HOSPITAL INFECTION CONTROL & PREVENTION

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AUGUST 2020 Vol. 47, No. 8; p. 85-96

INSIDE

RELIAS MEDIA

Trial by Fire: IPs Stand Fast Amid Unrelenting Pandemic

'We are not out of the woods yet'

By Gary Evans, Medical Writer

Infection preventionists (IPs) are playing critical roles in the coronavirus response, raising the profile of a profession that will never be viewed quite the same again after having been forged in the crucible of the worst pandemic in a century.

"IPs have been front and center through all of this and have been really embedded with the command centers [in hospitals]," says **Ann Marie Pettis**, RN, BSN, CIC, FAPIC, president-elect of the Association for Professionals in Infection Control and Epidemiology (APIC). "They have had to evaluate the constantly shifting recommendations from the experts such as the CDC (Centers for Disease Control and Prevention), WHO (World Health Organization), the state and county health departments. IPs have had to take an unbelievably pivotable role, and that has not been lost on the C-suite."

Emerging research that will become more granular as the pandemic continues should provide empirical evidence that infection prevention rose to the grim occasion, blunting the impact of SARS-CoV-2 (COVID-19) as it surged and ebbed in regional outbreaks.

"Once you prove you're valued-added, and they don't perceive you as a cost center per se, I think that helps us make the argument for things like additional technology, which costs money," says Pettis, director of infection prevention at the University of Rochester, NY. "I think our added value has been seen and embraced at this point, but the research will be important, and it is going on during the pandemic."

Practice changes may be forthcoming as well, much in the same way that the first severe acute respiratory syndrome (SARS) outbreak in 2003 made respiratory hygiene or "etiquette"

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

standard in waiting areas and emergency rooms. "That became a new normal, and we have never gone back from that," she says. "There were lessons learned back then, and there will be lessons learned through this pandemic for all sorts of healthcare-associated infections (HAIs). There are a lot of studies coming out as we speak."

CDC Validation

For example, a recent study of COVID-19 in 26 skilled nursing facilities (SNFs) in Detroit found that those with more infection control consultations had about half as many positive tests as those without IPs, according to a CDC report.[1] Overall, the study found that repeated point prevalence surveys (PPS) at the SNFs identified an attack rate of 44%. Within 21 days of diagnosis, 37% of infected patients were hospitalized and 24% died.

All facilities received an initial infection prevention and control (IPC) assessment, and two follow-up IPC assessments were conducted for 12 facilities participating in a second survey. The infection control interventions included reviewing cohorting practices using a facility floorplan, assessing the supply and use of personal protective equipment (PPE), hand hygiene practices, and staffing mitigation plans.

"Among facilities participating in both surveys, the percentage of new laboratory-confirmed cases declined from 35% to 18%, suggesting that facility-wide testing and on-site IPC support might have contributed to reductions in SARS-CoV-2 transmission," according to the CDC report. "Following testing and establishment of a COVID-19 care unit, IPC assessment and consultation were critical to assisting facilities in targeting interventions to mitigate suspected causes of ongoing transmission."

As SARS-CoV-2 tests become more available, repeated point prevalence surveys and "enhanced and expanded IPC support should be standard tools for interrupting and preventing COVID-19 outbreaks in SNFs," according to the CDC report.

"The IPC support was composed of teams of one to three IPC-trained clinicians — [including] physicians, nurse practitioners and physician assistants — who performed on-site assessments of IPC practices and provided improvement recommendations," says lead author **Guillermo Sanchez**, MSHS, MPH, a member of the CDC COVID-19 Response Team.

Although there was an overall decrease in mortality during the study, the data were insufficient to determine if infection prevention consults were the primary reason.

"The short-term implications are that repeated PPS in combination with IPC interventions appears to reduce SARS-CoV-2 transmission, and possibly contributes to improvements in morbidity and mortality," he says. "If this is true, then it would suggest that there may be a bigger role for ongoing infection prevention and control efforts in SNFs during the COVID-19 pandemic."

Beyond Healthcare

While infection prevention in post-acute settings clearly is valuable, the vast reach of the pandemic may lead to many industries seeking IP consults, Pettis says.

"I think you are going to see infection prevention and IPs moving into nonhealthcare settings, which is very exciting," she says. "COVID has

HOSPITAL INFECTION CONTROL & PREVENTION

***Hospital Infection Control & Prevention*® (ISSN 1945-9653) is published monthly by Relias LLC, 1010 Sync Street, Suite 100, Morrisville, NC 27560-5468. Periodicals postage paid at Morrisville, NC, and at additional mailing offices. POSTMASTER: Send address changes to *Hospital Infection Control & Prevention*, Relias LLC, 1010 Sync Street, Suite 100, Morrisville, NC 27560-5468.**

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

This activity is intended for infection preventionists and healthcare epidemiologists.

