will be made publicly available on a website and will include resources (e.g., PowerPoint presentations, education exercises, case studies) that managers and frontline staff can use to enhance their infection prevention efforts. There will also be a benchmarking survey that will be available on the website that hospitals can distribute to their employees to see how infection prevention is going in their own organization. The SMART Toolkit is currently scheduled to debut in 2022.
Keeping an Eye on Pediatric COVID-19 Cases

BY FRANK DIAMOND

A joint report by the American Academy of Pediatrics (AAP) and the Children’s Hospital Association indicates that 243,373 children were infected with COVID-19 from September 2 to September 9, 2021. From August 26 to September 9, 2021, there was a 10% increase in reported cases for children. (The definition of “child” varies from state to state but in all 49 states reporting, the age starts at 0 years. The higher-end cutoff age varies and can be anywhere from 14 to 20 years.) Children represent 15.5% of all cases in the pandemic up until this point. At present, there are no vaccines for children aged 5 to 12 years.

“At this time, it appears that severe illness due to COVID-19 is uncommon among children,” the AAP stated in a press release about the study. “However, there is an urgent need to collect more data on longer-term impacts of the pandemic on children, including ways the virus may harm the long-term physical health of infected children, as well as its emotional and mental health effects.”

They also note there is still no vaccine for children aged 5 to 12 years.

In the 11 states reporting testing, children made up from 11.1% to 21.6% of the total cumulated tests, which showed that from 4.9% to 17.8% of children tested positive. Twenty-four states reported hospitalizations, and children accounted for 1.6% to 4% of the total cumulated hospitalizations.

Pediatricians are especially keeping a close eye on multisystem inflammatory syndrome in children, or MIS-C. According to the Centers for Disease Control and Prevention (CDC), MIS-C, “is a condition [in which] different body parts can become inflamed, including the heart, lungs, kidneys, brain, skin, eyes, or gastrointestinal organs.” The CDC admits that it does not “yet know what causes MIS-C. However, many children with MIS-C had the virus that causes COVID-19 or had been around someone with COVID-19.”

Linda Spaulding, RN-BC, CIC, CHEC, CHOP, a member of Infection Control Today’s Editorial Advisory Board, warns that it’s a mistake to underestimate the harm COVID-19 can do to younger people.

“People keep [saying], ‘Well, the young kids [will] get it. They’ll get over it. It’s no big deal.’ But that’s not the reality of it. There are many young kids that have got COVID-19 and are now dealing with what they’re calling long-haulers disorder. And that’s when they do have heart damage or they have lung damage.”

She added that the disease “can be fatal in kids.”
Quick Action of US on Vaccines Prevented Deaths, According to Study

BY KILLIAN MEARA

The early COVID-19 vaccine campaign that was initiated in the United States prevented a significant number of deaths, as well as cases, according to a study by investigators from the RAND Corporation in collaboration with Indiana University. Results from the study were published in Health Affairs.1

“This study brings into focus the dramatic success of the early months of the nation’s coronavirus vaccine rollout,” said Christopher Whaley, senior study author. “The findings provide support for policies that further expand vaccine administration to enable a larger proportion of the nation’s population to benefit.”

The team of investigators created models that estimated the number of COVID-19 deaths and cases that would have occurred if the early vaccine campaign had never happened.

The team gathered information from each state on the number of vaccine doses administered from the Bloomberg COVID-19 vaccine tracker. They also collected data on deaths from the New York Times’ Coronavirus in the U.S.: Latest Map and Case Count database.

Findings from the study showed that the progress of vaccinations varied over time in different states. The investigators estimated that by the second week of May 2021, the number of deaths prevented because of early vaccination was approximately 140,000, with approximately 3 million cases prevented. Additionally, they estimated the economic value of lives saved during the study period to be between $625 billion and $1.4 trillion.

“Our results suggest that further efforts to vaccinate populations globally and in a coordinated fashion will be critical to achieving greater control of the COVID-19 pandemic,” said Sumedha Gupta, first study author. □

REFERENCES AVAILABLE AT INFECTIONCONTROLTODAY.COM
Beware of Gown-Glove Interface

BY FRANK DIAMOND

Proper donning and doffing of personal protective equipment (PPE) lowers the chance of spreading pathogens in a hospital or other health care facility. It involves several steps, but it’s worth doing well because the equipment protects patients and health care workers from the many deadly pathogens that can strike. COVID-19 and its variants aren’t the only dangers infection preventionists (IPs) have to deal with.

The Centers for Disease Control and Prevention (CDC) offers IPs and other health care professionals a step-by-step guide for how best to put on and take off PPE. And as the CDC’s National Institute for Occupational Safety and Health (NIOSH) notes, the various parts of PPE may come from different sources, or manufacturers, and that presents a problem.

PPE may not fit as snugly as it should. “A particularly vulnerable area is where the glove and gown meet: the glove-gown interface,” NIOSH points out. “This interface is considered one of the weakest areas because gaps can occur, allowing infectious fluids to seep through to the skin.” Recently, CDC investigators measured just how much pathogenic leakage can occur at the interface. Their findings, published in the *American Journal of Infection Control*, led them to conclude that there needs to be a national standard developed for measuring the safety of the glove-gown interface. That standard must take into account the various design factors of the different models of gloves and gowns.

The investigators evaluated “the fluid leakage through the glove-gown interface by simulating exposures and HCP [health care personnel] arm movements in patient care. We tested fluid leakage of 2 examination gloves with different cuff lengths and 7 isolation gown models designed with varying levels of barrier resistance and multiple cuff types.”

Gowns with a thumb loop design provided the best protection. The next best was the elastic cuff design, followed by the knit cuff design. But the investigators didn’t think any of the designs provided the proper protection because they found substantial leakage through gown fabrics.

They concluded that there’s “a need to develop a standardized method to evaluate leakage at the glove-gown interface to improve worker protection.”

That conclusion mirrors what NIOSH says about the glove-gown interface.

“Despite this concern, the glove-gown interface has received little research attention, so minimal guidance is available on how to prevent gaps. Furthermore, no standardized test currently exists to evaluate leakages in new products,” NIOSH says.

REFERENCES AVAILABLE AT INFECTIONCONTROLTODAY.COM

COVID Contingency Plan Includes New Type of Mask

BY INFECTION CONTROL TODAY® EDITORIAL STAFF

To match steps with crisis is to dance with uncertainty,” say investigators in study findings published in the *American Journal of Infection Control*. “A structure for decision-making and executive sponsorship is necessary to allow available information to be rapidly assembled and then decisively acted upon.”

The decision-making necessary to pull off the manufacturing of a new type of mask with entities that don’t often work together was facilitated by working with an Incident Command Center.

The uncertainty the study authors refer to will be all too familiar to infection preventionists and other health care professionals on the frontlines of the COVID-19 pandemic. It concerns the supply of personal protective equipment (PPE), particularly masks, and especially during early 2020.
Investigators from the University of Colorado School of Medicine and the University of Colorado College of Engineering set out to determine whether it would be best for hospitals and other health care facilities to put their efforts into shoring up existing medical supply lines or inventing alternative methods—and novel mask designs—to meet the need during COVID-19 surges.

