Go to **MDedge.com/CHESTPhysician** for the latest news on the coronavirus pandemic.

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CHEST® Physician

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REUTERS/Shannon Stapleton

The triage framework starts with surge planning that includes an inventory of intensive care unit resources such as ventilators, beds, supplies, and staff that could be marshaled to meet a surge in demand, followed by establishing "identification triggers" for triage initiation by a regional authority.

COVID-19 critical care guidance includes resource triage plan

BY ANDREW D. BOWSER
MDedge News

While triage of critical care resources should be a rare event during the COVID-19 crisis, failing to prepare for the worst-case scenario could have serious consequences, according to authors of recent reports that offer advice on how to prepare for surges in demand.

Even modest numbers of critically ill COVID-19 patients have already rapidly overwhelmed existing hospital capacity in hard-hit areas including Italy, Spain, and New York City, said authors of an expert panel report released in CHEST.

"The ethical burden this places on hospitals, health systems, and society is enormous," said Ryan C. Maves, MD, FCCP, of the Naval Medical Center in San Diego, lead author of the expert panel report from the Task Force for Mass Critical Care and the American College of Chest Physicians (CHEST).

"Our hope is that a triage system can help us identify those patients with the greatest likelihood of benefiting from scarce critical care resources, including but not limited to mechanical ventilation, while still remembering our obligations to care for all patients as best we can under difficult circumstances," Dr. Maves said in an interview.

Triage decisions could be especially daunting for resource-intensive therapies such as extracorporeal membrane oxygenation (ECMO), as physicians may be forced to decide when and if to offer

TRIAGE // *continued on page 7*

Concerns for clinicians over 65 grow during pandemic

BY ALICIA GALLEGOS
MDedge News

When Judith Salerno, MD, heard that New York was calling for volunteer clinicians to assist with the COVID-19 response, she didn't hesitate to sign up.

Although Dr. Salerno, 68, has held administrative, research, and policy roles for 25 years, she has kept her medical license active and always found ways to squeeze some clinical work into her busy schedule.

"I have what I could consider 'rusty' clinical skills, but pretty good clinical judgment," said Dr. Salerno, president of the New York Academy of Medicine. "I thought in this situation that I could resurrect and hone those skills, even if it was just taking care of routine patients and working on a team, there was a lot of good I can do."

Dr. Salerno is among 80,000 health care professionals who have volunteered to work temporarily in New York during the COVID-19 pandemic as of March 31, 2020, according to New York state officials. In mid-March, New

Over 65 // *continued on page 8*

INSIDE HIGHLIGHT

NEWS FROM CHEST

FROM THE EVP/CEO

How CHEST is helping to flatten the curve

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Dear Readers: It is unlikely to surprise you that the majority of this issue of *CHEST Physician* is dedicated to the coronavirus pandemic. What may surprise you is that this was given much consideration prior to implementation. The rate at which our understanding of this virus, how it spreads, and how it is best managed is growing rapidly, so that today's information may be quickly out of date, making it a challenge to finalize a publication almost a month before it finds its way into readers' hands. That said, we at *CHEST Physician* thought it inappropriate to focus on anything other than what is clearly the greatest public health crisis of our time.

So, as you peruse these pages, note that all data herein were current as of their writing in late April. And please, above all else, stay safe.

David A. Schulman, MD, FCCP, Editor in Chief

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COVID-19 unusual features: 'Look for tricky symptoms'

BY M. ALEXANDER OTTO
MDedge News

The take-home message from a growing number of recent COVID-19 case reports is that the infection might be far more than a respiratory disease.

Although a cause-and-effect relationship is unknown, people with the virus have presented with or developed heart disease, acute liver injury, ongoing GI issues, skin manifestations, neurologic damage, and other problems, especially among sicker people.

For example, French physicians described an association with encephalopathy, agitation, confusion, and corticospinal tract signs among 58 people hospitalized with acute respiratory distress (N Engl J Med. 2020 Apr 15. doi: 10.1056/NEJMc2008597).

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In particular, Yale New Haven (Conn.) Hospital is dealing with unexpected complications up close. Almost half of the beds there are occupied by COVID-19 patients. Over 100 people are in the ICU, and almost 70 intubated. Of the more than 750 COVID admissions so far, only about 350 have been discharged. "Even in a bad flu season, you never see something like this; it's just unheard of," said Harlan M. Krumholz, MD, a Yale cardiologist and professor of medicine helping lead the efforts there.

Kidney injuries prominent

"When they get to the ICU, we are seeing lots of people with acute kidney injuries; lots of people developing endocrine problems; people having blood sugar control issues, coagulation issues, blood clots. We are just waking up to the wide range of ways this virus can affect people. Our ignorance is profound," Dr. Krumholz said, but physicians "recognize that this thing has the capability of attacking almost every single organ system, and it may or may not present with respiratory symptoms."

Dr. Harlan M. Krumholz

It's a similar story at Mt. Sinai South Nassau, a hospital in Oceanside, N.Y. "We've seen a lot of renal injury in people having complications, a lot of acute dialysis," but it's unclear how much is caused by the virus and how much is simply because people are so sick, said Aaron E. Glatt, MD, infectious disease professor and chair of medicine at the hospital. However, he said things are looking brighter than at Yale.

"We are not seeing the same level of increase in cases that we had previously, and we are starting to see extubations and discharges. We've treated a number of patients with plasma therapy, and hopefully that will be of benefit. We've seen some response to" the immunosuppressive "tocilizumab [Actemra], and a lot of response to very good respiratory therapy. I think we are starting to flatten the curve," Dr. Glatt said.

"Look for tricky symptoms"

The growing awareness of COVID's protean manifestations is evident in Medscape's Consult forum, an online community where physicians and medical students share information and seek advice; there's been over 200 COVID-19 cases and questions since January.

Early on, traffic was mostly about typical pulmonary presentations, but lately it's shifted to nonrespiratory involvement. Physicians want to know if what they are seeing is related to the virus, and if other people are seeing the same things.

There's a case on Consult of a 37-year-old man with stomach pain, vomiting, and diarrhea, but no respiratory symptoms and a positive COVID test. A chest CT incidental to his abdominal scan revealed significant bilateral lung involvement.

A 69-year-old woman with a his-

Continued on following page

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Continued from previous page

tory of laparotomy and new-onset intestinal subocclusion had only adhesions on a subsequent exploratory laparotomy, and was doing okay otherwise. She suddenly went into respiratory failure with progressive bradycardia and died 3 days later. Aspiration pneumonia, pulmonary embolism, and MI had been ruled out. "The pattern of cardiovascular failure was in favor of myocarditis,

Dr. Aaron E. Glatt

Dr. William Shaffner

but we don't have any other clue," the physician said after describing a second similar case.

Another doctor on the forum reported elevated cardiac enzymes without coronary artery obstruction in a positive patient who went into shock, with an ejection fraction of 40% and markedly increased heart wall thickness, but no lung involvement. There are also two cases of idiopathic thrombocytopenia without fever of hypoxia.

An Italian gastroenterologist said: "Look for tricky symptoms." Expand "patient history, asking about the sudden occurrence of dysgeusia and/or anosmia. These symptoms have become my guiding diagnostic light" in Verona. "Most patients become nauseated, [and] the taste of any food is unbearable. When I find these symptoms by history, the patient is COVID positive 100%."

'Make sure that they didn't die in vain'

There was interest in those and other reports on Consult, and comments from physicians who have theories, but no certain answers about what is, and is not, caused by the virus.

Direct viral attack is likely a part of it, said Stanley Perlman, MD, PhD, a professor of microbiology and immunology at the University of Iowa, Iowa City.

The ACE2 receptor the virus uses to enter cells is common in many organs, plus there were extrapulmonary manifestations with severe acute respiratory syndrome (SARS), another pandemic caused by a zoonotic coronavirus almost 20 years ago. At least with SARS, "many organs were infected when examined at autopsy," he said.

The body's inflammatory response is almost certainly also in play. Progressive derangements in inflammatory markers – C-reactive protein, D dimer, ferritin – correlate with worse prognosis, and "the cytokine storm that occurs in these patients can lead to a degree of encephalopathy, myocarditis, liver impairment, and kidney impairment; multiorgan dysfunction, in other words," said William Shaffner, MD, a professor of preventive medicine and infectious diseases at Vanderbilt University Medical Center, Nashville, Tenn.

But in some cases, the virus might simply be a bystander to an unrelated disease process; in others, the experimental treatments being used might cause problems. Indeed, cardiology groups recently warned of torsade de pointes – a dangerously abnormal heart rhythm – with hydroxychloroquine and azithromycin.

"We think it's some combination," but don't really know, Dr. Krumholz said. In the meantime, "we are forced to treat patients by instinct and first principles," and long-term sequelae are unknown. "We don't want to be in this position for long."

To that end, he said, "this is the time for us all to hold hands and be together because we need to learn rapidly from each other. Our job is both to care for the people in front of us and make sure that they didn't die in vain, that the experience they had is funneled into a larger set of data to make sure the next person is better off."

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Plan for fair and equitable triage

// continued from page 1

such support after demand outstrips a hospital's ability to provide it.

"ECMO requires a lot of specialized capability to initiate on a patient, and then, it requires a lot of specialized capability to maintain and do safely," said Steven P. Keller, MD, of the division of emergency critical care medicine in the department of emergency medicien at Brigham and Women's Hospital and Harvard Medical School, both in Boston.