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really pointed out the need for that, whether it be the travel industry, the food industry, recreation, sports, and the entertainment industry. Moving forward, I think we will see a lot more attention paid to infection prevention in those venues."

With the pandemic pushing a high level of healthcare worker compliance with hand hygiene and other measures, the challenge will be for IPs to sustain the gain in the aftermath.

"Hand hygiene right now is kind of off the charts," she says. "Moving forward it will only increase the level of attention not just on the [IPs], but more importantly, on infection prevention [overall]."

A tantalizing question is whether the emphasis on infection control during the pandemic will translate to reductions in HAIs that IPs have been battling for decades. In that regard, Pettis has split her staffing responsibilities so that some focus on COVID-19 and others track traditional infections, such as those caused by drug-resistant bacteria.

"Our surveillance is continuing for HAIs," she says. "Amazingly, we really have not seen an increase. One could argue that things have been so stressful and so crazy that we would, but perhaps because people are paying so much attention to the basics of infection prevention, hand hygiene, and PPE, we really have not seen a spike. It seems to be helping."

Vigilance is a must, as healthcare pathogens are nothing if not opportunistic. For example, Pettis became concerned after noticing that no one was using the hospital water fountains out of an abundance of caution for COVID-19. "We started worrying about biofilm building up and did a lot of water testing for Legionella," she says. "Everything was negative — we were so relieved. We don't want to take our eye off the ball."

IPs have a singular opportunity to elevate the profession, but nobody is saying it will be easy. Indeed, as this report was filed, daily U.S. total cases were climbing steadily, public masking had become politicized, and any hopes that the coronavirus would be blunted by hot weather were effectively dashed.

"It has raised our visibility. It has increased our credibility," Pettis says. "It is sort of 'be careful what you hope for' because it is also exhausting. Everyone in healthcare is pretty worn out. We're not through the first wave and we are trying to prepare for the second wave."

Same Virus, Different Vendors

Reports of shortages of PPE continue in some hard-hit areas, but a lot of manufacturers have stepped up production of critical items. As different brands and types of equipment are used to bolster stocks, it raises the question of whether staff retraining is needed in some cases. Although staying with the same vendor may be preferable, this is a luxury that IPs may not be able to afford.

"One of our challenges is with alcohol-based hand rubs," Pettis says. "We can hardly get any of the particular one we use that fits in to our dispensers, so now we are having to look at switching things out. But then you go to another supplier, and they already have their customers, so you have to get in a queue. It is definitely still a challenge, even if you are not in the one of the states that is seeing a surge right now."

Another example is restocking disinfectant wipes, which may have varying contact times recommended by different manufacturers. "With all the PPE, you may need to do retraining, because there are idiosyncrasies in different equipment and supplies," she says. "This requires ongoing evaluation, particularly by IPs. We tend to be the ones that have to look at the [product], decide whether it is appropriate or not, and then reeducate the staff on how to use this PPE."

This is a particular concern with respirators that require fit testing, says **Michael Calderwood**, MD, MPH, a hospital epidemiologist at Dartmouth-Hitchcock Medical Center in New Hampshire.

"N95s differ quite a bit in their shape and fit, so as we run into supply issues, hospitals may need to bring in different models of these respirators," he says. "We could run out of one N95 [model] that people have been using for a long time and have been fit tested with. If we bring something new in, is it similar enough that we assume it has the same fit? Do we need to retest people to make sure that it fits to their face? That is always my concern."

The choice may be one of reprocessing the respirators staff are familiar with or bringing in a new product and redoing fit testing.

"A lot of hospitals have been able to reuse respirators with the same efficacy after undergoing decontamination procedures," he says. "You have to have in place an ability to look at how well those masks are filtering and [assess] them in terms of fit. Many of the masks come back damaged from general wear and tear, so it does require some infrastructure."

As hospitals in some areas reopen for elective surgeries, it becomes more critical to keep track of PPE needs in case COVID-19 resurges. Calderwood's team is using a modeling program to project coronavirus transmission, then bringing in patients who deferred care for other conditions during the pandemic.

"It really had an adverse impact on patients as they waited to get care," he says. "They may have waited a long time for their surgery, and now they require a more complex procedure. So, people are being very careful not to do what we had to do the first time — turn everything off."

Dartmouth has an analytics institute, which has adapted the Penn Chime model to forecast coronavirus activity for the local area out to four weeks.[2]

"We do our modeling and see if we have enough PPE to handle it," Calderwood says. "We look at cases both in our healthcare system and in other hospitals in our region. If we see an increase in COVID cases — we have to turn down other activities."