“Based on the vital importance of being able to deliver PPE in preserving the health and trust of the medical workforce, our academic medical center elected to pursue this avenue to meet what was potentially going to be an unmet need based on the information available early in the pandemic,” the authors state. “As of this point, these novel masks, and the manufacturing capability to create more, remain in reserve. However, based on our experience, the iterative process from design to production required several months, and subsequent waves of COVID-19 have demonstrated that regional supplies of equipment can be strained long after the initial surge has passed.”

The investigators’ aim, they write, was to “design and manufacture a novel, reusable, half-face respirator in case conventional medical supply chain failed to meet demand.”

However, they had 3 major concerns. The first was to not let the new masks foster a false sense of security among clinicians who would be wearing them. The investigators explained to clinicians just what the new masks could and couldn’t do. Another concern was that clinicians and the public might become anxious knowing that a new mask was being manufactured because supply lines could run dry. The investigators and hospital administrators thus decided to keep the project secret.

The third concern was the question of legal liability if the hospital used masks that had not been approved by the National Institute for Occupational Safety and Health. “To address this, the decision was made that [Jared Polis, governor of Colorado] would need to declare crisis standards of care and the conventional PPE options available to the hospital would have to be exhausted before they would see use,” the authors write.

The investigators wanted to design a mask that afforded the same protection as an N95 respirator. It would need to be able to be decontaminated and reused and be able to fit inside a face shield without causing fogging.

“Via the Incident Command Center, our infection prevention officer reviewed the prototype with key clinical and executive leadership for input and to establish buy-in during the iterative design phase,” the authors note. “The center was also critical in approving simulated fit testing of the novel design through Employee Health.”

The industries needed to help in the manufacturing process were not the type that usually work with health care organizations, according to the investigators. The University of Colorado’s College of Engineering facilitated the manufacturing process.

“An original mask design was developed and the University Hospital had an initial batch of this novel mask manufactured during the first wave of the SARS-CoV-2 pandemic,” the authors write. “These masks, and the die necessary to produce more, are in reserve in case of depletion of stores of conventionally sourced PPE.”

The study concludes: “Health care organizations facing similar crisis in the future need to make this decision early. One way or another, by the time the surge peaks, or next pandemic wave arrives, the die is cast.”

REFERENCES AVAILABLE AT INFECTIONCONTROLTODAY.COM
Forty percent of hospitals have accelerated hiring in an effort to meet the surging demand for medical services after the pandemic lockdowns, according to Aon’s 2021 Benefits Survey of Hospitals. Furthermore, 36% of hospitals plan to hire at a normal rate, and 24% say they are being cautious, delaying hiring, or issuing a freeze, says the insurance risk mitigation consulting company.

The Benefits Survey of Hospitals looked at responses from hospital employers between April and June 2021. The survey compiles results of participating benefit plans for more than 2.4 million health system employees at 1150 hospitals across the United States, according to an Aon press release.1

The hospitals’ moves are a stark contrast to the cost-cutting measures they implemented in 2020 during the heart of the lockdowns. At that time, 54% had instituted furloughs, 45% had laid off workers, 14% had suspended 401(k) or 403(b) retirement plan contributions, and 10% had employed voluntary separation programs, the release says.

“The top priority in 2020 was to mitigate rising costs for the employer—understandably, given the financial shock that health systems were reeling from,” Sheena Singh, senior vice president of Aon’s national health care industry practice, says. “Now the pandemic has exacerbated a labor shortage that could impact patient care delivery, delay attainment of organizational objectives, and accelerate burnout among clinical staff.”

Some top concerns expressed by survey respondents include:
- Employee burnout/workforce resiliency (77%)
- Employee work/life balance (76%)
- Financial stress for employees (75%)
- Benefits to support diversity, equity, and inclusion (73%)
- Hospital are adopting beefier benefits packages to lure in staff.
- Average health benefit per hospital employee per year is projected to grow by 2.7%, from $14,466 in 2020 to $15,133 in 2021. A further 77% of hospitals say they aim to pay 76% or more of their employees’ health care costs, and 23% offer a no-cost health plan option to a segment of their employee population. Another 85% of the surveyed health systems say they provide employees a discount via plan design to access their own facilities and providers, according to the release.

Other enhanced benefits being provided by hospitals include the following:
- 94% offering tuition reimbursement programs
- 69% offering flexible work options (an additional 30% are considering adding this option)
- 66% offering cash-out vacation policies
- 45% offering adoption benefits
- 36% offering gender-affirming surgery
- 33% offering on-site day care
- 32% offering student loan repayment plans (an additional 40% are considering this option)
- 31% offering backup childcare
- 23% offering backup elder care

“Attracting and retaining talent remains a top priority, and health systems have prioritized benefits as a mechanism to reward their workforce,” Singh says. “This is a trend that will continue with a shortage of qualified health professionals and rising demand for health care services, as these organizations seek to build a resilient workforce in the wake of the COVID-19 pandemic.”

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Drugs in Development Might Help Fight Deadly Candida auris

BY INFECTION CONTROL TODAY® EDITORIAL STAFF

Infection preventionists (IPs) and other health care professionals know to be on the lookout for Candida auris, which has a mortality rate of anywhere from 30% to 60%. Adding to the problem: COVID-19 provides C auris with cover.1 A study published in the Journal of Global Antimicrobial Resistance called C auris a “lurking scourge.”2 Investigators warned the global medical community about the potential of C auris as a confounding factor in COVID-19.

There may be some pharmaceutical help on the horizon. Jeffrey Rybak, PharmD, PhD, an instructor with the department of pharmaceutical sciences at St Jude Children’s Research Hospital, has been conducting research on C auris in trying to identify novel targets for therapy, apply next-generation sequencing technologies, and develop molecular tools to advance the study of the fungus.3

New antifungal agents such as Ibrexafungerp (Brexafemme) are being studied for C. auris treatment. Rybak tells Infection Control Today®’s ICT®’s sister publication, Contagion®, that these investigational agents show promise against the infection but need undergo more clinical trials in order for researchers to better understand their full treatment utility.

Rybak also points out that isolates might become resistant while someone is on therapy. “Even while it might be susceptible upfront, after a week or two of therapy, we may find that the patient has an infection now caused by an isolate of the same Candida auris that has become resistant to the echinocandins and we are really left with nothing else.”

New pharmaceuticals against C auris seem to be needed now more than ever. Earlier this year, 2 outbreaks of the deadliest form of C auris occurred:1 1 at a nursing home in Washington, DC, and the other at 2 hospitals in the Dallas, Texas, area. This particular iteration of C auris seems to be impervious to any antibiotic or antifungal thrown at it. During this outbreak, a cluster of 101 cases was detected in the Washington, DC, nursing home and a cluster of 22 cases was detected in the 2 Dallas areas hospitals from January to April.

According to reports, some of these patients infected with C auris did not show any clinical improvement after being treated with all 3 major classes of the antifungals. In fact, of 5 patients who were fully resistant to treatment, 3 died.

A study in the Centers for Disease Control and Prevention’s (CDC’s) Morbidity and Mortality Weekly Report (MMWR)4 said that “these 2 simultaneous, independent clusters of pan- or echinocandin-resistant C auris cases in patients with overlapping inpatient health care exposures and without previous echinocandin use provide the first evidence suggesting that pan- or echinocandin-resistant C auris strains might have been transmitted in US health care settings. Surveillance, public health reporting, and infection control measures are critical to containing further spread. Clinicians should consider early antifungal susceptibility testing in patients with C auris infection, especially in those with treatment failure.”