Dr. Maves

Dr. Keller

Those resource requirements can present a challenge to health care systems already overtaxed by COVID-19, according to Dr. Keller, coauthor of a guidance document in Annals of the American Thoracic Society. The guidance suggests a pandemic approach to ECMO response that's tiered depending on the intensity of the surge over usual hospital volumes.

Mild surges call for a focus on increasing ECMO capacity, while a moderate surge may indicate a need to focus on allocating scarce resources, and a major surge may signal the need to limit or defer use of scarce resources, according to the guidance.

"If your health care system is stretched from a resource standpoint, at what point do you say, 'we don't even have the capability to even safely do ECMO, and so, perhaps we should not even be offering the support'?" Dr. Keller said.

Critical care guidance

The guidance from the Task Force for Mass Critical Care and CHEST offers nine specific actions that authors suggest as part of a framework for communities to establish the infrastructure needed to triage critical care resources and "equitably" meet the needs of the largest number of COVID-19 patients. "It is the goal of the task force to minimize the need for allocation of scarce resources as much as possible," the authors stated.

The framework starts with surge planning that includes an inventory of intensive care unit resources such as ventilators, beds, supplies, and staff that could be marshaled to meet a surge in demand, followed by establishing "identification triggers" for triage initiation by a regional authority, should clinical demand reach a crisis stage.

Next is preparing the triage system, which includes creating a committee at the regional level, identifying members of tertiary triage teams and the support structures they will need, and preparing and distributing training materials.

Agreeing on a triage protocol is important to ensure equitable targeting of resources, and how to allocate limited life-sustaining measures needs to be considered, the panel wrote. They also recommend adaptations to the standards of care such as modification of end-of-life care policies; support for health care workers, family, and the public; and consideration of pediatric issues including transport, concentration of care at specific centers, and potential increases in age thresholds to accommodate surges.

Barriers to triage?

When asked about potential barriers to rolling out a triage plan, Dr. Maves said the first is acknowledging the possible need for such a plan: "It is a difficult concept for most in critical care to accept – the idea that we may not be able to provide an individual patient with interventions that we consider routine," he said.

Beyond acknowledgment of need, other potential barriers to successful implementation include the limited evidence base to support development of these protocols, as well as the need to address public trust.

"If a triage system is perceived as unjust or biased, or if people think that triage favors or excludes certain groups unfairly, it will undermine any system," Dr. Maves said.

Dr. Maves and coauthors reported that some of the authors of their guidance are U.S government employees or military service members, and that their opinions and assertions do not reflect the official views or position of those institutions. Dr. Keller reported no disclosures related to the ECMO guidance.

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SOURCES: Maves RC et al. Chest. 2020 Apr 11. pii: S0012-3692(20)30691-7. doi: 10.1016/j.chest.2020.03.063; Seethara R, Keller SP. Ann Am Thorac Soc. 2020 Apr 15. doi: 10.1513/AnnalsATS.202003-233PS.

Clinicians over 65 can do important administrative and telemedicine work // continued from page 1

York Governor Andrew Cuomo (D) issued a plea for retired physicians and nurses to help the state by signing up for on-call work. Other states have made similar appeals for retired health care professionals to return to medicine in an effort to relieve overwhelmed hospital staffs and aid capacity if health care workers become ill. Such redeployments, however, are raising concerns about exposing senior physicians to a virus that causes more severe illness in individuals aged over 65 years and kills them at a higher rate.


Dr. Salerno

At the same time, a significant portion of the current health care workforce is aged 55 years and older, placing them at higher risk for serious illness, hospitalization, and death from COVID-19, said Douglas O. Staiger, PhD, a researcher and economics professor at Dartmouth College, Hanover, N.H. Dr. Staiger recently coauthored a viewpoint in JAMA called "Older clinicians and the surge in novel coronavirus disease 2019," which outlines the risks and mortality rates from the novel coronavirus among patients aged 55 years and older.


Dr. Staiger

Among the 1.2 million practicing physicians in the United States, about 20% are aged 55-64 years and an estimated 9% are 65 years or older, according to the paper. Of the nation's nearly 2 million registered nurses employed in hospitals, about 19% are aged 55-64 years, and an estimated 3% are aged 65 years or older.

"In some metro areas, this proportion is even higher," Dr. Staiger said in an interview. "Hospitals and other health care providers should consider ways of utilizing older clinicians' skills and experience in a way that minimizes their risk of exposure to COVID-19, such as transferring them from jobs interacting with patients to more supervisory, administrative, or telehealth roles. This is increasingly important as retired physicians and nurses are being asked to return to the workforce."

Protecting staff, screening volunteers

Hematologist-oncologist David H. Henry, MD, said his eight-physician group practice at Pennsylvania Hospital, Philadelphia, has already taken steps to protect him from COVID exposure.


Dr. Henry

At the request of his younger colleagues, Dr. Henry, 69, said he is no longer seeing patients in the hospital where there is increased exposure risk to the virus. He and the staff also limit their time in the office to 2-3 days a week and practice telemedicine the rest of the week, Dr. Henry said in an interview.

"Whether you're a person trying to stay at home because you're quote 'nonessential,' or you're a health care worker and you have to keep seeing patients to some extent, the less we're face to face with others the better," said Dr. Henry, who hosts the Blood & Cancer podcast for MDedge News. "There's an extreme and a middle ground. If they told me just to stay home that wouldn't help anybody. If they said, 'business as usual,' that would be wrong. This is a middle strategy, which is reasonable, rational, and will help dial this dangerous time down as fast as possible."

On a recent weekend when Dr. Henry would normally have been on call in the hospital, he took phone calls for his colleagues at home while they saw patients in the hospital. This included calls with patients who had questions and consultation calls with other physicians.

"They are helping me and I am helping them," Dr. Henry said. "Taking those calls makes it easier for my partners to see all those patients. We all want to help and be there, within reason. You want to step up an do your job, but you want to be safe."

Peter D. Quinn, DMD, MD, chief executive physician of the Penn Medicine Medical Group, said safeguarding the health of its workforce is a top priority as Penn Medicine works to fight the COVID-19 pandemic.

"This includes ensuring that all employees adhere to Centers for Disease Control and Penn Medicine infection prevention guidance as they continue their normal clinical work," Dr. Quinn said in an interview. "Though age alone is not a criterion to remove frontline staff from direct clinical care during the COVID-19 outbreak, certain conditions such as cardiac or lung disease may be, and clinicians who have concerns are urged to speak with their leadership about options to fill clinical or support roles remotely."

Meanwhile, for states calling on retired health professionals to assist during the pandemic, thorough screenings that identify high-risk volunteers are essential to protect vulnerable clinicians, said Nathaniel Hibbs, DO, president of the Colorado chapter of the American College of Emergency Physicians.


Dr. Hibbs

After Colorado issued a statewide request for retired clinicians to help, Dr. Hibbs became concerned that the state's website initially included only a basic set of questions for interested volunteers.

"It didn't have screening questions for prior health problems, comorbidities, or things like high blood pressure, heart disease, lung disease – the high-risk factors that we associate with bad outcomes if people get infected with COVID," Dr. Hibbs said in an interview.

To address this, Dr. Hibbs and associates recently provided recommendations to the state about its screening process that advised collecting more health information from volunteers and considering lower-risk assignments for high-risk individuals. State officials indicated they would strongly consider the recommendations, Dr. Hibbs said.

The Colorado Department of Public Health & Environment did not respond to messages seeking comment. Officials at the New York State Department of Health declined to be interviewed for this article but confirmed that they are reviewing the age and background of all volunteers, and individual hospitals will also review each volunteer to find suitable jobs.

The American Medical Association on March 30 issued guidance for retired physicians about rejoining the workforce to help with the COVID response. The guidance outlines license considerations, contribution options, professional liability considerations, and questions to ask volunteer coordinators.

"Throughout the COVID-19 pandemic, many physicians over the age of 65 will provide care to patients," AMA President Patrice A. Harris, MD, said in a statement. "Whether 'senior' physicians should be on the front line of patient care at this time is a complex issue that must balance several factors against the benefit these physicians can provide. As with all people in high-risk age groups, careful consideration must be given to the health and safety of retired physicians and their immediate family members, especially those with chronic medical conditions."

Tapping talent, sharing knowledge

When Barbara L. Schuster, MD, 69, filled out paperwork to join the Georgia Medical Reserve Corps, she answered a range of questions, including inquiries about her age, specialty, licensing, and whether she had any major medical conditions.


Dr. Schuster

"They sent out instructions that said, if you are over the age of 60, we really don't want you to be doing inpatient or ambulatory with active patients," said Dr. Schuster, a retired medical school dean in the Athens, Ga., area. "Unless they get to a point where it's going to be you or nobody, I think that they try to protect us for both our sake and also theirs."


Dr. Buerhaus

Dr. Schuster opted for telehealth or administrative duties, but has not yet been called upon to help. The Athens area has not seen high numbers of COVID-19 patients, compared with other parts of the country, and there have not been many volunteer opportunities for physicians thus far, she said. In the meantime, Dr. Schuster has found other ways to give her time, such as answering questions from community members on both COVID-19 and non–COVID-19 topics, and offering guidance to medical students.