Supply Chain Reinvention

While modeling may help manage PPE, there is a general consensus that the medical supply chain must not revert to the lean inventory management systems that left facilities scrambling nationwide when the pandemic hit.

"We learned this very early on," Calderwood says. "We had kind of standard use of PPE and had supplies to support a number of days. But of all of a sudden, we were getting into an environment where we needed a lot more PPE."

A recent analysis of the pandemic by the MIT Center for Collective Intelligence recommended creating resilient supply chains that have both stockpiles of essential equipment and diagnostics, and the ability to ramp up production.[3]

"The whole just-in-time supply chain idea, I would hope has been proven to be woefully inadequate and must be addressed," Pettis says.

APIC and many other infectious disease and public health groups have penned a letter urging the federal government to extend the current emergency declaration, which is set to expire on July 25.[4]

A RECENT ANALYSIS OF THE PANDEMIC RECOMMENDED CREATING RESILIENT SUPPLY CHAINS THAT HAVE BOTH STOCKPILES OF ESSENTIAL EQUIPMENT AND DIAGNOSTICS, AND THE ABILITY TO RAMP UP PRODUCTION.

"We are not out of the woods yet," Pettis says. "We're very concerned about the fall, when we may see flu at the same time as the second wave of COVID. We can't be looking back wishing we had prepared adequately. It seems true that at the local, state, and federal level — none of them were really ready with the amount of PPE that is needed. I think the idea of continuing the emergency preparations is incredibly important."

The letter to the department of Health and Human Services urges renewal of the emergency declaration for at least an additional 90 days.

"It is imperative that the federal government continue to deploy all resources and authorities necessary to protect the public and assist states and localities as they continue to respond to this urgent situation," the authors state. "We cannot afford to ease up on our response to this grave threat."

With all signs suggesting the pandemic of novel coronavirus may be with us for a while, there have been various silver linings anticipated, including that infection prevention will emerge as a proven safeguard against the inevitable appearance of a future threat.

"You never want to miss an opportunity to increase your level of credibility," Pettis says. "Every now and then there is a bright side to a crisis, even COVID." ■

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CMS Continues Infection Control Inspections for Coronavirus

If you are prepared for the pandemic, you are probably ready for CMS

The Center for Medicaid & Medicare Services (CMS) continues to survey hospitals and long-term care facilities for infection control measures to prevent the novel coronavirus, COVID-19. The inspections assess the basics of hand hygiene, personal protective equipment (PPE), and staff education — things most facilities should be doing months into a pandemic.

The CMS can do a novel coronavirus inspection if the agency receives a complaint on something completely unrelated, warns **Ann Marie Pettis**, RN, BSN, CIC, FAPIC, director of infection control at the University of Rochester, NY.

"We were surveyed by CMS. They came in on a routine complaint, but once they are in, they can determine what their focus will be," she says. "Once they realized the complaint was not legitimate, they decided to turn it into COVID survey. We did very well."

In large part, that is because of the pandemic response, because infection control is being emphasized across the entire healthcare delivery system, she adds. "Some of our nursing homes were also surveyed recently by CMS, and they have done well," Pettis says. "In terms of how to prepare for these surveys, basically what we have been doing all along [for novel coronavirus] is really preparation for any survey, including by CMS."

Indeed, there is so much emphasis on infection prevention during delivery of care, that in some cases, healthcare workers may be safer at work than in the community.

"We are seeing very little transmission," says Pettis, president-elect of the Association for Professionals in Infection Control and Epidemiology (APIC). "Our healthcare workers are wearing the appropriate PPE, so our positivity rate is actually lower than in the community. That tells you that appropriate PPE is protective for healthcare workers."

The CMS surveys were announced in a March 23, 2020, memo to inspectors.[1] Originally, the action was set to expire in three weeks, but CMS is expected to continue surveys at least until the pandemic emergency order is lifted. As this report was filed, there was an effort by APIC and other medical groups to extend the emergency order beyond the original July 25 deadline.[2]

The CMS survey includes a checklist of measures, summarized as follows. For the complete requirements see the aforementioned CMS memo.

Hand Hygiene

CMS recommends taking the following actions to reduce COVID-19 transmission:

- Are staff performing hand hygiene when indicated?
- If alcohol-based hand rub (ABHR) is available, is it readily accessible and preferentially used by staff for hand hygiene?
- Staff should wash hands with soap and water when their hands are visibly soiled (e.g., blood, body fluids). Interview appropriate staff to determine if hand hygiene supplies are readily available and who they contact for replacement supplies. If there are shortages of ABHR, hand hygiene should be done with soap and water.