C auris has been diagnosed in 40 countries since the first report about it in 2009, when clinicians found a single isolate from the discharge of the external ear canal of a 70-year-old inpatient at Tokyo Metropolitan Geriatric Hospital. By 2016, 13 cases had been identified in the United States, leading the CDC to issue interim recommendations, as well as a clinical alert, requesting laboratories to report cases and send samples to state and local health departments and the CDC.

As ICT® has reported, IPs and other health care professionals need to be on alert for C auris and move fast when it’s detected.4 That was the case at Scripps Memorial Hospital La Jolla in March 2020. A single case of C auris prompted swift action by IPs, who—along with public health officials—implemented a robust infection prevention plan. That plan included isolation precautions, environmental cleaning, disinfection, and education of health care employees.

The patient was hospitalized for 47 days, and the county public health department recommended that the hospital conduct C auris colonization screening for other patients to ensure that the infection hadn’t spread. It worked. No C auris colonization and/or clinical isolates were identified at the hospital in the subsequent 6 months.

The CDC has outlined 3 main concerns about C auris:

 It is often multidrug-resistant.
 Because it is a newer, emerging fungus, it can be challenging for labs to diagnose with standard laboratory methods, which can lead to misidentification and in turn lead to the incorrect treatment and management.
 It can quickly lead to outbreaks in health care facilities.

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CDC’s Flu Czar Says She’s Ready for the Fall Offensive
The CDC’s Lynnette Brammer: “We always had talked about being prepared for an influenza pandemic. And being able to scale up our systems. Well, COVID[-19] scaled up our systems way more than we ever dreamed about scaling up for.”

COVID-19 Mitigation Efforts Helped Stonewall C Difficile at Hospital
Barbara Smith, MPA, BSN, RN, CIC: “I think that we need to do a little bit more with the public in terms of antibiotic use in the community. So that they’re not at risk for C difficile for whatever reason later in their life.”

The Doctor Is On: Fields Tough Questions About COVID-19
Kevin Kavanagh, MD: “COVID-19 is not just respiratory, it affects every organ of the body. This is a serious type of infection. And we need to be focusing on trying to keep this virus from spreading, plus protecting our young.”

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Notable Quotables

“Nursing homes have needed a full-time IP [infection preventionist] for years and have really been struggling without them. Although they may have staff who manage infection prevention activities, these staff members are generally also managing a multitude of other responsibilities, taking away from the time needed to prevent and control infections. I don’t think people realize how much time it takes to prevent and control infections, and if we want to do this effectively in nursing homes, we have to have a dedicated, full-time IP in each facility.”

— HEATHER SAUNDERS, MPH, RN, CIC
DIRECTOR OF INFECTION CONTROL
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It’s hard to believe that influenza season is right around the corner again. While writing this article, we could only think that we are no further ahead in preventing respiratory illnesses than we were this time last year. Once again, the United States is dealing with a COVID-19 surge, and this time it’s the Delta variant that is filling health care facility beds. It’s not only older people who are falling victim but also children as young as 11 days old and individuals in their 50s. The hospitalized populations are largely unvaccinated. Most people who are vaccinated against COVID-19 are not getting sick enough to be hospitalized, but unfortunately, there are enough unvaccinated people to strain the health care system once again.
The vaccine protects those who don’t have major underlying health conditions such as diabetes, cancer, and autoimmune diseases. Nonetheless, the season of respiratory tract infections is upon us. Influenza, rhinovirus, respiratory syncytial virus, and pertussis—as well as COVID-19—have begun to attack many individuals across not only the United States but also the entire world. We saw this coming. With the decrease in mask mandates this year, we should not be surprised by an increase in respiratory tract infections, including COVID-19 and influenza, both of which can cause an increase in hospitalization and death.¹

There are environmental factors at play, from the red tide in Florida to wildfires and poor air quality across the state of California. Many areas throughout the country are dealing with higher-than-normal temperatures. In the coming influenza season, the questions to be answered are whether people will get vaccinated against influenza and whether the heated debates over COVID-19 vaccinations (to mandate or not mandate) will drive more individuals to get their influenza vaccine this year.

When historians talk about the history of influenza, they inevitably bring up the Spanish flu of 1918, which infected approximately 500 million people around the world and killed an estimated 50 million.² But influenza actually goes back to the ancient Greeks, to the time of Hippocrates in the fifth century BC. Influenza has been around, so to speak, for 2500 years, at least.¹

Although the illness can strike at any time of year, the typical flu season usually starts in September or October with a peak between December and February. Once an individual has been infected with the virus, viral shedding begins within 24 to 48 hours, and it usually takes about 24 hours before symptoms begin. These can include fever or feeling feverish; a stuffy or runny nose; cough; muscle and body aches; headache; fatigue; and vomiting and diarrhea, which are more typical in children than in adults. Influenza can range from asymptomatic to severe illness. Symptoms of COVID-19 can be similar but take longer after exposure to manifest, usually between 2 and 14 days but typically by day 5.

As a record 193.8 million doses of vaccine were administered during 2020-2021, influenza viruses constantly change, so vaccines must change annually to keep people safe and protect them from life-threatening symptoms. During the past flu season (2020-2021), the dominant viruses reported were influenza A (61.4%) and influenza B (38.6%). Most cases of influenza A were of the H3N2 strain, which comprised 52.5% of cases. Sixty percent of cases of the influenza B virus were of the Victoria lineage—B/Victoria/2/87—1 of the 2 major hemagglutinin (HA) lineages of influenza B virus. The other is the Yamagata lineage (B/Yamagata/16/88).³

There were also 5 cases of influenza reported that spreads in pigs and not people. This is known as a variant influenza virus. Those infected reported that they had direct exposure to pigs or lived on a property where pigs were housed. There was no person-to-person spread of this variant influenza. These types of influenza variants are rare. Since 2005, a total of 489 variant influenza virus infections have been identified in the United States.⁴

After spending the last 2 years hearing so much about the COVID-19 variants, people may ask more questions about influenza variants this year. So let’s look at how and why influenza viruses are constantly changing, which leads to the need for annual vaccinations. The more information we have in our knowledge toolkits, the better prepared we will be.

THE SEASON OF RESPIRATORY TRACT INFECTIONS IS UPON US.

INFLUENZA, RHINOVIRUS, RESPIRATORY SYNCYTIAL VIRUS, AND PERTUSSIS—AS WELL AS COVID-19—ONCE AGAIN ARE ATTACKING MANY INDIVIDUALS ACROSS THE US AND WORLDWIDE.

Each year, state and local health department laboratories submit data to the Centers for Disease Control and Prevention (CDC) about the present year’s influenza cases. The CDC performs genetic and antigenic characterization based on that information. They use these data to compare how similar they are to the current virus in order to target strains in the current vaccine.