"I've spent an increasing number of hours on Zoom, Skype, or FaceTime meeting with them to talk about various issues," Dr. Schuster said.

As hospitals and organizations ramp up pandemic preparation, now is the time to consider roles for

Continued on following page

ABIM grants MOC extension

BY GREGORY TWACHTMAN
MDedge News

Physicians will not lose their certification if they are unable to complete maintenance of certification requirements in 2020, the American Board of Internal Medicine announced.


Dr. Baron

"Any physician who is currently certified and has a Maintenance of Certification requirement due in 2020 – including an assessment, point requirement or attestation – will now have until the end of 2021 to complete it," ABIM President Richard Baron, MD, said in a letter sent to all diplomates.

Additionally, physicians "currently in their grace year will also be afforded an additional grace year in 2021," the letter continued.

ABIM noted that many assessments were planned for the fall of 2020 and the organization will continue to offer them as planned for physicians who are able to take them. It added that more assessment dates for 2020 and 2021 will be sent out later this year.

"The next few weeks and months will challenge our health care system and country like never before," Dr. Baron stated. "Our many internal medicine colleagues – and the clinical teams that support them – have been heroic in their response, often selflessly putting their own personal safety at risk while using their superb skills to provide care for others. They have inspired all of us."

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Continued from previous page

older clinicians and how they can best contribute, said Peter I. Buerhaus, PhD, RN, a nurse and director of the Center for Interdisciplinary Health Workforce Studies at Montana State University, Bozeman. Dr. Buerhaus was the first author of the recent JAMA viewpoint "Older clinicians and the surge in novel coronavirus 2019."

"It's important for hospitals that are anticipating a surge of critically ill patients to assess their workforce's capability, including the proportion of older clinicians," he said. "Is there something organizations can do differently to lessen older physicians' and nurses' direct patient contact and reduce their risk of infection?"

Dr. Buerhaus' JAMA piece offers a range of ideas and assignments for older clinicians during the pandemic, including consulting with younger staff, advising on resources, assisting with clinical and organizational problem solving, aiding clinicians and managers with challenging decisions, consulting with patient families, advising managers and executives, being public spokespersons, and working with public and community health organizations.

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Imaging recommendations issued for COVID-19

BY MITCHEL L. ZOLER
MDedge News

FROM THE JOURNAL *CHEST* ▪ A consensus statement on the role of imaging during the acute work-up of COVID-19 patients called for liberal use in patients with moderate to severe clinical features indicative of infection, regardless of their COVID-19 test results, but limited use in patients who present with mild symptoms or are asymptomatic.

The consensus statement on The Role of Imaging in Patient Management During the COVID-19 Pandemic released by the Fleischner Society on April 7 (Chest. 2020 Apr 7. doi: 10.1016/j.chest.2020.04.003) was designed to highlight the "key decision points around imaging" in COVID-19 patients.

"We developed the statement to be applicable across settings" so that each clinic or hospital managing COVID-19 patients could decide the situations where chest radiography (CXR) or CT would work best, said Geoffrey D. Rubin, MD, professor of cardiovascular research, radiology, and bioengineering at Duke University in Durham, N.C., and lead author of the statement.

Written by 15 thoracic radiologists and 10 pulmonologists/intensivists including an anesthesiologist, a pathologist, and additional experts in emergency medicine, infection control, and laboratory medicine, and with members from any of 10 countries on three continents, the panel arrived at agreement by more than 70% for each of the 14 questions.

As effective treatments are developed, thoracic imaging may find new roles by establishing treatment response or characterizing patients as likely responders to novel therapies.

"I was impressed and a little surprised that consensus was achieved for every question" posed to the panel by the Fleischner Society for Thoracic Imaging and Diagnosis, Dr. Rubin said in an interview. The panel also placed their 14 decisions about imaging within the context of three distinct clinical scenarios chosen to mirror common real-world situations: mild COVID-19 features, moderate to severe features with no critical-resource constraints, and moderate to severe features with constrained resources.

The statement also summarized its conclusions as five main recommendations and three additional recommendations.

The statement particularly called out one of its recommendations – that a COVID-19 diagnosis "may be presumed when imaging findings are strongly suggestive of COVID-19 despite negative COVID-19 testing" in a patient who has moderate to severe clinical features of COVID-19 and whose pretest probability is high. The panel voted unanimously in favor of this concept, that imaging is "indicated" in hospitalized patients with moderate to severe symptoms consistent with COVID-19 despite a negative COVID-19 test result.


Dr. Rubin

"This guidance represents variance from other published recommendations which advise against the use of imaging for the initial diagnosis of COVID-19," the statement acknowledged and specifically cited the recommendations issued in March 2020 by the American College of Radiology.

Despite that, the ACR and Fleischner recommendations "are not at odds with one another," maintained Dr. Rubin. The panel based its take on this question on the "direct experience" of its members caring for COVID-19 patients, according to the statement.

"I wholeheartedly agree with the suggested uses of imaging outlined by the panel," commented Sachin Gupta, MD, FCCP, a pulmonologist and critical care physician in San Francisco. "The consensus statement brings a practical way to consider obtaining imaging. It leaves the door open to local standards and best judgment for using CXR or CT. Many physicians are unclear whether to image low-risk and mildly symptomatic patients. This statement gives support to a watchful waiting approach."

Another recommendation advises against daily CXR in stable, intubated COVID-19 patients. This guide "now gives backing from an important society and thought leaders while giving an explanation" for why daily imaging is problematic, he noted in an interview.


Dr. Gupta

The daily CXR in these patients adds no value, and skipping unneeded imaging minimizes SARS-CoV-2 exposure to radiology personnel, and conserves personal protection equipment, said the statement.

"The Fleischner Society is known worldwide for its recommendations. Having the society lend its weight on triage with imaging for COVID-19 patients is important. I suspect it will help standardize practice."

Dr. Gupta also highlighted that lung imaging with a portable ultrasound unit has quickly become recognized as a very useful imaging tool with increasing use as the pandemic has unfolded, an option not covered by the Fleischner statement.

Study results have "confirmed excellent sensitivity, specificity, and reproducibility" with lung ultrasound, and it's also "easy to use," Dr. Gupta said.

Ultrasound chest imaging of COVID-19 patients did not get included in the statement despite the reliance some U.S. sites have already placed on it largely because few on the panel had direct experience using it. "We didn't feel we could contribute" to a discussion of ultrasound, Dr. Rubin said.

The statement's recommendations appear to have already begun influencing practice. "The feedback I've gotten is that people are relying on them," said Dr. Rubin, and some programs have sent him screen shots of the recommendations embedded in their local electronic health record.

The authors concluded on a somber note: "The evidence base supporting the use of imaging across the scenarios presented is scant and the advice presented herein may undergo refinement through rigorous scientific investigation, exposing nuances of image interpretation that may lead to prognostic information and guide management decisions. At the time of this writing, no therapy has been confirmed to alter the course of COVID-19, there is no known cure, and there is no vaccine for prevention. As effective treatments are developed, thoracic imaging may find new roles by establishing treatment response or characterizing patients as likely responders to novel therapies."

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Imaging recommendations for acute, hospitalized COVID-19 patients

Main recommendations

- Imaging is not routinely indicated for COVID-19 screening in asymptomatic people.
- Imaging is not indicated for patients with mild features of COVID-19 unless they are at risk for disease progression.
- Imaging is indicted for patients with features of moderate to severe COVID-19 regardless of COVID-19 test results.
- Imaging is indicted for patients with COVID-19 and evidence of worsening respiratory status.
- When access to CT is limited, chest radiography may be preferred for COVID-19 patients unless features of respiratory worsening warrant using CT.

Additional recommendations

- Daily chest radiographs are not indicated in stable, intubated patients with COVID-19.
- CT is indicated in patients with functional impairment, hypoxemia, or both, after COVID-19 recovery.
- COVID-19 testing is warranted in patients incidentally found to have findings suggestive of COVID-19 on a CT scan.

SOURCE: Chest. 2020 Apr 7. doi: 10.1016/j.chest.2020.04.003

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Remdesivir shows potential in COVID-19 drug trials

BY ANDREW D. BOWSER
MDedge News

While there are still no proven treatments for COVID-19, the antiviral medication remdesivir is currently the most promising therapy under investigation, according to authors of a recent review covering nearly 300 active clinical treatment trials underway for the disease.

Remdesivir, which has potent in vitro activity against the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is not approved by the Food and Drug Administration and is currently being tested in randomized trials, according to the review authors, led by James M. Sanders, PhD, of the department of pharmacy at University of Texas Southwestern Medical Center, Dallas.

By contrast, oseltamivir has not demonstrated efficacy against the virus, corticosteroids are not recommended, and promising data from a small French hydroxychloroquine study are balanced by "several major limitations" including small sample size and exclusion of early dropouts from the analysis, among others, Dr. Sanders and coauthors wrote.

"These limitations coupled with concerns of additive cardiotoxicity with combination therapy [i.e., hydroxychloroquine with azithromycin] do not support adoption of this regimen without additional studies," the researchers wrote. Their report is in JAMA (2020 Apr 13. doi: 10.1001/jama.2020.6019).

Dr. Sanders and colleagues identified 291 COVID-19–specific studies listed in ClinicalTrials.gov through April 2, including 29 placebo-controlled trials.