Staff should perform hand hygiene — even if gloves are used — in the following situations:

- Before and after contact with patients
- After contact with blood, body fluids, or visibly contaminated surfaces or other objects and surfaces in the care environment
- After removing PPE (e.g., gloves, gown, facemask)
- Before performing a procedure, such as an aseptic task (e.g., insertion of an invasive device, such as a urinary catheter, manipulation of a central venous catheter, medication preparation, and/or dressing care).

PPE

Determine if staff appropriately use PPE, including, but not limited to, the following:

- Gloves are worn if potential contact with blood or body fluid, mucous membranes, or non-intact skin
- Gloves are removed after contact with blood or body fluids, mucous membranes, or non-intact skin
- Gloves are changed and hand hygiene is performed before moving from a contaminated site to a clean site during care (body, equipment, etc.)
- An isolation gown is worn for direct patient contact if the patient has uncontained secretions or excretions
- A facemask, gloves, isolation gown, and eye protection are worn

when caring for a patient with new acute cough or symptoms of an undiagnosed respiratory infection unless the suspected diagnosis requires airborne precautions (e.g., tuberculosis)

• If PPE use is extended/reused, is it done according to national and/or local guidelines? If it is reused, is it cleaned/decontaminated/maintained after and/or between uses?

Interview appropriate staff to determine if PPE is available, accessible, and used by staff.

• Are there sufficient PPE supplies available to follow infection prevention and control guidelines? In the event of PPE shortages, what procedures is the facility taking to address this issue?

• Do staff know how to obtain PPE supplies before providing care?

• Do they know who to contact for replacement supplies?

Education and Screening

CMS also recommends making sure the following questions have satisfactory answers:

• Is there evidence the provider has educated staff on COVID-19 (e.g., symptoms, how it is transmitted, screening criteria, work exclusions)?

• How does the provider convey updates on COVID-19 to all staff?

• Is the facility screening all staff at the beginning of their shift for fever and signs/symptoms of illness?

• Is the facility actively taking their temperature and documenting absence of illness (or signs/symptoms of COVID-19 as more information becomes available)?

If staff develop symptoms at work, does the facility:

• have a process for staff to report their illness or developing symptoms;

• place them in a facemask and have them return home for appropriate medical evaluation;

• inform the facility's infection preventionist and include information on individuals, equipment, and locations the person came in contact with. ■

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Patient Handwashing: An Idea Whose Time Has Come?

Like everything else, a different view through pandemic lens

The COVID-19 pandemic adds impetus to a longstanding mission of a nurse scientist: getting hospitalized patients to wash their hands. Somewhat surprisingly, this commonsense measure is not in effect at many facilities, although it is known that patients can contaminate their own invasive lines and self-inoculate infections.

"We know from data from all over the world that patients' hand hygiene practice is very poor," says **Shanina C. Knighton**, PhD, RN, an instructor and researcher at Case Western Reserve University in Cleveland, OH. "Patients' hand hygiene is even lower than some of the worst healthcare compliers — less than 40% at times."

The Centers for Disease Control and Prevention (CDC) recommends that hospital patients wash their hands for their own protection, but hospitals are not required to provide information to patients about cleaning their hands, she notes. "As a patient in a healthcare setting, you are at risk of getting an infection while you are being treated for something else," the CDC states.[1] "Patients and their loved ones can play a role in asking and reminding healthcare providers to clean their hands. Your hands can spread germs too, so protect yourself by cleaning your hands often."

The CDC recommends patients wash their hands at regular intervals, including:

• before preparing or eating food;

• before touching their eyes, nose, or mouth;

• before and after changing wound dressings or bandages;

• after using the restroom;

• after blowing their nose, coughing, or sneezing;

• after touching hospital surfaces, such as bed rails, bedside tables, doorknobs, remote controls, or the phone.

Proposed State Law

How serious is Knighton about this topic? Recently, she worked to get a state law introduced in Ohio that would require handwashing education

for patients and long-term care residents. "[This] bill is the first in the nation asking for mandatory patient hand hygiene education in hospitals and in long-term care facilities," she says. "Science does no good if it is sitting on a shelf."

Introduced by Ohio Rep. **Juanita Brent** (D-Cleveland), the Hand Hygiene Education Bill would require using educational materials to teach patients and residents to independently decontaminate their hands with alcohol rubs or soap and water. The bill calls for healthcare staff to assist patients and residents with hand hygiene if they cannot independently wash their hands.