Low Activity
There was unusually low influenza activity throughout the 2020-2021 flu season, not only in the United States but also globally. US reports indicated that 1675 (0.2%) of the 818,939 respiratory specimens submitted for testing were positive for an influenza virus. This low level of activity decreased hospitalizations and death compared with previous flu seasons. The number of influenza-associated hospitalizations was the lowest recorded since these data were first collected in 2005. The CDC received 1 report of a pediatric flu death in the 2020-2021 season. The CDC states that “since flu deaths in children became nationally notifiable in 2004, reported flu deaths in children had previously ranged from a low of 37 (during 2011-2012) to a high of 199 (during 2019-2020).” Influenza vaccination also contributed to keeping cases lower.
Antigenic Drift
Influenza viruses change in 2 different ways. The first is antigenic drift. This is when small changes or mutations occur in the virus’ genes that lead to a change in the surface proteins of the virus, HA and neuraminidase (NA). These virus proteins are antigens.3 Antigens are recognized by our immune system and trigger an immune response, which produces antibodies that block an infection. As the virus replicates, antigenic drift occurs. Influenza vaccines are designed to target an influenza virus’ HA surface proteins or antigens. Small changes to the antigenic drift can accumulate over time and result in viruses that are different. When the antigenic drift happens, the body’s immune system may not recognize and prevent illness caused by the new influenza virus. This makes individuals more susceptible to influenza infection again. The virus has changed enough that your existing antibodies won’t attack the newer influenza viruses. This is the primary reason the vaccine must be updated each year.

Antigenic Shift
The second type of change is known as the antigenic shift. The is an abrupt major change in an influenza A virus resulting in a new HA or new HA and NA proteins in the viruses. A shift can result in a new influenza A subtype in humans, such as when an influenza virus from an animal population can infect humans. This occurred in 2009 when the H1N1 virus with genes from North American swine, Eurasian swine, humans, and recombinant influenza vaccines, as listed below:

US quadivalent formulations of egg-based influenza vaccines should contain the following:
- A/Victoria/2570/2019 (H1N1) pdm09-like virus
- A/Cambodia/e0826360/2020 (H3N2)-like virus
- B/Washington/02/2019-like virus (B/Victoria lineage)
- B/Phuket/3073/2013-like virus (B/Yamagata lineage)

US quadivalent cell- or recombinant-based vaccines should contain the following:
- A/Wisconsin/588/2019 (H1N1) pdm09-like virus
- A/Cambodia/e0826360/2020 (H3N2)-like virus
- B/Washington/02/2019-like virus (B/Victoria lineage)
- B/Phuket/3073/2013-like virus (B/Yamagata lineage)

Now, as data are submitted, the CDC will determine how close of a match these vaccines were and how much coverage individuals will need to protect them from influenza. This determines how bad of a flu season the CDC expects to see. The agency then shares its information with state and local officials so proper mitigation processes can be recommended to the general population.2

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As COVID-19 continues to mutate, institutions are deliberating on infection mitigation strategies to help them reach herd immunity. Health care workers are at great risk when vaccination rates are low. Mandating vaccination as a barrier to disease transmission can be useful yet presents both advantages and disadvantages. Further, it necessitates the consideration of deontological and utilitarian principles.

Vaccines, social distancing, and masks are effective tools for protecting the public against the SARS-CoV-2 virus. Nearly all coronavirus deaths and hospitalizations are being attributed to unvaccinated individuals. The rapid transmission of the Delta, Lambda, and Zeta variants is placing communities, workplaces, schools, and medical facilities at risk. Even individuals who are fully vaccinated can contract and spread the disease.

Vaccine mandates have been issued previously to maintain the health of the public, such as those to eradicate polio and smallpox. More recently, in 2004, health care facilities began mandating the influenza vaccine for health care workers. Compulsory inoculations can be viewed as morally reasonable but may interfere with individual rights. Institutions in their decision-making processes should consider personal freedoms and essential actions to protect the public.

Considerations
As of this writing, the Pfizer/BioNTech vaccine has been fully approved by the US Food and Drug Administration (FDA). The Centers for Disease Control and Prevention (CDC) has not changed their position regarding mandates and continues to allow for local ones: “Whether a state, local government, or employer may require or mandate COVID-19 vaccination is a matter of state or other applicable law.” Some health care facilities may consider exemptions to mandatory vaccinations for religious reasons or medical contraindications. The compulsory policies being considered by various entities are not, in one sense, obligatory, as one can choose not to receive the vaccine. There are no criminal consequences for those who do not receive the vaccine.

State- or industry-mandated vaccination without exemptions is an attempt to protect the public as guided by the ethical principle to do no harm. However, it may have long-term implications. A compulsory vaccination policy with no exemptions places constraints on the workforce. It also constrains colleges and universities that are educating the next generation of health care workers and seeking clinical placements for their students. In a no-exemption facility, students, unvaccinated employees, and others will not be permitted to have a clinical placement or continue to hold their positions. Colleges and universities must consider whether to support the science behind mandatory vaccination or support their constituents’ request or need not to be vaccinated.

Additionally, health care facilities with a no-exemption policy may indirectly reduce the next generation of workers who are not in compliance, further exacerbating the looming shortage of employees in health care occupations. The termination of employees for not receiving a mandatory vaccine has been upheld in the courts. Mandatory vaccination must also be examined from the perspective of health care workers having direct contact with populations at risk of infection or death in health care settings.

These workers have an ethical obligation to “do no harm” to their patients.
Health care facilities are obliged to create a safe health care environment for the populations they serve.

The vaccine mandate would serve to offer community protection or encourage herd immunity. Unvaccinated employees increase the risk of transmitting the virus to the patients and residents living in long-term care or communal settings. Such employees also increase the risk of vaccinated employees being exposed to the surging variants. Mandatory vaccination should be balanced to achieve public safety and increase herd immunity. This would protect the most vulnerable populations and help maintain the capacity of the acute health care system. From an ethical perspective, mandatory vaccination policies support the principles of beneficence, nonmaleficence, and justice. But mandatory vaccination requirements in health care settings also may be viewed as denying an individual the right to refuse health care treatment. Additionally, they do not take into consideration the ethical principle of autonomy. However, one must remember that choosing to work in health care comes with an ethical and moral responsibility to do no harm and to place the patient’s interests above one’s own.

History’s Lessons
History has shown that the refusal of vaccines is linked with the outbreak of vaccine-preventable diseases. Protecting patients from SARS-CoV-2 follows the same ethical principles that require health care workers to be vaccinated against any other illness with outbreaks of highly infectious disease. In 1991, refusal to vaccinate led to over 1000 cases of measles in Philadelphia, Pennsylvania, and in 2015 over 100 cases in California. Currently, health care workers must be vaccinated against common childhood and bloodborne diseases as well as various infectious diseases.

From a deontological standpoint, prudent individuals should abide by their duties when making an ethical decision. Health care workers have a fiduciary responsibility to prevent harm to their patients when precautions are available to prevent the transmission of disease. From a utilitarian viewpoint, individuals should be vaccinated to prevent the spread of disease as that would bring about the greatest amount of good for the largest number of people.

Requiring all health care workers to be vaccinated reduces the transmission of COVID-19 to patients, decreasing disease spread as well as maintaining the capacity of the health care delivery system during the pandemic.

It is therefore essential that when there is a public threat of highly infectious disease, such as COVID-19, infection preventionists (IPs), administrators, ethicists, investigators, and academics bring their voices to weigh in on personal freedoms and ethical obligations versus public health risks. The risks to the population must be weighed against the directives that are issued to ensure that the current direct care workforce is protected. Collaborative efforts to retain experienced frontline workers and sustain a future workforce will enable those who work in the health care system and other industries to deliver care and critical services to populations compromised by disease. IPs and hospital leadership teams need to communicate with all stakeholders to balance the health of the community and with protecting the current and future workforce. Creating a shortage of health care workers would be a costly mistake.