This list might represent just a sliver of the treatments that could combat COVID-19, according to the researchers, who said more than 3,000 small-molecule drug candidates with potential activity against human coronaviruses have been identified.

Remdesivir for COVID-19

Remdesivir, an investigational nucleotide analog, is one promising agent because of its broad-spectrum and potent activity against SARS-CoV-2 and other novel coronaviruses, they said, adding that phase 1 trials demonstrated the drug was well tolerated without observed liver or kidney toxicity.

There have been "successful" case reports of remdesivir use in COVID-19, and at least five ongoing clinical trials are evaluating the drug's safety and antiviral activity in this disease. Among those studies is a National Institutes of Health–sponsored adaptive, randomized, placebo-controlled trial that will provide data on the use of remdesivir versus supportive care.

"As the results from randomized controlled trials are anticipated, inclusion of this agent for treatment of COVID-19 may be considered," Dr. Sanders and colleagues wrote in their report. To date, remdesivir remains investigational and needs to be obtained via compassionate use, through expanded access, or by participating in a clinical trial, they added.

Hydroxychloroquine and chloroquine

Among the published hydroxychloroquine studies is a "promising" 36-patient open-label nonrandomized French study, in which the antimalarial agent given every 8 hours improved virologic clearance by day 6 versus controls (70% vs. 12.5%, respectively), the review authors said. Moreover, viral clearance was 100% for 6 patients who received hydroxychloroquine plus azithromycin, compared to 57% (8 of 14) for patients treated with hydroxychloroquine alone. However, that study had several important limitations, including the small sample size, variable viral loads at baseline between groups, and a lack of safety and clinical outcomes reporting, according to the investigators. Moreover, six patients in the hydroxychloroquine group were taken out of the analysis because of early treatment stoppage due to medical intolerance or critical illness.

One prospective study including 30 patients in China demonstrated no difference in virologic outcomes for patients randomized to hydroxychloroquine plus standard of care versus standard of care alone, they added. There is also a case series of more than 100 patients with COVID-19 that reportedly improved viral clearance and reduced disease progression, though they said results haven't been published or presented beyond a news briefing in China.

Randomized, controlled trials of chloroquine and hydroxychloroquine for COVID-19 treatment are underway, and studies are planned or enrolling to look at chloroquine prophylaxis in health care personnel and hydroxychloroquine for postexposure prophylaxis, authors said.

In results from one of those randomized trials, just reported, a higher dose of chloroquine was associated with a cardiac adverse event and an increased mortality risk, leading to the closure of that study arm. In the parallel, double-blinded, phase IIb clinical trial, patients in Brazil with SARS-CoV-2 infection received low or high doses of chloroquine plus ceftriaxone and azithromycin. According to the preprint publication, a higher rate of heart rate–corrected QT interval (QTc) prolongation and a "trend toward higher lethality" was observed in the high-dose group, leading investigators to "strongly recommend" the higher dose be abandoned.

According to the researchers, more than 3,000 small-molecule drug candidates with potential activity against human coronaviruses have been identified.

"No apparent benefit of chloroquine was seen regarding lethality in our patients so far, but we will still enroll patients in the low chloroquine dose group to complete the originally planned sample size," said investigators of the study, which at the time of the report had enrolled 81 out of an anticipated 440 patients.

Other therapies under study

Treatments of note in the review included the following:

- **Tocilizumab.** This monoclonal antibody interleukin-6 receptor antagonist, approved by the FDA for treatment of rheumatoid arthritis and for cytokine release syndrome related to chimeric antigen receptor (CAR) T-cell therapy, has yielded success in small series of patients with severe cases of COVID-19, according to authors. In one 21-patient report, 91% had clinical improvement, usually after a single dose. In China, tocilizumab is included in COVID-19 treatment guidelines, and several randomized clinical trials are underway in China.
- **Immunoglobulin therapy.** Antibodies from recovered COVID-19 patients could help with free virus and infected cell immune clearance, the authors said, adding that further studies are warranted beyond a few small published case series that suggest promise. Furthermore, on March 24 the FDA released guidance for screening donors for COVID-19 convalescent plasma and on emergency investigational new drug applications based on this modality.
- **Lopinavir/ritonavir.** Despite demonstrated in vitro activity against other novel coronaviruses, there are no published in vitro data for lopinavir/ritonavir in SARS-CoV-2, and likely a "limited role" for this combination is anticipated in treating COVID-19, according to the review authors. In an open-label randomized clinical trial published in the New England Journal of Medicine (2020 Mar 18. doi: 10.1056/NEJMoa2001282), there were no differences in clinical improvement, viral clearance, or mortality for antiviral treatment versus standard care. Delayed treatment initiation may explain the ineffectiveness, though a subgroup analysis didn't show a shorter time to clinical improvement for those who got the treatment earlier.
- **Ribavirin.** Likewise, this antiviral medication has efficacy and safety data suggesting "limited value" for treatment of COVID-19. Treatment of SARS yielded "inconclusive results" for ribavirin, which was also associated with substantial toxicity that included hemolytic anemia in 60% of SARS patients.
- **Oseltamivir.** While it may treat influenza, it has no documented activity against SARS-CoV-2 in vitro: "This agent has no role in the management of COVID-19 once influenza has been excluded," said Dr. Sanders and coauthors.
- **Corticosteroids.** They could decrease inflammatory responses in the lung, but they could also lead to delays in viral clearance and increases in secondary infection risk. Guidelines for COVID-19 say to avoid corticosteroids, and the authors of the review concur, saying that potential harms and lack of proven benefit mean they usually should not be used outside of a randomized clinical trial setting.

Dr. Sanders reported no potential conflicts. Senior author James B. Cutrell, MD, also of the University of Texas Southwestern Medical Center, reported nonfinancial support from Gilead and Regeneron outside of the study. No other authors reported disclosures.

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Treating lung cancer during the pandemic

BY PAM HARRISON

Lung cancer experts in Europe issued highly considered recommendations for the management of lung cancer during the COVID-19 crisis, the main intention of which is to minimize the risk of patients getting infected by SARS-CoV-2 while in hospital receiving treatment.

The recommendations were published online April 3 in ESMO Open.

"We know that having cancer increases the risk of dying of COVID-19, although not necessarily the risk of getting the virus and we also know that having lung cancer could increase the risk of pulmonary complications from SARS-CoV-2," lead author Alfredo Addeo, MD, University Hospital of Geneva, said in an interview.

"Try to think outside the box and find a way to minimize the risk of infection, and if you have to limit treatment, discuss the pros and cons of your treatment plan with the patient."

"But patients who are often in the hospital have a higher risk of catching the virus. So this paper is not about not giving necessary treatment, it's about treating patients the best you can based on the area where you live and the resources you have and keeping patients away from the hospital as much as possible," he added.

"The main message is, try to personalize the care you deliver," Dr. Addeo said.

"Rather than remain rigid about how you've been treating patients thus far, try to think outside the box and find a way to minimize the risk of infection, and if you have to limit treatment, discuss the pros and cons of your treatment plan with the patient and make sure the message is given clearly," he emphasized.

Considering benefit

The first general concept to keep in mind is: How likely is a patient to benefit from treatment?

"All regimens with a survival benefit should be maintained and prioritised whenever possible," Dr. Addeo and colleagues observe. The other co-authors of the paper are Giuseppe Banna, MD, Ospedale Cannizzaro, Catania, Italy; Alessandra Curioni-Fontecedro, MD, University Hospital Zürich; and Alex Friedlaender, MD, University Hospital of Geneva.

For non–small cell lung cancer (NSCLC), neoadjuvant chemotherapy for locally advanced resectable disease and sequential/concurrent chemotherapy/radiation therapy for patients with stage III lung cancer – provided they have adequate respiratory function – should be started when possible and should not be stopped without justification, the authors point out.

This is also true for first-line ther-

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apy in patients with metastatic disease. Treatment should also not be stopped without good reason among patients already receiving maintenance immune checkpoint inhibitor therapy.

For small-cell lung cancer (SCLC), both first-line treatment for extensive-stage disease as well as concurrent chemotherapy/radiotherapy for patients with limited-stage disease should be started when possible, again provided they have adequate respiratory function.

Palliative or stereotactic body radiotherapy (SBRT) delivered outside the lung should also be initiated when possible in SCLC patients.

The authors caution, however, that, if palliative or SBRT outside the lung requires multiple visits to the hospital, treatment to the lung should be limited to cases with compression of airways or bleeding.

Oncologists should also try to start radiotherapy on day 1 of chemotherapy because then only 2 cycles will be needed; if radiotherapy is started with cycle 2 or is given sequentially, 3 cycles of treatment will be required.

"Fractions of SBRT could be reduced, depending on organ at risk (8 fractions to 5 or 3) while palliative RT [given] as a single fraction or two (8-10 Gy or 17 Gy, respectively) should be used where possible," the authors observe.

Concurrent chemotherapy with radiotherapy for limited-stage disease should not be stopped without justification and nor should first-line treatment for metastatic SCLC, the authors continue.

Again, however, patients must have adequate respiratory function to receive or continue with concurrent chemotherapy and radiotherapy, they add.

For patients with stage III NSCLC, concurrent chemotherapy plus radiotherapy may be considered and given preferentially or not.