"This is a piece of legislation that was in the works prior to the COVID-19 pandemic," Brent said in a statement. "I have been collaborating with Dr. Knighton on this bill to improve patient and resident hand hygiene. Good hand hygiene must be practiced now to help combat the spread of the COVID-19 virus."

Knighton is the lead author of a recently published study that assessed patients' hand hygiene practice in a survey administered in post-discharge visits.[2]

Patients were asked to provide their perspective on the importance of patient hand hygiene compared with hospital staff, as well as their satisfaction or lack thereof with hand hygiene independence.

Overall, 65 (61%) of the 107 respondents reported that prior to being admitted to the hospital, they were able to maintain cleaning their hands with little or no difficulty.

"During their admission, only 21 (19.6%) of the participants reported needing little or no assistance," the researchers found. "More than one-half of the participants, 34 (32%) and 23 (22%), respectively, reported mostly or completely agreeing that the hand hygiene of the healthcare staff was more important than their own."

Fifty (47%) participants were not satisfied with their ability to maintain their hand hygiene in the hospital. Ten (9%) were very satisfied with their ability to maintain hand hygiene.

"In surveys, patients often attribute their poor hand hygiene practices primarily to staff being too busy to provide assistance and lack of access to hand hygiene products," the authors note.[3-5] "Despite healthcare settings being one of the most likely places to acquire or transmit pathogens, patients are not included in routine hand hygiene practice."

With the efficacy of hand hygiene in healthcare workers well established "no hands should be ignored" in hospitals and nursing homes, Knighton emphasizes. "For example, patient-centered education around infection prevention is needed so that patients do not believe that hand hygiene resources around the hospital are only meant for health care staff," the paper concludes.

Q&A

Hospital Infection Control & Prevention (*HIC*) asked Knighton to comment further on this issue in the following interview, which has been edited for length and clarity.

HIC: When this subject comes up, there often are concerns expressed that impaired patients and those with dementia may try to consume or otherwise misuse alcohol hand rubs.

Knighton: Right, but we're not talking about all patients. The United States has about 150 million admissions each year. How many of those are people who can adequately clean their hands?

The other piece of it is that we know that healthcare workers' hands can become contaminated. We know that the environment surrounding the patient is contaminated — their bedside tables, call lights, bed rails that they commonly touch. For a catheter insertion, a wound change, we may use the patient's bedside table. There are a lot of contamination elements. [There have been reports] of finding COVID on doorknobs, bedrails, and call lights.

These are the same concerns we acknowledge for the pathogens that lead to healthcare-associated infections. We have public health initiatives right now saying everybody clean their hands, but some of our vulnerable patients cannot clean their hands. Are we neglecting their ethical rights?

HIC: You mentioned the CDC recommendations in this area, and you have a paper emphasizing four moments for patient hand hygiene.[6]

Knighton: Yes, we understand that some healthcare systems are limited. Everyone is not going to provide every patient with a bottle of hand sanitizer. We get that, but start with the basics of education. [Patients] can practice hand hygiene when [eating] their meals, going to the rest room, when they are coming in and out of their rooms, and also if they are touching any wounds or medical devices.

Right now, a lot of hospitalized patients wait for their healthcare workers to tell them everything, including their hand hygiene [recommendations]. Our study asked them to reflect, after they are admitted, on what their hand hygiene practices were. Were you provided any materials? Did you independently clean your hands?

A lot of patients were aware of hand hygiene from a prior profession or because this is just a norm for them. It ends up being a situation of where they know the sink is there and the hand sanitizers are on the wall, but they think they are for healthcare workers, not them.

HIC: You have found that this is a longstanding blind spot in infection control practice.

Knighton: If the hand sanitizer is located on the wall and the patient can't get to it, does it just mean that we shouldn't clean their hands? I think that has been the norm, because it has been ignored for so many years. When I look back at studies from the 1960s and 1970s — these were monumental studies that informed infection prevention right now — they mention the fact that patients have germs on their hands. In some cases, they note that the patients are the original carriers of these germs. But the conclusion — and you can tell that it is biased — is that healthcare workers should clean their hands [because] patients may be a route of transmission. If the results suggest that the patient was the original carrier, why is it suggested that only healthcare workers clean their hands? There are studies that show patients bring in germs to emergency departments (EDs), comparing the different strains of MDR0s (multidrug-resistant organisms) inside the hospital from those found in the ED.

***HIC*:** There certainly have been campaigns for patients to "speak up" and remind healthcare workers to disinfect their hands. Perhaps there is some concern that patients would be alarmed if warned about the pathogens in the hospital environment?