Consultations with all stakeholders in conjunction with well-designed educational programs that speak to the efficacy and safety of the COVID-19 vaccine are essential to encourage voluntary vaccinations. It is important that we remain unassuming about the unknown. Understanding the possible outcomes of all ethical and practical decisions may keep the community safe in the present and the future while we work through the realities.

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COVID-19 could now be considered a vaccine-preventable disease (VPD), and with that designation comes an issue we have with other VPDs: vaccine hesitancy. The COVID-19 response has been rife with misinformation; what has been coined “the infodemic” has impeded effective and coordinated response efforts since before the virus was identified.

One year ago as of this writing, the idea of a COVID-19 vaccine was a hope on the horizon. When one was finally available, health care workers had a powerful tool that could help bring the pandemic to an end. I recall how I felt after receiving my first dose. Sitting in my car in the vaccine drive-through clinic, waiting for the obligatory 15 minutes after administration, I burst into tears. Months of anxiety, stress, fear, and hopelessness were released in that moment. I know many other health care workers who felt the same.

Now it is almost 9 months since the vaccine became available, and the nation is still struggling to reach high enough levels of vaccine uptake to meet population-level immunity. We are currently experiencing yet another surge, pushed on by the Delta variant, and health care as an industry is strained once again. There are some differences from our prior experiences: Hospitals are struggling with staff shortages, Delta is more contagious than earlier variants, and patients are younger and sicker. But perhaps the most significant difference in this surge is that we have a powerful weapon available at any drug store or provider’s office and many grocery stores: vaccination.

All the ancillary and support staff, including infection preventionists, have been called upon to support the work of the frontline caregivers and are subject to the same stressors and potential for burnout.

More and more states are making other preventive moves, such as masking, social distancing, and minimizing indoor groupings, obsolete through legislation and lack of enforcement. Vaccination is seen as a silver bullet that will end the pandemic. And yet public mistrust of the vaccine continues to pervade and affect public health care efforts. Individuals in states with lower vaccination rates have 4 times the risk of hospitalization with COVID-19.1

Health care workers have been pushed to the brink in this marathon of pandemic response. Frontline and behind-the-scenes workers, mentally and physically at their limit, are again being relied on to take care of an influx of patients with COVID-19 as well as ones without the disease. As the Centers for Disease Control and Prevention (CDC) reports, this surge in hospitalizations is being driven by people who are not fully vaccinated. Does this perceived nonadherence affect providers’ ability to be compassionate to patients? If the means to prevent infection is freely available and people voluntarily refuse it, then do not take other measures to protect themselves and prevent infection, how can health care workers maintain professionalism and treat all patients equally?

Not Judges
We are here not to judge but to care for our patients. We often hear this comment now, as the talk at nurses’ stations and in break rooms can move to anger and apathy toward those who did not get vaccinated and are now filling the hallways of the hospital. Compassion fatigue, although not a new concept, may be more of an issue during this pandemic response. It is the emotional, physical, cognitive, and spiritual drain that results in the decreased ability to provide empathetic care to patients.2 Compassion fatigue can affect even the most dedicated health care workers and results from continued stress and long-term exposure to another’s suffering. Over time, without ways to cope with the stressors, health care workers can become detached and...
have trouble experiencing empathy and emotions when caring for patients. Results from prior studies, conducted pre-pandemic, found that nearly 40% of nurses had symptoms of compassion fatigue. One can imagine that percentage has increased dramatically throughout the past 18 months.

Empathy is a key piece in the healing and caring process for patients. Not only does empathy improve patient outcomes, it can also increase caregiver satisfaction. Unfortunately, health care workers who are experiencing compassion fatigue report distancing themselves from others, shielding from emotional connections with patients and families, and isolating themselves from others in their lives. All these symptoms directly affect their ability to have empathetic connections.

As health care professionals, we are taught to treat the disease and the patient and refrain from judging patients for the behaviors that led to their current situation. But over these past 18 months, with the continued bombardment of fear, anxiety of the unknown, and the struggle to regain some sense of pre–COVID-19 habits, health care workers have not been immune to the emotions the public is experiencing. And yet we are held to a higher standard. We have to set personal opinions aside and provide the best care for all patients, as well as, hopefully, some science and research–based education to help prevent future infection.

News articles and interviews are touching on compassion fatigue and some brave providers have spoken openly about these feelings. It is important to normalize and address the subject and the frustrations that are permeating the entire health care industry, not just the frontline staff. All the ancillary and support staff, including infection preventionists (IPs), have been called upon to support the work of frontline caregivers and are subject to the same stressors and potential for burnout.

**Unique Situation**

IPs, as the subject matter experts, have similarly been called upon for other major disease outbreaks and pandemics, such as the H1N1 influenza and the Ebola virus. But the sheer duration of the pandemic response and its impact on all aspects of daily life have made this COVID-19 situation unique for many IPs.

Vaccination hesitancy among some health care workers is a topic that is not always addressed. It can feed into workplace stress and the formation of in and out crowds among health care teams. As more health systems mandate COVID-19 vaccination, the protests and complaints grow. Nurses and other staff members are quitting, with some suing, over vaccine mandates. Vaccine uptake among health care workers varies, with one health system reporting that more than 90% of physicians have taken the vaccine but only 50% or fewer nurses and aides have. What is sometimes forgotten is that health care workers are humans too, and although they have worked through these surges, a significant number do not trust the vaccines or may have concerns about their efficacy and adverse effects. Those who are angry about patients who refuse vaccination may also find it difficult to empathize with colleagues who refuse vaccination. Such divisiveness on hospital units can lead to communication and trust errors, which can directly affect patient care.

IPs have been trying to educate about vaccina-
communication is a skill that many working in pandemic response have found valuable. One lesson from this deluge of misinformation is the importance of learning how to communicate during emergencies and become a reliable source of information. Risk communication is a skill that should become part of the core competencies of infection prevention programs.

IPs continue to be a source of knowledge about the epidemiology and prevention of COVID-19. They must find ways to share consistent and reliable messaging with staff and patients about how to stop disease transmission, the benefits of vaccination, and other public health efforts to control transmission. As Delta rips through the country and the fear of more mutations and variants of high consequence takes hold, we are working on borrowed time to push back against the virus and regain the public’s trust. The US Food and Drug Administration’s full approval of the Pfizer-BioNTech COVID-19 vaccine (other approvals may have followed after this writing), may help sway some of the public to get vaccinated, although it will not be enough to stop the current surge. IPs can help staff with compassion fatigue by having crucial conversations and speaking about the anger and betrayal they may be experiencing, all while being the calm in the Delta storm.

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One could never have predicted how much difference a year would make in our understanding of COVID-19. Currently it is almost impossible to have a conversation without bringing up the subject of variants. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes COVID-19 infection, is a ribonucleic acid (RNA) virus. RNA viruses are known to mutate, and mutations can cause variants. A variant is created when a meaningful change occurs in the infectivity or lethality of the virus. Mutations that modify the virus’ spike protein can cause meaningful changes in both transmissibility and disease severity. Spike proteins are numerous projections that surround the capsule of the virus and attach the virus to the host cell’s angiotensin-converting enzyme 2 (ACE2) receptor.

The original SARS-CoV-2 virus was first detected in Wuhan, China, in the fall of 2019. Within a few months, it had rapidly spread around the world, causing severe disease and hundreds of thousands of deaths. By spring 2020 it was evident that the virus had changed and mutated; the spike protein mutation was denoted as D614G (this nomenclature means aspartate was replaced with glycine at position 614). Bette Korber and colleagues reported in a preprint study that the virus was increasing at an “alarming rate” and had a “fitness” advantage. According to the authors, the detection of D614G was associated with fewer polymerase chain reaction cycles, indicating higher viral loads. They also presented evidence of recombination between strains that produce hybrid viruses.