Similarly, oral rather than intravenous chemotherapy may be preferred for elderly NSCLC patients or for those with an Eastern Cooperative Oncology Group performance status of 2 as well as for SCLC patients.

Delaying surgery

As a general principle, the use of neoadjuvant chemotherapy instead of adjuvant therapy following surgery can delay the need for immediate surgery. If surgery can be delayed, "the risk of a patient catching the virus several months from now might be less," Dr. Addeo noted. Thus, treating patients upfront with chemotherapy is one tactic to consider in appropriate patients.

For NSCLC patients at high risk for COVID-19, adjuvant chemotherapy should be discussed and potentially withheld, the authors observe.

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NSCLC patients at high risk for COVID-19 include those with either comorbidities such as cardiovascular or pulmonary disease as well as patients who are 70 years of age and older.

Immunotherapy should also be discussed and possibly delayed for stage III NSCLC patients following concurrent chemotherapy and radiation, they add.

Maintenance pemetrexed also may be withheld for NSCLC patients, and intervals of immunotherapy may be prolonged (e.g., nivolumab every 4 weeks and pembrolizumab every 6 weeks).

Intervals of immunotherapy should be similarly prolonged for SCLC patients, they continue.

"Shorter duration of chemotherapy (e.g., four cycles of chemotherapy instead of six) should be discussed with patients and maintenance chemotherapy can be withheld," the authors note.

Furthermore, "given the pandemic, it is highly likely that metastatic cancer patients will be less likely to be intubated or to be heavily ventilated compared to patients without any comorbidity," Dr. Addeo explained.

"So we have to acknowledge that metastatic lung cancer patients will be at higher risk of dying due to severe pulmonary COVID-19 complications," he added.

Therefore, third and further lines

of chemotherapy in both NSCLC and SCLC patients at significant COVID-19 risk should not be initiated without having a good reason to do so.

"Prophylactic cranial irradiation (PCI) is still a matter of debate [in SCLC patients]," Dr. Addeo noted.

"So the reasonable alternative is to do surveillance MRI and in 6 or 8 months, we can probably offer PCI more safely at that point," he suggested, adding that radiation therapy to the brain should be considered only if a patient develops brain metastases.

The authors also suggest that thoracic consolidation radiotherapy for extensive stage SCLC should not be initiated unless there is good reason to do so.

Patients with family members or caregivers who have tested positive for COVID-19 should themselves be tested before or during any cancer treatment.

If patients themselves then test positive and are asymptomatic, "28 days of delay should be considered before (re)starting the treatment," the authors advise.

However, two negative tests done 1 week apart should be carried out before starting or restarting treatment, they note.

The authors have disclosed no relevant financial relationships.

A version of this article first appeared on Medscape.com.

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New guide on managing acute CVD during COVID-19

BY DEBRA L. BECK

The Chinese Society of Cardiology (CSC) has issued a consensus statement on the management of cardiac emergencies during the COVID-19 pandemic.

The document first appeared in the Chinese Journal of Cardiology, and a translated version was published in Circulation. The consensus statement was developed by 125 medical experts in the fields of cardiovascular disease and infectious disease. This included 23 experts currently working in Wuhan, China.

Three overarching principles guided their recommendations.

- The highest priority is prevention and control of transmission (including protecting staff).
- Patients should be assessed both for COVID-19 and for cardiovascular issues.

- At all times, all interventions and therapies provided should be in concordance with directives of infection control authorities.

"Considering that some asymptomatic patients may be a source of infection and transmission, all patients with severe emergent cardiovascular diseases should be managed as suspected cases of COVID-19 in Hubei Province," noted writing chair and cardiologist Yaling Han, MD, of the General Hospital of Northern Theater Command in Shenyang, China.

In areas outside Hubei Province, where COVID-19 was less prevalent, this "infected until proven otherwise" approach was also recommended, although not as strictly.

Diagnosing CVD and COVID-19 simultaneously

In patients with emergent cardiovascular needs in whom COVID-19 has not been ruled out, quarantine in a single-bed room is needed, they wrote. The patient should be monitored for clinical manifestations of the disease, and undergo COVID-19 nucleic acid testing as soon as possible.

After infection control is considered, including limiting risk for infection to health care workers, risk assessment that weighs the relative advantages and disadvantages of treating the cardiovascular disease while preventing transmission can be considered, the investigators wrote.

At all times, transfers to different areas of the hospital and between hospitals should be minimized to reduce the risk for infection transmission.

The authors also recommended the use of "select laboratory tests with definitive sensitivity and specificity for disease diagnosis or assessment."

For patients with acute aortic syndrome or acute pulmonary embolism, this means CT angiography. When acute pulmonary embolism is suspected, D-dimer testing and deep vein ultrasound can be employed, and for patients with acute coronary syndrome, ordinary electrocardiography and standard biomarkers for cardiac injury are preferred.

In addition, "all patients should undergo lung CT examination to evaluate for imaging features typical of COVID-19. ... Chest x-ray is not recommended because of a high rate of false negative diagnosis," the authors wrote.

Intervene with caution

Medical therapy should be optimized in patients with emergent cardiovascular issues, with invasive strategies for diagnosis and therapy used "with caution," according to the Chinese experts.

Conditions for which conservative medical treatment is recommended during COVID-19 pandemic include ST-segment elevation MI (STEMI) where thrombolytic therapy is indicated, STEMI when the optimal window for revascularization has passed, high-risk non-STEMI (NSTEMI), patients with uncomplicated Stanford type B aortic dissection, acute pulmonary embolism, acute exacerbation of heart failure, and hypertensive emergency.

"Vigilance should be paid to avoid misdiagnosing patients with pulmonary infarction as COVID-19 pneumonia," they noted.

Diagnoses warranting invasive intervention are limited to STEMI with hemodynamic instability, life-threatening NSTEMI, Stanford type A or complex type B acute aortic dissection, bradyarrhythmia complicated by syncope or unstable hemodynamics mandating implan-

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Cardiac symptoms can be first sign of COVID-19

BY M. ALEXANDER OTTO
MDedge News

In about 7% of people with confirmed novel coronavirus disease 2019 (COVID-19), and 22% of the critically ill, the virus injures the heart, probably by either attacking it directly or causing a cytokine storm that leads to myocyte apoptosis, according to a report from the Columbia University Division of Cardiology in New York.

Reports from China document patients presenting with palpitations and chest pain without the typical fever and cough. Among those affected, acute myocardial injury is either apparent at presentation or develops after hospitalization.

The exact mechanism of injury is uncertain, but for now, "it appears that the incidence of fulminant myocarditis and profound cardiogenic shock is low; however, the rate of recovery and mode of treatment are yet to be determined," wrote authors led by Kevin Clerkin, MD, a cardiologist and assistant professor of medicine at Columbia (Circulation. 2020 Mar 21. doi: 10.1161/CIRCULATIONAHA.120.046941).

High-sensitivity cardiac troponin I (hs-cTnI) might be prognostic. In one Chinese study of hospitalized patients, median hs-cTnI levels were 2.5 pg/mL in survivors on day 4 of symptoms and did not change significantly during follow-up. Among people who died, day 4 hs-cTnI was 8.8 pg/mL and climbed to 290.6 pg/mL by day 22 (Lancet. 2020 Mar 11. doi: 10.1016/S0140-6736[20]30566-3).

"The rise in hs-cTnI tracks with other inflammatory biomarkers ... raising the possibility that this reflects cytokine storm or secondary hemophagocytic lymphohistiocytosis more than isolated myocardial injury," Dr. Clerkin and colleagues wrote.

But there are also acute heart injury reports out of China, including one man who presented with chest pain and ST-segment elevation, but no coronary obstruction, and another who presented with fulminant myocarditis in addition to severe respiratory manifestations, but with no cardiac history.

Irina Shatilova/Getty Images

Both had depressed left ventricular ejection fractions, enlarged left ventricles, and elevated cardiac biomarkers, and both responded to intravenous immunoglobulin and steroids, among other treatments.

Amid a surge of COVID-19 cases at Columbia, "we have seen both forms of cardiac presentations: those presenting with cardiac predominant symptoms (none have had true [ST-segment elevation myocardial infarctions] yet, but most fall in the myopericarditis group), some of which have required mechanical circulatory support, and those who seem to have secondary myocardial injury with globally elevated inflammatory biomarkers (e.g., ferritin, interleukin-6, lactate dehydrogenase, hs-cTnI, and D-dimer)," Dr. Clerkin said in an interview.

"We are discussing each of these cases in a multidisciplinary fashion with our infectious disease, pulmonary, interventional cardiology, and cardiac surgery colleagues to try to make the best decision based on what we know and as our knowledge evolves," he said.

The exact cardiac effect of COVID-19 is unknown for now, but it is known already that it rides along with cardiovascular issues. There's a high prevalence of hypertension, diabetes, and diagnosed cardiovascular disease among patients, but it's unclear at this point if it's because the virus favors older people who happen to be more likely to have those problems or if it attacks people with those conditions preferentially.

It might be the latter. The virus that causes COVID-19, severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), invades cells through angiotensin-converting enzyme (ACE) 2 receptors, which are highly expressed in the heart.

That raises the question of whether ACE inhibitors or angiotensin receptor blockers might help. However, "at this time, nearly all major societies have recommended against adding or stopping ... antagonists in this setting, unless done on clinical grounds independently of COVID-19, given the lack of evidence," Dr. Clerkin and his colleagues wrote.