Knighton: We are talking about a nation where healthcare-associated infections affect about 2 million people [per] year and cause 100,000 deaths. If you can tell a patient to tell their providers to clean their hands, then you have already disclosed that there are germs in the hospital. One reason I say that patient education is important is that right now the burden falls on nurses because they are closest to the patient. They may choose to do it or not to do it. But there are strategies that can be employed, such as [bringing] everyone as a caregiver that interacts with the patient and educating the patient themselves. Patients may require physical therapy, so get physical therapy on board to help clean their hands. When nurses come in the room and they are cleaning their hands, they can [prompt] the patient to clean their hands. The study showed that a lot of patients had practiced hand hygiene at home, but if they are under the impression that the materials are not meant for them, then they don't have the knowledge to practice hand hygiene at the minimum they need.

> "IS IT ETHICAL TO NOT PROVIDE PATIENTS WITH HAND HYGIENE EDUCATION AND ADEQUATE MATERIALS?"

***HIC*:** Historically, changing practices in infection control, and medicine in general, have been notoriously difficult.

Knighton: In this instance, I can tell you since 2009-2010 I have met resistance. I don't want this to be the [Ignaz] Semmelweis reflex 2.0. That man was working very hard to try to get people to clean their hands, and it was ignored because it was not deemed important. If I am a patient, cleaning my hands not only helps prevent potential infections, but it means I can be engaged [in my care] instead of waiting or hoping that someone can keep me safe. Patients assume that the environment is going to be clean and their healthcare workers are going to clean their hands. We are talking about human-based actions that can lead to error. Why wouldn't we provide them with another strategy to protect themselves before they end up infected? Again, is it ethical to not provide patients with hand hygiene education and adequate materials? ■

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Effects of COVID-19 on the Brain

Infection, stress of pandemic are dual risks to healthcare workers

Healthcare workers and patients who have contracted SARS-CoV-2, particularly if they were hospitalized, could be at risk of neurological deficits in the short term and as well as later cognitive problems, says **Majid Fotuhi**, MD, PhD, the lead author of a new paper on the effect of COVID-19 on the brain.[1]

"For healthcare workers, there are two issues," he says. "One is the impact of [the] SARS-CoV-2 virus itself [on the] brain. The other is the stress of the COVID-19 pandemic, seeing patients die before their eyes. That causes post-traumatic stress disorder (PTSD). I think we need to monitor frontline healthcare workers even more closely [than patients], because the stress response in our body can actually harm the brain significantly."

Loss of sense of smell (anosmia), "stroke, paralysis, cranial nerve deficits, encephalopathy, delirium, meningitis, and seizures are some of the neurological complications in patients with COVID-19," Fotuhi and co-authors note. "There remains a challenge to determine the extent to which neurological abnormalities in COVID-19 are caused by SARS-Cov-2 itself, the exaggerated cytokine response it triggers, and/or the resulting hypercoagulapathy and formation of blood clots in blood vessels throughout the body and the brain."

The article reviews neurological problems reported in COVID-19 patients and proposes a basic "NeuroCovid" classification scheme.

"Keeping accurate registries of COVID-19 patients with neurological deficits may enable us to establish plausible connections with aging-associated and neurodegenerative disorders, such as Parkinson's disease, in the future," the authors conclude. "Standardized evaluations, such as quantitative EEG (electroencephalogram), fluid biomarkers, cognitive evaluations, and multimodal neuroimaging can also lend insight to possible long-term neurological sequalae in COVID-19, such as depression, memory loss, mild cognitive impairment, or Alzheimer's disease."

Fotuhi is medical director of NeuroGrow Brain Fitness Center in McLean, VA, and an affiliate staff member at Johns Hopkins Medicine in Baltimore. The paper identifies three distinct NeuroCovid neurological categories or stages.

In Stage I, the virus damage is limited to epithelial cells of nose and mouth. "The majority — 95% — recover without any problem," he says. "These are the patients who are least likely to have long-term neurological problems."

In NeuroCovid Stage II, patients may experience blood clots in their brain caused in part by an inflammatory immune response called the "cytokine storm." This can result in mini-strokes that can cause cumulative neural damage.

"We can talk of large strokes the same way we do in patients that do not have COVID-19," he says. "But when they have small strokes, the patient may have no symptoms, an MRI (magnetic resonance imaging) is not done, and no one knows what this patient has suffered. These patients, long-term, are likely to have depression, memory loss, and other neurological [problems]."

In NeuroCovid Stage III, there is damage to the blood-brain barrier, which protects the blood vessels of the brain, causing seizures or encephalopathy.

"The cytokine storm is so huge that it ruptures and damages the blood-brain barrier, such that the virus particles get inside the brain, along with the inflammatory markers," Fotuhi says.