Downplayed
This study should have sounded an alarm, but instead the findings were downplayed, as was the evidence of increased transmissibility. In its final publication in Cell the word alarming was dropped. The term fitness was spun by policymakers as an unimportant change.

The narrative that SARS-CoV-2 did not have a high mutation rate and, thus, would not quickly form variants was bolstered by the finding that SARS-CoV-2 had a mutation rate about half that of seasonal influenza. This is because SARS-CoV-2 has a reparative enzyme designed to correct replication mistakes. With the seasonal flu, we encounter 1 new strain per year and have a vaccine ready for its emergence. Thus it was hoped that a SARS-CoV-2 vaccine could be produced and administered yearly, possibly less frequently, to control the pandemic.

Korber and colleagues’ study was an example of the data not fitting the hypothesis, and the response by all too many was to try to discount the data. However, there is now a plethora of research documenting increased transmissibility of D614G. But an even larger problem was looming.

When the virus replicates, it can mutate. If replication and transmission increase, so too do mutations. The wild type of SARS-CoV-2 is at least 3 times as infectious as the seasonal flu, and the D614G strain increases infectivity further by generating 4 to 5 times the number of spike proteins on its capsule, increasing its transmissibility. This set the stage for rampant mutations. It may be true that each virus mutates half as much as the seasonal flu, but with increased transmissibility SARS-CoV-2 rapidly mutated and outpaced the flu with the emergence of new variants.

The virus can evolve and adapt to its environment in 2 ways. One way is by a point mutation or substitution of a specific amino acid due to an error in the replication. The other is by recombination when the virus swaps large portions of its genetic code with another virus. Korber and colleagues found evidence of recombination with SARS-CoV-2. Recombination is promoted by high rates of community infections and sets the stage for the creation of supervariants.

By November 2020, it had become evident that the virus was mutating and at a fast rate. The website nextstrain.org vividly illustrates the myriad of lineages and mutations of SARS-CoV-2. There should be no question that this virus has a high rate of mutation.

In addition, investigators had hoped that any meaningful change in the spike protein would also decrease SARS-CoV-2’s ability to attach to the cell. This, of course, by a point mutation or substitution of a specific amino acid due to an error in the replication. The other is by recombination when the virus swaps large portions of its genetic code with another virus. Korber and colleagues found evidence of recombination with SARS-CoV-2. Recombination is promoted by high rates of community infections and sets the stage for the creation of supervariants.

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In addition, investigators had hoped that any meaningful change in the spike protein would also decrease SARS-CoV-2’s ability to attach to the cell. This, of course,
did not happen. By the end of 2020, a variant (B.1.351) had arisen in South Africa with an immune escape mutation, E484K, sometimes referred to as “EeK.” By April 2021, a number of other SARS-CoV-2 viruses of different lineages had independently developed the E484K mutation, including the Brazil variant (P.1) and some strains of the New York (B.1.526) and United Kingdom (B.1.1.7) variants. This was an example of convergent evolution, and some believed that the virus had possibly reached an evolutionary plateau because so many different lineages were acquiring the same solution to partially escape immunity.

**Nomenclature**

By this time the variants were becoming so numerous, and the corresponding numbers and letters used to denote names so complex, that a new system of nomenclature was needed. Typically, the name of the country or region of origin is not used as it can politicize a pandemic. The best example is the Spanish flu, a 1918-1919 pandemic for which the first known case occurred in Kansas. The United States and Europe did not want to acknowledge the infection or the massive impact it was having on their World War I troops, as it might have emboldened the German army. Spain, on the other hand, which had remained neutral in the war, was fully transparent regarding the pandemic. The Spanish monarch, Alfonso XIII, became severely sick with the disease and the country was then blamed for the pandemic.7

Hence the World Health Organization decided to name the major variants of SARS-CoV-2 with Greek letters, as shown in the Table below.8

The US government’s SARS-CoV-2 Interagency Group (SIG) has also prioritized variants, classifying them into 3 categories based upon their impact.9

- **Variant of interest:** has specific genetic markers that may affect transmission, diagnosis, therapeutics, or immune escape. There is evidence that the variant is the cause of an increased proportion of cases or can cause unique outbreaks, but it has limited prevalence in the US and other countries.
- **Variant of concern:** has a significant impact on diagnostics, treatments, or vaccines, and has increased transmissibility and/or increased disease severity.
- **Variant of high consequence:** high impact on countermeasures, including failure of diagnostic tests, low vaccine protection against severe illness along with more severe clinical disease, and increased hospitalizations.

SARS-CoV-2 has continued to evolve, and with each emerging variant, it appears to have become progressively more infectious. Variants that increase viral load may also increase transmissibility and the ability to mutate, along with overwhelming a host’s immune system and becoming more virulent. To make matters worse, SARS-CoV-2 is infecting a number of animals, including cats, large cats, dogs, and gorillas.10 Most recently, concern has been raised that the virus may have found an animal host in white-tailed deer, with SARS-CoV-2 antibodies identified in 40% of surveyed animals.11

A mutation in India, the Delta variant, acquired several important mutations (including L452R, P681R, D614G, and T478K), and by the summer of 2021, it had become the dominant strain in the US and United Kingdom. This variant acquired another important mutation, K417N, also known as Delta plus. Many of these variants appear to be

### Table: Tracking COVID-19 variants of concern and interest

<table>
<thead>
<tr>
<th>VARIANT</th>
<th>WHO DESIGNATION</th>
<th>CLASSIFICATION</th>
<th>COUNTRY/REGION OF ORIGIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.1.1.7</td>
<td>Alpha</td>
<td>Variant of concern</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>B.1.351</td>
<td>Beta</td>
<td>Variant of concern</td>
<td>South Africa</td>
</tr>
<tr>
<td>B.1.617.2</td>
<td>Delta</td>
<td>Variant of concern</td>
<td>India</td>
</tr>
<tr>
<td>AY.1 &amp; AAY.2</td>
<td>Delta Plus</td>
<td>Variant of interest</td>
<td>India</td>
</tr>
<tr>
<td>B.1.427 / B.1.429</td>
<td>Epsilon</td>
<td>Variant of interest</td>
<td>California</td>
</tr>
<tr>
<td>P.1</td>
<td>Gamma</td>
<td>Variant of concern</td>
<td>Brazil</td>
</tr>
<tr>
<td>B.1.526</td>
<td>Iota</td>
<td>Variant of interest</td>
<td>New York</td>
</tr>
<tr>
<td>B.1.617.1</td>
<td>Kappa</td>
<td>Variant of interest</td>
<td>India</td>
</tr>
<tr>
<td>C.37</td>
<td>Lambda</td>
<td>Variant of interest</td>
<td>Peru</td>
</tr>
<tr>
<td>B.1.621</td>
<td>Mu</td>
<td>Variant of interest</td>
<td>Columbia</td>
</tr>
</tbody>
</table>

Source: World Health Organization
effective at evading immunity. Anthony S. Fauci, MD, director of the National Institute of Allergy and Infectious Diseases and President Joe Biden’s chief medical advisor, testified to that effect in March during a Senate hearing.