As for heart transplants, the current thinking is to continue them without changes in immunosuppression so long as recipients test negative and haven't been around anyone who has tested positive for a month. If a donor had COVID-19, they should have been free of the virus by polymerase chain reaction for at least 14 days. The concern is that it might be in the donor heart.

If transplant patients come down with COVID-19, the "data to date [indicate that management] is supportive care and continuation of immunosuppression for mild COVID-19 with reduction of the antimetabolite (mycophenolate or azathioprine), and further treatment based on disease severity and drug availability. Notably, one potential treatment option for COVID-19 is protease inhibitors," the authors said, but it's important to remember that they will increase the levels of cyclosporine, tacrolimus, and other calcineurin inhibitor transplant drugs.

At Columbia, "our processes have been adjusted" for heart transplants. "For instance, nonurgent testing [before and after transplant] has been tabled, we have predominantly shifted to noninvasive screening for rejection, and each potential transplant requires more scrutiny for urgency, donor screening/risk for COVID-19, and perioperative management," Dr. Clerkin said in the interview.

There was no funding, and the authors had no disclosures.

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tation of a device, and pulmonary embolism with hemodynamic instability for whom intravenous thrombolytics are too risky.

Interventions should be done in a cath lab or operating room with negative-pressure ventilation, with strict periprocedural disinfection. Personal protective equipment should also be of the strictest level.

In patients for whom COVID-19 cannot be ruled out presenting in a region with low incidence of COVID-19, interventions should be considered for more severe cases and undertaken only in a cath lab, electrophysiology lab, or operating room "with more than standard disinfection procedures that fulfill regulatory mandates for infection control."

If negative-pressure ventilation is not available, air conditioning (for example, laminar flow and ventilation) should be stopped.

Establish plans now

"We operationalized all of these strategies at Beth Israel Deaconess Medical Center several weeks ago, since Boston had that early outbreak with the Biogen conference, but I suspect many institutions nationally are still formulating plans," Dhruv Kazi, MD, MSc, said in an interview.

Although COVID-19 is "primarily a single-organ disease – it destroys the lungs" – transmission of infection to cardiology providers was an early problem that needed to be addressed, said Dr. Kazi. "We now know that a cardiologist seeing a patient who reports shortness of breath and then leans in to carefully auscultate the lungs and heart can get exposed if not provided adequate personal protective equipment; hence the cancellation of elective procedures, conversion of most elective visits to telemedicine, if possible, and the use of surgical/N95 masks in clinic and on rounds."

Regarding the CSC recommendation to consider medical over invasive management, Dr. Kazi noted that this works better in a setting where rapid testing is available. "Where that is not the case – as in the U.S. – resorting to conservative therapy for all COVID suspect cases will result in suboptimal care, particularly when 9 out of every 10 COVID suspects will eventually rule out."

One of his biggest worries now is that patients simply won't come. Afraid of being exposed to COVID-19, patients with MIs and strokes may avoid or delay coming to the hospital.

"There is some evidence that this occurred in Wuhan, and I'm starting to see anecdotal evidence of this in Boston," said Dr. Kazi. "We need to remind our patients that, if they experience symptoms of a heart attack or stroke, they deserve the same lifesaving treatment we offered before this pandemic set in. They should not try and sit it out."

A version of this article originally appeared on Medscape.com.

Join us for CHEST Annual Meeting 2020

Registration for CHEST Annual Meeting 2020 has opened! It is important now, more than ever, to stay up to date in clinical chest education. CHEST Annual Meeting is prepared to equip attendees with the latest education and original research in the field that can be taken back home and implemented into practices.

While CHEST is excited to bring the premier event in clinical chest medicine to their Second City Home of Chicago, Illinois, this October 17-21, it is understood that now may not be the best time to be planning for a conference that is 6 months down the road. Currently, your full attention is likely on your patients, your families, your health, and your safety, and it should be! Here at CHEST, the hope is to create a "light at the end of the tunnel" to give you and your colleagues something to look forward to – an opportunity to relax, learn, explore, and reconnect with your peers in the chest medicine field.

This year's annual meeting will be filled with both new and returning educational opportunities, including CHEST Games; virtual patient tours; hands-on simulation courses; problem-based learning; and the return of FISH Bowl, an innovation competition. Along with the advanced education, there will be countless opportunities to network at after-hour events, such as the CHEST Challenge final competition, the Young Professionals Reception, and the CHEST Foundation Casino Night. Our hope is that you will be able to look ahead to October and be excited about the chance to experience everything that will be offered at CHEST 2020.

Before the meeting in October, don't forget to submit your abstracts and case reports for consideration to be presented at CHEST 2020. CHEST is excited to give you and your colleagues the opportunity to present new and original research at this year's meeting, which is why the deadline for submissions has been extended to June 1, 2020.

CHEST acknowledges that your workload is becoming increasingly heavier each day, and we are also making the safety of attendees the top priority.

That is why CHEST will be granting full refunds to any registrant who finds that they can no longer attend CHEST 2020 as the meeting approaches. Any hotel reservation that is made through CHEST's official housing site, onPeak, will be able to be changed or canceled up to 24 hours in advance of the reservation date. Visit chestmeeting.chestnet.org/hotel-accommodations for more information.

CHEST 2020 meeting chair, Victor Test, MD, FCCP, hopes to leave CHEST learners with a beacon of hope, saying, "Signing up to come to the meeting and participating may seem impossible to think about right now. We are working hard to provide a high-quality experience and are encouraging everyone to look forward to the future, which will be a lot brighter."

For all of the latest information on CHEST 2020, visit chestmeeting.chestnet.org.

Courtesy of the Chicago Architecture Foundation

FROM THE EVP/CEO

How CHEST is helping to flatten the curve

BY ROBERT MUSACCHIO, PHD

As you know, the COVID-19 pandemic has caused immense strain on global health systems. With our membership at the epicenter, many of you have experienced firsthand the shortages that result from a surging patient population – lack of personal protective equipment (PPE), access to ventilators, and increasing demand for more qualified health-care workers needed on the front lines to treat and care for patients. As the staff leader of your organization, I feel an immense responsibility to support our community through this crisis.

In recent weeks, CHEST petitioned the federal and local governments on several issues, advocating for tax relief for COVID responders, expansion of liability protections, and the development of a provider relief fund. We will continue to collaborate with other societies and push such efforts. However, we also recognize an obligation to make a more tangible, real-time difference in the circumstances of our membership and the lives of the patients you are working to save.

An opportunity arose when we received a call from Dr. Doreen Addrizzo-Harris, Immediate Past President of the CHEST Foundation and Professor of Medicine at NYU Langone Health. In late March, New York City was seeing an uptick in patients with confirmed COVID infection in critical condition that was escalating by the day. The situation was beginning to resemble the trajectory of hotspots in Wuhan, China and Italy, and it was already taking a toll on health-care teams. Dr. Adrizzo-Harris asked whether there was any way to leverage the strength of the CHEST community to provide help. Already, our headquarters team had received unsolicited offers to travel to areas in need from our members. The question was how could we more proactively identify such willing and able clinicians.

Dr. Robert Musacchio

We knew that if we could apply our knowledge and deploy our heroic members, we could develop a solution that could save lives and relieve frontline clinicians.

We quickly drew upon our existing CHEST Analytics platform to target physicians outside New York City who might be well-positioned to travel. We harnessed our communication channels to get the word out. The response was immediate, with more than 100 people completing applications to join forces with their colleagues in New York. In the first 10 days of recruitment efforts, we added an additional 250 interested volunteers to the system. The positive response from members showed both the willingness of qualified medical staff to assist on the front lines but also highlighted deficiencies in other registration systems overwhelmed with requests in the face of this pandemic. Finding certified pulmonary and critical care physicians who are willing to step in where they are needed is time- and labor-intensive and detracts from health systems' ability to focus on care. Watching the projections in other regions, we recognized other areas may soon need this same help.

With this in mind, CHEST approached ATS and our long-time partner PA Consulting to help us address the problem on a national scale. We felt we had the resources to leverage our databases and our analytic tools to create a more efficient process that would put physicians in hospitals where they could do the most good more efficiently. We knew that if we could apply our knowledge and deploy our heroic members, we could develop a solution that could save lives and relieve frontline clinicians. By leveraging the existing CHEST Analytics platform, the team created a solution that can be used by provider institutions, government agencies, and willing clinicians to quickly and effectively provide care where it is needed most. The team has engineered the solution to be scalable nationally and expandable to other critical care specialties (eg, anesthesia, emergency, nursing, respiratory therapy).

The Clinician Matching Network formally launched on April 14, 2020. It provides a two-way input that accepts sign up from individual clinicians and gathers needs and requirements from hospital systems, connecting health-care providers with the systems most in need of the specific support they are equipped to provide. We believe this has the potential to enable us to move ahead of the curve of the crisis.

I am very proud of the teams that lead this effort and have gained a greater appreciation of how CHEST, in partnership with other medical societies, can fully utilize data and analytics toward implementing public health solutions. The design and development of the Clinician Matching Network was accomplished in less than a week, leveraging a methodology that will enable the team to continuously improve and iterate through weekly releases, adding functionality quickly as the pandemic evolves.