"When that happens, there is significant damage to the brain cells, and these are the patients that I think will have the highest degree of neurological issues in the future," he adds.

There are blood tests to measure the intensity of the inflammatory immune response, which may be responsible for the relatively rare severe infections in younger people.

"It is the body's own immune systems that harms the patient," he says.

In healthcare workers, the neurological effects of COVID-19 could be compounded by the stress of fighting the pandemic.

"The more stressed you are, the more the part of your brain for memory — the hippocampus — shrinks," Fotuhi says. "Frontline healthcare workers dealing with patients in dire situations experience an extreme amount of stress. The cortisol that is produced in response to stress indirectly harms the hippocampus. We need to monitor our healthcare workers dealing with COVID-19 patients closely. They may have secondary harm due to PTSD even if they don't have the virus [itself]."

PTSD can harm areas of the brain affecting regulation of emotion, memory, and executive functions, he adds.

Overall, the basic measures to boost brain performance, regardless of patient history, include vigorous exercise, stress reduction, and eight hours of sleep nightly, he recommends. ■

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Pandemic Necessity Is the Mother of Invention

SHEA finds hospitals making their own PPE, testing supplies

Hospital clinicians are using creative strategies and producing their own equipment to meet the outsized demands of treating patients during the novel coronavirus pandemic, the Society for Healthcare Epidemiology of America (SHEA) reports.[1]

A SHEA survey of its research network hospitals in the United States and Canada found that strategies to maintain safety while preserving supplies and delivering care included:

- extended use of disposable respirators beyond one day;
- respirators worn in combination with masks (surgical, cloth) to preserve them;
- storage of disposable respirators by the user in a paper bag between uses;
- reprocessing of disposable respirators via hydrogen peroxide vapor, ethylene oxide, ultraviolet irradiation, or moist heat treatments;
- extended use of disposable gowns;
- self-production of personal protective equipment (PPE), test kits, and testing materials.

In April 2020, the SHEA Research Network collected survey responses from healthcare epidemiologists at 69 healthcare facilities, including 58 from the United States and Canada, and 11 located internationally. "In the 'other' field in a question about self-producing test components, 13% of facilities wrote in that they were self-producing PPE, such as face shields and gowns, due to shortages," the authors report. "A quarter of facilities were self-producing testing components, such as swabs, transport media, and collection tubes."

The survey did not assess the time and resources that were required to research and implement these strategies.

"However, the burden of doing this across settings, types of procedures, patients, healthcare roles, and local circumstances represents substantial opportunity cost at a time when healthcare facilities were under strain to prepare for, mitigate, and respond to the pandemic," the authors noted. "These challenges also include implementing unfamiliar practices for [healthcare personnel], such as long durations of extended use of disposable respirators and gowns."

In a finding that informs this self-reliant approach, 40% of respondents said their supply of respirators was "limited" or at "crisis level." Nine (15%) respondents assessed their supply as "sustainable for the pandemic," and 27 (45%) said it was "adequate for the current situation."

Approximately two-thirds of facilities reported receiving ethical guidance from their institutions regarding PPE contingency strategies, potential therapies for COVID-19, patient triage, equipment modifications, and visitor policies.

"Only about one-third of survey participants had received ethical guidance from states and professional societies in these areas," the authors reported. "PPE contingency strategies was the topic that facilities said they had most frequently sought and received ethical guidance."

Regarding testing, 52 (81%) of 64 facilities reported having access to in-house testing for COVID-19. Among 51 facilities that indicated the turnaround time for COVID-19 diagnostic test results, 22 (43%) reported it was less than six hours; 10% reported a range of seven to 12 hours; 10% reported 13 to 24 hours; and 18% reported longer than 24 hours.

Overall, 18 respondents (26%) indicated that they self-produced test components because of shortages. Of these, 13 (72%) produced viral transport media, 11 (61%) made their own viral collection swabs, and three (16%) produced collection tubes as a result of shortages. "The vast majority (81%) reported having access to in-house testing for COVID-19," they concluded. "Sixty-four percent of facilities reported testing asymptomatic patients prior to certain procedures."

AMA Pleads for PPE

In a related development, the American Medical Association (AMA) sent a letter on June 30, 2020, to federal emergency officials expressing "ongoing concern over the availability of PPE, specifically for clinicians in office-based settings."[2]

"We understand that PPE and other critical infection control supplies have been directed towards COVID-19 hotspots and to facilities treating infected patients, and we have

supported the Administration's efforts to send supplies where they are most needed," the AMA states. "However, as non-hospital-based physicians return to work and reopen their practices, the need for these supplies is rapidly expanding to other care sites."