“In the South African study conducted by Johnson & Johnson, they found that [unvaccinated] people who were infected with wild type were exposed to the variant in South Africa, the [B.1.351],” he said. “It was as if they had never been infected before. They had no protection.”

In early fall 2020, the city of Manaus, Brazil, was assumed to have reached herd immunity with two-thirds of its population having antibodies to SARS-CoV-2 (and others without antibodies potentially having memory B cells). Then it was hit with another even larger wave caused by the Gamma variant, which devastated its population.

In Delhi, India, officials assumed in January 2021 that herd immunity to SARS-CoV-2 may have been achieved after antibody testing revealed that 60% of the country’s population carried antibodies to SARS-CoV-2. Like Brazil, India was subsequently devastated with an adapted virus, this time the Delta variant.

An emerging pattern is that each new wave that envelops a nation is caused by different variants of the virus. The US has had 4 major waves of SARS-CoV-2, each caused by a different variant: the wild-type virus, the D614G variant, the Alpha variant, and the Delta variant.

It also is apparent that each major wave is caused by a variant that possesses immune escape properties. These waves are coming frequently, at least several times a year, and are outpacing our ability to produce and administer highly effective vaccines.

An emerging pattern is that each new wave that envelops a nation is caused by different variants of the virus. The US has had 4 major waves of SARS-CoV-2, each caused by a different variant: the wild-type virus, the D614G variant, the Alpha variant, and the Delta variant.

It also is apparent that each major wave is caused by a variant that possesses immune escape properties. These waves are coming frequently, at least several times a year, and are outpacing our ability to produce and administer highly effective vaccines. Unfortunately, future variants are also waiting in the wings, including the Kappa and Lambda variants, which may also cause large waves of infections. Lambda is of particular concern because it has immune escape properties and significantly different mutations (G75V, T76I, L452Q, F490S, D614G, T859N, and a deletion Δ246-252) compared with other variants.
Herd immunity is no longer possible; the virus is mutating and likely has animal hosts. We must raise the bar on public health outcomes, focusing not only on deaths but also on morbidity and long-hauler syndrome, which can be all too common and even occur with vaccine breakthrough infections.16

SARS-CoV-2 is not influenza. It does not disappear with seasons, and it affects every organ of the body.

The emergence of a variant of high consequence is all but certain with evasion of vaccine protection and our ability to detect it with tests. Slowing down the replication and mutation of this virus is of the utmost importance.

To do so, we must take the following steps:

- Upgrade recommendations for mask usage, including the use of N95 or KN95 masks whenever possible.
- Everyone who can do so must get vaccinated. Like Israel, we should fast-track approval for mRNA boosters for individuals at higher risk, including those who are immunosuppressed, over the age of 60 years, and at least 5 months out from vaccination.
- Upgrade building ventilation systems to increase air exchanges and air sanitation.
- Expand testing capabilities to be able to test frontline workers and schoolchildren at least twice a week and other workers at least once a week.
- Limit sizes of gatherings, including learning pods in schools, and plan for permanent hybrid instruction to limit class sizes.
- Businesses, including restaurants, need to offer online ordering along with curbside pickup and, when possible, home delivery.
- Mandatory vaccines should be required in many settings, including health care. Vaccine passports or green cards are being implemented in Israel and France and should be implemented in the United States.

The above steps are also necessary to restore consumer confidence and maintain our economy. We must plan and invest in long-term solutions. This virus may disappear, like the 1918 influenza, or it may be present for decades, like polio, measles, and smallpox. Consistent messaging and the widespread embrace of vaccines and other public health measures are key to providing our pharmaceutical industry with the necessary time to formulate new vaccines and therapeutics that can effectively treat and prevent infections.

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REFERENCES AVAILABLE AT INFECTIONCONTROLTODAY.COM
Without an Engaged Community, Infection Prevention Can Flounder

BY SYRA MADAD, DHSC, MSC, MCP; AND PRIYA DHAGAT, MS, MLS(ASCP), CIC

The COVID-19 pandemic has highlighted the importance of understanding and consistently applying basic infection prevention and control (IPC) measures. These include wearing a well-fitted mask, seeking better-ventilated spaces, employing good hand hygiene and respiratory etiquette, and keeping one’s distance—all to prevent, mitigate, and curb the spread of SARS-CoV-2.

These basic measures are not new. For example, before the pandemic, hospitals routinely asked patients to wear a mask for source control if they were exhibiting respiratory symptoms and demonstrated how to wear it correctly. Additionally, study findings have shown that applying social distancing measures in non–health care workplaces can reduce influenza transmission.

Yet during the pandemic, these IPC measures became a novelty, one that much of the general public had difficulty understanding and consistently applying. An “infodemic” arose, causing an avalanche of what was often misinformation and disinformation as people sought recommendations and guidance on how to apply IPC measures to keep themselves and others safe.

The Centers for Disease Control and Prevention (CDC) developed numerous infographics on these measures, such as how to select a face mask (ie, 2 or more layers of fabric), how to appropriately wear a mask (ie, covering mouth and nose), and how to clean hands properly (ie, scrubbing for 20 seconds). But such public guidance regarding basic IPC measures fell short. It did not consider the 7% of Americans who don’t have access to a computer to seek this information or the 14% who struggle with basic literacy.

Other sources people consult to learn about current events, the latest public health guidance, and “how to” guides on applying IPC measures include their health care provider, social media, television, radio, and family, friends, and neighbors. But a key approach that has been lacking in the US COVID-19 response is the use of community engagement (CE) to share, teach, and promote IPC measures. CE is the act of promoting the role of communities in interventions that allow for education, participation, empowerment, and sensitization to public health topics. CE infuses cultural competency and addresses barriers such as language. It employs guiding principles including trauma-informed care through the use of trusted messengers in the community. It is an approach for the people, by the people, to the people.

It is vital to dissect CE’s importance and to operationalize outreach led by trusted local community members to offer a safe and inclusive method of promoting infection prevention education in hopes of embedding it in normal practice. This community-centric public health approach can play a significant role in overall infection prevention and control for both vaccine-preventable diseases and emerging infectious disease threats. It also can be leveraged to help tackle the lack of trust within specific communities due to health inequities. As perfectly stated in an analysis of CE in India, community-led advocacy and encouragement will lead to empowerment and equity. It will enable communities affected by health disparities and those who are affected by an “infodemic” to establish trust and decision-making.

CE is by far one of the most important tools that seems to be underutilized in the United States for various infectious diseases, including COVID-19, and needs prompt and ongoing attention. As we look to sustain the gains we have made, build back better, and further pandemic-proof our society, we must invest in solutions that work, are inclusive, and make an impact.

Global Strategies

Globally, CE has been shown to be a valuable strategy in reducing the burden of
disease through active peer-to-peer education and community participation. To help the public understand the risk of disease transmission during high-risk activities such as burials, the Democratic Republic of the Congo utilized CE during the sporadic outbreaks of Ebola virus disease, teaching about safe, dignified burials through community acceptance. During the 2018 cholera outbreak in Yemen, CE helped to encourage safe hygiene practices through “hygiene promoters” and community volunteers. These promoters and volunteers, as part of the United Nations Children’s Fund (UNICEF), used various approaches to reach out to community members and improve the understanding of basic hygiene and sanitation best practices.