In the weeks ahead, communications will be distributed to hospitals and hospital systems to help identify their staffing needs, encourage them to input their needs into the Clinician Matching Network, and expand the clinician-to-hospital matching effort. We aim to increase the number of collaborationg associations to grow the pool of clinicians who can be deployed to areas in need.

Please visit www.chestnet.org/clinician-matching to learn more, sign up to serve, tell us about the needs of your institution, or collaborate toward this cause.

SLEEP STRATEGIES

COVID-19 and impact on sleep medicine practices

BY SHANNON S. SULLIVAN, MD, AND INDIRA GURUBHAGAVATULA, MD, MPH

Introduction

Since reported in late 2019 in Wuhan China, the disease named "novel coronavirus disease 2019" (COVID-19), caused by the virus referred to as Severe Acute Respiratory Syndrome-causing Coronavirus-2 (SARS-CoV-2) has spread widely to many parts of the world. As of April 13, 2020, a total of 210 countries reported more than 1.9 million cases, resulting in more than 119,000 deaths.[1] All 50 states have reported cases of COVID-19 to the Centers for Disease Control and Prevention (CDC), and most US states are reporting community spread. While levels of COVID-19 activity vary by region, the CDC has reported that the US remains in the acceleration phase of the pandemic, and that widespread transmission is expected.

On March 18, the Centers for Medicare & Medicaid Services (CMS) advised[2] that all elective surgeries and nonessential medical, surgical, and dental procedures should be delayed to promote physical distancing, preserve personal protective equipment (PPE), and enable health-care workers (HCW) to redirect work to high-need areas. California was the first to issue a statewide shelter-in-place order on March 19, and by April, leaders in 42 states, the District of Columbia, and Puerto Rico issued similar stay-at-home orders. The White House has announced that physical distancing should continue until at least April 30. With the potential for an explosion of new cases that could overwhelm health-care resources, "business as usual" ceased to exist practically overnight.

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The speed with which these events transpired, the demand to tailor response within days or even hours, the lack of robust data to support decision-making, the possibility of spread by asymptomatic carriers, and the potential risk for airborne, as well as droplet and fecal-oral spread, caused sleep medicine clinicians to rely on expert consensus and clinical judgment. The goal of such guidance has been to optimize care to patients with sleep disorders, while protecting the health and safety of all. Sleep medicine practices have had to balance efforts to reduce viral exposure and transmission, the need to triage health-care resources and personnel, and maintain access to care.

General clinical measures

From the outset, in areas of community spread, sleep medicine practices were called to adapt to now-standard measures, such as provider self-quarantine if ill or exposed, in-person clinic triage strategies for patients and staff prior to entrance to facilities to rapidly identify people with respiratory illness (eg, temperature monitoring), elimination of nonessential visitors, and infection control measures such as vigilant cleaning and appropriate use of personal protective equipment (PPE) during patient interactions. Typical issues facing sleep medicine practices include the need to prioritize urgent or emergency care, track canceled or postponed visits, and maintain access to communication with patients, the health-care team, payors, and employers.

Sleep medicine practices have had to balance efforts to reduce viral exposure and transmission, the need to triage health-care resources and personnel, and maintain access to care.

Infection mitigation recommendations: sleep laboratories and ambulatory practices

Diagnostic testing

By mid-March, relatively early in the course of the outbreak in the US, the American Academy of Sleep Medicine (AASM) released recommendations for sleep clinics and laboratories regarding continuation of in-lab diagnostic, split-night, and titration studies, as well as clinical interactions and telemedicine, taking into account the CDC mitigation strategies[3] which vary according to level of community transmission or impact of COVID-19.

Dr. Sullivan

This advisory was updated repeatedly over the ensuing weeks, most recently on April 8, as community-based spread increased. The AASM now strongly urges all sleep clinicians to postpone in-laboratory polysomnography (PSG) for adults and children, both diagnostic and positive airway pressure (PAP) titrations, except in emergencies. Data regarding adherence with these recommendations are lacking; anecdotal reports suggest that sleep medicine communities most heavily affected by the community spread are indeed following this practice.

The AASM guidance also advises use of home sleep apnea testing (HSAT) with consideration of single-use components or devices, use of mail-in recorders, and/or removal of reusable devices from service for 72 hours between patients.

Positive airway pressure (PAP) therapy

The potential for PAP devices to promote the aerosolization of viral particles, which could increase transmission to others on shared ventilation networks in homes and health-care settings, requires careful attention.

Generally, exhaled particle size depends on multiple characteristics, including the force and pressure at generation and environmental conditions (eg, temperature, relative humidity, and air flow). Large-size particles remain suspended in the air only briefly and settle within 1 meter from the source; these are usually mediated by breathing zones of individuals.[4] However, smaller particles can travel farther, with distance governed by airflow that is driven by many variables, including ventilation, human movement, and temperature gradients. While droplets tend to evaporate rapidly, dry residues can remain suspended in the air.[5] Infectious respiratory aerosols can occur as droplets >5 mcm diameter, or droplet nuclei (<5 mcm diameter).[6] Present evidence indicates that SARS-CoV-2 transmission occurs primarily through droplet spread in settings with normal breathing. However, the World Health Organization (WHO) advises more stringent, airborne precautions for aerosol-generating procedures with COVID-19. Such procedures include intubation, extubation, noninvasive ventilation, high-flow nasal cannula, and cardiopulmonary resuscitation before intubation.[7] Some evidence indicates that SARS-CoV-2 can linger in aerosol form for hours,[8] and aerosol transmission is therefore plausible. Non-peer reviewed data in real-world settings indicate the presence of SARS-CoV-2 in air samples from hallways outside and in rooms adjacent to COVID-19-containing patients.[9]

These findings raised some concerns about use of PAP in medical and home environments, leading to the recommendation that the decision to continue or withhold PAP temporarily be made based on a risk-benefit evaluation. Scant data hint that PAP therapy may be safe to use in rooms that support appropriate ventilation (eg, negative pressure rooms). Regarding mask type, recently, a group reported the possibility that oronasal masks have a better aerosol dispersal profile.5 However, this conclusion was based on a single study of a specific model of oronasal mask, which demonstrated an absence of ability to measure a dispersion air jet, because the exhalation ports on the mask caused diffuse rather than directed dispersion of air.[10] The same study found, that when the jet could be measured (with nasal pillows or with leak from any interface), greater dispersion was indeed evident. While anecdotal practical methods to filter exhaled air from PAP devices to reduce aerosol transmission have been proposed, data regarding successful reduction in transmission are still lacking, and such methods are not endorsed by mask manufacturers.

As the spread of COVID-19 accelerated, the AASM recommended that sleep medicine practices postpone and reschedule all nonemergency, in-person appointments, and conduct as many visits as possible by telemedicine.

Ambulatory clinics: role of telemedicine

As the spread of COVID-19 disease accelerated, the AASM recommended that sleep medicine practices postpone and reschedule all non-

EDITOR'S PERSPECTIVE

Drs. Sullivan and Gurubhagavatula, co-chairs of the American Academy of Sleep Medicine Public Safety Committee, contributed an excellent and timely overview of the impact of COVID-19 on sleep medicine practices nationally. The speed of change to current practices came like a sudden storm on March 18, 2020, when CMS announced its recommendation of halting all nonessential medical, surgical, and dental procedures in order to preserve medical equipment, free up the health-care workforce, and minimize infection risks to patients and health-care providers.

With this pivotal announcement, the medical community was forced to mobilize in ways that were never expected before. CMS followed up with recommendations for new models of care and billing practices with a specific focus on telemedicine. With technologic advances in remote monitoring for evaluation and treatment of sleep-disordered breathing and other sleep disorders, the field of sleep medicine is poised to be an ideal model for telemedicine. Although telemedicine is not new to the practice of sleep medicine, it has not been widely embraced.

The COVID-19 pandemic will undoubtedly force a "new normal" for medicine worldwide, and we can be sure to embrace certain aspects of this change, including implementation of telemedicine into existing models of care. It remains to be seen how the medical community will be able to successfully adapt and will heavily depend on how CMS implements its policies to this "new normal."

Michelle Cao, DO, FCCP
Section Editor, Sleep Strategies

emergency, in-person appointments, and conduct as many visits as possible by telemedicine.

This rapid transition posed many layers of logistical complexity, including how to quickly initiate or scale up an often fledging telemedicine presence; scheduling and instructing patients for telemedicine encounters; problem-solving in situations with limited device and Internet availability; triaging patients based on risk; and tracking postponed appointments. Administrators, medical assistants, nurses, advanced practitioners, respiratory therapists, technologists, and physicians have learned new ways of doing things, and laboratory personnel have undergone training and transitioned to new roles and responsibilities during postponement of lab studies. Training programs, in particular, have had to be nimble in finding ways to meet the educational needs of sleep medicine fellows that leveraged telemedicine opportunities.

AASM has recommended avoidance of PAP or noninvasive ventilation for those with presumed or confirmed COVID-19 who cannot self-isolate according to CDC guidance.

Economic implications of transformed sleep medicine practices

While deploying such systematic change costs both time and money, sleep practices are also confronted with questions around lost revenue from drops in laboratory and clinic volumes. Many additional questions around reimbursement and revenue shortfalls are present, and short-term, furloughed employees may not be able to sustain income loss, which could result in difficulty in resuming services when the COVID-19 threat has been reduced.