Although many physician practices have been shuttered in the transition to telemedicine, in-person visits are returning as offices reopen.

"While it is critical to the long-term viability of these practices to resume office visits, the serious threat of COVID-19 infection persists and it is essential that physicians and their staff institute proper infection control protocols and procedures in their practices," the AMA emphasized. "However, strains on the supply chain for PPE and disinfectant products continue, and they simply are not readily available from the usual sources our physicians use. We are hearing significant and growing concern from our member physicians that they cannot secure needed supplies to safely reopen and that they are unsure where to turn for further guidance and assistance."

The AMA suggested the Federal Emergency Management Agency create a "clearinghouse on a regional, state, or local level to provide such information to providers in one easy-to-access location." ■

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Pandemic Coronavirus May Kill the Handshake

Some level of microbe transfer with fist bumps as well

The COVID-19 pandemic may be the death knell of the handshake, although its deep anthropological roots may resurface after the viral storm is over.

The handshake is an ancient custom, with its origins thought to be a sign that one was unarmed in greeting another. With the suggestion that it originated with the opening tap of gloves in boxing, the fist bump is generally considered the more hip and less contagious version of the handshake.

The elbow bump has become the pandemic equivalent of touching fists, but these and other social gestures that bring people in close proximity are all being rethought as SARS-CoV-2 spreads globally.

A study using nonpathogenic bacteriophage MS2 as a viral surrogate found that handshakes and, to a lesser extent, fist bumps can be sources of transmission.[1] Another study by the same clinical group found that both greetings also could transmit methicillin-resistant *Staphylococcus aureus* (MRSA).[2] **Curtis Donskey**, MD, an infectious disease physician at Louis Stokes Cleveland VA Medical Center, led the research.

"In both studies, the bottom line is that any sort of greeting that involves contact between hands seemed to be very efficient at spreading viruses or MRSA," he says. "So, even though the fist bump was statistically better than the handshake, with a little bit lower transfer, there was still plenty of transfer. You definitely wouldn't want to do a fist bump with a COVID patient."

In the viral study, 22 participants used a keyboard and mouse contaminated with MS2 for two minutes and then did handshakes and fist bumps in randomly assigned order with 22 noncontaminated participants. "After use of the contaminated keyboard and mouse, the fist bump greeting resulted in significantly less frequent transfer of bacteriophage MS2 and in fewer viral particles transferred than the handshake," the authors found. "However, the frequency of viral transfer with the fist bump was strikingly high despite the reduced surface area of contact involving only the back of the hand."

The findings suggest that viral particles on the fingers and palms may be transferred rapidly to the back of the hands.

In the other study, 50 MRSA-colonized patients participated in hand greetings with researchers wearing sterile gloves. The contact portions of the sterile glove were cultured, and the number of MRSA colony-forming units were tabulated. Again, there was a reduction in the frequency of MRSA transfer for the fist bump (16%) vs. the handshake (22%). Although less, the level of contamination with the fist bump still was a concern.

"Our data would suggest that in the setting of COVID or even MRSA,

[the fist bump] is probably not a good idea," Donskey says. "The hands are a tremendously efficient way to transfer viruses or bacteria, and even hand hygiene isn't perfect at eliminating contamination. I think as much as possible I would avoid hand contact greetings." That is another "new normal" of the pandemic, but it remains to be seen whether the entrenched practice of handshakes will return.

"There is a pretty significant cultural change occurring in the community and in the healthcare setting," he says. "[Handshaking] is kind of hard to break, but it is happening now." ■

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CME/CE QUESTIONS

1. **In a study of repeated point prevalence surveys for COVID-19 at skilled nursing facilities, what was the outcome for 12 facilities that had two additional infection control consultations?**

   a. Personal protective equipment (PPE) use was reduced by 31%.
   b. Mortality reductions were directly tied to the consultations.
   c. Staff furloughs increased.
   d. Cases of COVID-19 declined from 35% to 18%.

2. **Michael Calderwood, MD, MPH, said modeling of COVID-19 activity in the local area allows forecasting out to:**

   a. one week.
   b. four weeks.
   c. three months.
   d. six months.

3. **A survey by the Society for Healthcare Epidemiology of America found that responding facilities most often were seeking ethical advice on:**

   a. PPE contingency strategies.
   b. testing decisions for staff and patients.
   c. use of ventilators.
   d. use of patient therapies.

4. **Studies of handshakes and fist bumps for both a viral marker and a bacterial pathogen found:**

   a. no viral contamination with fist bumps.
   b. no bacterial contamination with handshakes.
   c. shaking hands with gloves did not prevent viral contamination.
   d. contamination for virus marker and bacteria for both handshakes and fist bumps.