The 2016 Zika virus outbreak in Cuba highlighted the critical role of CE and community participation to raise awareness and help control the outbreak through ongoing risk communication. Messages promoting preventive behaviors were employed at the individual, family, and community level to eliminate or treat Aedes mosquito breeding sites. In Laos, malaria elimination campaigns use elements of CE to promote uptake and adherence in target communities for mass antimalarial administration.

These examples of the effective use of CE in various infectious disease responses around the world highlight the critical role of CE interventions to mitigate, control, and prevent the spread of disease. These can include a range of approaches from education to outreach to improve health and economic or social well-being; promote equity; help with outbreak response; and ultimately, help save lives and prevent further illness.

CE Outbreak Response
The United States can learn a lesson or two from these examples of CE interventions in outbreak response. We can apply the various concepts, strategies, and lessons learned across the globe to threats we face here, such as vaccine-preventable diseases including measles and our annual foe, influenza.

During the US flu season, it is common to observe and receive reminders on when and where the flu vaccine will be available; however, an explanation as to why people should receive them seems to be lacking. Although health care professionals often explain the key facts on reducing disease severity, hospitalization, and death, they need to explain and promote much more. Hand washing, cough etiquette, and physical distancing have always played a major role in infection prevention but were only highlighted and enforced during a pandemic. Dispelling myths, providing evidence-based facts, and explaining the science behind these recommendations should not be forgotten during a flu season.

The Global Task Force on Cholera Control recently described best practices for community engagement, including facilitating routine feedback and engagement between the community and the response team; facilitating risk assessments and using locally generated data to develop an implementation plan for the community; forming small local task teams comprised of trusted leaders, respected community members, and religious representatives to engage with response teams; linking up with and using mass media to promote community engagement activities; and using local structures to discuss public health advice promoted in the media.

These best practices can lead to community empowerment and enable decision-making. Tapping into faith-based leaders, health care workers, and elected officials to educate and share information is a public health tool that should be used not only when dealing with a sudden outbreak but also during seasonal waves of infectious disease and on an ongoing basis. Whether it concerns seasonal influenza, tick-borne illness, sexually transmitted infections, or vaccine-preventable illnesses, the rationale for community-engaged health promotion, policy making, and research is largely rooted in the recognition that lifestyles, behaviors, and the incidence of illness are all shaped by social and physical environments.

Subject matter experts, health care organizations, and departments of health must be reminded of this rationale and continue to build a knowledgeable community base to ensure education is provided and instill trust and confidence within marginalized communities.

The infection prevention strategies we have all practiced thus far during the pandemic are fundamental practices that can be applied routinely to combat the spread of infection without the underlying pretense of pandemic safety. Coupling risk communication and effective engagement with the community can provide opportunities to change behavior and shape awareness of basic practices that can break the chain of transmission for many diseases.

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REFERENCES AVAILABLE AT INFECTIONCONTROLTODAY.COM

For more on the latest infection control and prevention literature, visit InfectionControlToday.com
UV Robot Reportedly Zaps Vancomycin-resistant Enterococci

Vancomycin-resistant Enterococci (VRE) often thwarts the best-laid plans of infection preventionists (IPs) and other health care professionals at hospitals to keep patients safe from the deadly pathogen. A company called Xenex Disinfection Services thinks it may have the answer with its product, the LightStrike Robot. In a press release, the company describes the device as patented pulsed xenon UV room disinfection technology.

Recently, investigators with Hiroshima University Hospital studied the effectiveness of the device. Their study was published in the Journal of Infection and Chemotherapy. Investigators looked for evidence of VRE in rooms that had been occupied by patients infected by the pathogen after traditional manual cleaning of various surfaces—including toilet seats, toilet assist bars, bedrails, over-bed tables, TV remote controls, and sink counters. Rooms that had been disinfected by the LightStrike Robot were also tested. “The study showed that VRE was still present on surfaces in the patient rooms after manual cleaning, but there was no VRE remaining after LightStrike disinfection,” the press release says.

The device creates intense bursts of broad-spectrum ultraviolet (UV) light to destroy bacteria and viruses. “Viruses and bacteria are vulnerable to UV light at different wavelengths, so the LightStrike robot deactivates them at the wavelengths where they are most susceptible,” the press release states, adding that “each robot can disinfect dozens of rooms per day.”

Mark Stibich, PhD, the company’s cofounder and Xenex’s chief scientific officer, says that “this study validates other research, which has shown that less than half the surfaces in a patient room are properly disinfected when it’s being prepared for the next patient.”

Disinfecting Wipe Dispenser Said to Speed Up Process

Disinfection will always be a top priority for health care professionals in any health care setting, and that means being able to grab disinfection wipes in a hurry. To help in that endeavor, PDI Healthcare recently unveiled a product called the Dual Access Lid that should make the grabbing much easier.

“The innovative wide opening of the Dual Access Lid ensures users pull the appropriate number of wipes for the job, allowing them to dispense 1 wipe for small surfaces or multiple wipes for larger surfaces, with rapid threading in case of fall back,” PDI Healthcare says in a press release. “The flip cap is designed with ‘Snap & Close’ technology to snap securely in place with just 1 tap, and the definitive open/close positions provide better moisture protection.”

Apparently, the company noticed that health care professionals sometimes get frustrated by the inability to quickly grab a disinfection wipe.

Earl Adamy, PDI Healthcare’s senior director of marketing, said in the press release that “too often we observed customers struggle with canister lids including, loading the first wipe, dispensing multiple wipes, and leaving lids open. We felt that with some innovation, we could address these issues and improve the customer experience. The Dual Access Lid has a tremendous impact on saving staff time and reducing frustration so nurses can focus on what matters most—their patients.”

PDI has 3 divisions, PDI Healthcare, Sani Professional, and PDI Contract Manufacturing.

Device Takes On Problem of Pressure Injuries

Perhaps one of the more underreported challenges health care providers face in hospitals and other health care settings involves pressure injuries. A company called Encompass Group recently unveiled a product that the company says should go a long way in helping to prevent those injuries. Airisana has received an issuance of patent by the US Patent and Trademark Office.

In a press release, the company states that “each Airisana system comes with an intuitive soft-touch user control panel that’s quiet enough to ensure a comfortable healing environment and keeps control in the care provider’s hands. The repeating pressure therapy patterns employed by traditional therapeutic support surfaces increase the probability that a patient’s body can adjust to the process, which can impede healing.”

Airisana uses randomized pressure therapy modes to reduce that risk. The modes promote sustained pressure reduction and combines multiple pressure therapies into a constantly changing surface a patient’s body doesn’t get used to. Michelle Daniels, the company’s vice president of product strategy, development and administration, notes in the press release that “while many hospital-acquired conditions … have decreased, pressure injuries remain a stubborn exception.”
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A breakthrough design for better access.

The Dual Access Lid makes disinfection easier and more efficient.

Today’s fast-paced healthcare environments demand speed, precision and confidence to achieve their infection prevention goals. The Dual Access Lid answers the challenge, with an innovative design that provides fast and efficient access to all of your disinfecting wipes.

- **Easy and Quick Set Up:** Wide opening for rapid initial thread and reload in case of fall back
- **Intuitive Design:** Easy dispensing of both single and multiple wipes
- **Better Moisture Protection:** Flip cap features Snap & Close Technology and definitive open/close positions to help reduce dry out
- **Precise Selection:** Choose the right number of wipes needed for the job

Visit pdihc.com/DualAccessLid-ICT to learn more