Helpfully, during this public health emergency, CMS has expanded coverage for telemedicine services and waived requirements for face-to-face or in-person encounters,[11] and some private payers have followed. Additionally, for the duration of the public health emergency, Medicare will cover PAP devices based on the clinician's assessment of the patient without requiring PSG or a home sleep apnea test (HSAT). However, CMS has not clarified what follow-up testing, if any, may be required after this public health emergency is over. The duration of these new payment models remains uncertain.

Recommendations for PAP users

Patients and families, practitioners, and group living facilities have all expressed concerns about use of PAP during the epidemic given presumed increased risk of viral spread. In many hospital protocols, the use of PAP is restricted or disallowed for patients with suspected or confirmed COVID-19. Guidance regarding out-of-hospital use of PAP has been sparse.

AASM has recommended avoid-

Continued on following page

Continued from previous page

tion (NIV) for those with presumed or confirmed COVID-19 who cannot self-isolate according to CDC guidance. Risk-benefit assessment is recommended for those who perform safety-sensitive activities or have higher-risk medical conditions. During the period that PAP is withheld, alternative or modifying therapies can be considered, such as positional therapy or oral appliance.

Cleaning device components and washing and replacing filters as recommended by the manufacturer, as well as simple but important interventions like handwashing before and after touching the face or airway gear is thought to be especially important during this time.

Conclusions

The COVID-19 pandemic has fueled unprecedented, rapid changes in the way sleep medicine practices deliver care to millions of patients. These changes have been propelled by practitioners and staff who have embraced adaptability, creativity, resourcefulness, and attention to safety and effectiveness.

Widespread use of telemedicine services, greater reliance on ambulatory testing, ongoing risk-benefit stratification, leveraging technology and teamwork, and sharing knowledge as it becomes available has resulted in care that is more accessible and convenient for some vulnerable patients, and, yet, challenges persist in accessing needed care. Necessity has been the mother of invention, and we expect the field will need to continue to rebalance as the situation evolves. The ultimate test of these rapid innovations will be how sleep medicine patients fare in the long run, in terms of their health, safety, mortality, and overall quality of life. Future research must address these questions, and the resulting information may yet inform the way sleep medicine is practiced in the years to come.

Dr. Shannon is Medical Director, EVAL Research Institute, Palo Alto, CA; Dr. Gurubhagavatula is Associate Professor, Perelman School of Medicine, University of Pennsylvania, and with Crescenz VA Medical Center, Philadelphia, PA.

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Meet the FISH Bowl finalists

CHEST 2019 marked the inaugural FISH Bowl competition for attendees. Inspired by Shark Tank, our kinder, gentler, yet still competitive and cutting-edge FISH Bowl (Furthering Innovation and Science for Health) featured CHEST members disrupting our beliefs about how clinical care and education are performed. As health-care providers, they presented innovative ideas pertaining to education and clinical disease for pulmonary, critical care, and sleep medicine. Six finalists were chosen from dozens of submissions, and three emerged winners. In this new Meet the FISH Bowl Finalists series, CHEST introduces you to many of them – including the People's Choice Award winning team that includes Dr. Russ Acevedo, Wendy Fascia, and Jennifer Pedley.

Names: Russ Acevedo, MD, FCCP; Wendy Fascia MA, RRT; Jennifer Pedley, RRT
Institutional Affiliation: Crouse Health
Title: Crouse Lung PaRTners
Brief Summary of Submission: The goal of our program is to improve the quality of life for patients with COPD by establishing a primary life-long relationship with a respiratory therapist who ensures that they and their caretakers have a thorough understanding of the disease process, as well as the ability to carry out prescribed therapy, obtain resources, and reach out for help once they leave the hospital.

Meet the FISH Bowl competition People's Choice Award winning team that includes Dr. Russ Acevedo, Wendy Fascia, and Jennifer Pedley.

Once enrolled in the Lung Partners Program, patients receive an in-depth initial assessment and daily assessments by a team of specially trained, primary respiratory therapists who will screen them for health literacy, physical functionality, anxiety, depression, sleep disorders, nutrition, and medication management.

Clinical protocols are in place to allow for optimal treatment plans in an efficient timeframe and to assist in timely referral of patients to specialists for further assessment and follow-up.

1. What inspired your innovation? By maximizing the Respiratory Care department efficiency, this allowed for the ability of a primary respiratory care inpatient disease management program. This allows us to use our respiratory therapists to the full extent of their licensure.

2. Who do you think can benefit most from it, and why? We feel this will most benefit the patients, the respiratory therapists, and our physician partners. In the end, the major benefit is to decrease healthcare fractionation.

3. What do you see as challenges to your innovation gaining widespread acceptance? How can they be overcome? To be successful, there needs to be very strong direction from the medical director. We do a poor job in training our fellows to be strong medical directors. Increasing attention to training our fellows in the science of respiratory care will help to overcome this challenge.

Getting the word out is also a challenge that can be overcome by increased exposure of our program like we are receiving from the Fish Bowl Competition and presentations at national meetings.

4. What impact has winning Fish Bowl 2019 had on your vision for the innovation? The positive feedback and networking from our winning has confirmed the value of our program. We have received many requests for our Lung Partner Handbook.

5. How do you think your success at Fish Bowl 2019 will continue to impact your career overall in the months and years to come? We would like to grow our involvement in state and national leadership. In all that we have learned in the development and implementation of Lung PaRTners, we can help support other local and national COPD initiatives.

President's report

BY STEPHANIE M. LEVINE, MD, FCCP

As I write, I must admit this message is different than the one I'd envisioned sharing with you weeks ago. I anticipated updating you on meetings and collaborations with sister societies, new educational offerings, and how the Bologna World Congress and Annual Meeting plans were progressing, but activities at CHEST – and our sense of priority – have evolved along with those of our global community.

Pulmonary and critical care providers are now at the forefront of health care. Our patients, and now the greater public, are relying on our efforts and those of our teams. Amid this crisis, there is a renewed appreciation for the work all of you do; and with it, an opportunity for CHEST to lead and help ensure that the profession and our systems emerge stronger.

Back in February, we held the program committee meeting for the Annual Meeting with over 1,000 submissions. It is astounding how the program came together over just a few days thanks to the preemptive work done by Chair, Dr. Victor Test, and, Co-Chair, Dr. Christopher Carroll, and all of the curricular groups, program committee members, and staff putting in so much work prior to the face-to-face meeting. Also during February, CHEST leadership held the Forum of International Respiratory Societies' (FIRS) strategic planning meeting. The main outcome is a plan to engage a lobbyist to represent the worldwide respiratory societies in the WHO in Geneva on universal topics such as air pollution and now, unfortunately, COVID-19. CHEST was represented at the Society of Critical Care Medicine (SCCM) Congress where we heard late-breaking information as the pandemic was beginning to unfold. We met with the Critical Care Societies Collaborative (CCSC), which is composed of representatives from CHEST, SCCM, the American Thoracic Society (ATS), and the American Association of Critical-Care Nurses (AACN). We had an opportunity to meet with the European Society of Intensive Care Medicine (ESICM) and initiate discussions toward future collaboration.

In early March, as COVID-19 began to interfere with in-person meetings, we participated virtually in the NAMDRC meeting, and finalized our commitment to formally joining forces under the umbrella of CHEST to better serve our members in the area of advocacy. To this end, a new standing CHEST committee was founded, consisting of members from the former NAMRDC Board and members from the CHEST Board of Regents and Board of Trustees and chaired by Dr. Neil Freedman and Dr. Jim Lamberti. We look forward to hosting advocacy sessions during our October meeting, and going forward, our Spring Leadership Meeting will be combined with the former NAMDRC meeting to allow our leaders to participate in advocacy efforts. We will continue to publish the Washington Watchline, bringing important news on efforts to enhance access to care and our ability to deliver it effectively. Our spring leadership meetings, board meetings, and committee meetings in early April were held virtually in light of the pandemic.

Since March, CHEST has been heavily immersed in COVID-19 preparation with new plans for alternate methods of educational delivery, new business models, and curtailment of travel on both our home fronts and on the CHEST front. Zoom and like platforms are now my best friend! Our daily vocabulary now includes an abundance of caution, surge, sheltering in place, quarantine, social distancing, flattening the curve, telemedicine, and don and doff, and we close e-mails, texts, and phone calls with Stay Safe! I established a COVID task force led by Dr. Steve Simpson (CHEST President-Elect) and with representation from the Critical Care, Chest Infections, and Disaster Response and Global Health NetWorks. They have been meeting weekly with the goals of disseminating and distilling COVID-related materials for the busy practitioner with links to the specific article or statement along with the BLUF (Bottom Line Up Front). I'm sure you were able to see and hear some of the reports by Dr. Mangala Narasimhan and others on the front lines in New York, on the CHEST website, *60 Minutes*, and *CNN*. CHEST held a two-part webinar with our Chinese colleagues who shared their COVID experiences with us. These relationships were, in part, built from the PCCM Fellowship Training program we conducted with Chinese physicians, led by Dr. Darcy Marciniuk and Dr. Chen Wang under the guidance of Dr. Renli Qiao, and with the help of the late Dr. Mark Rosen, Dr. Jack Buckley, and myself. CHEST has posted a webinar on point of care ultrasound testing in the setting of COVID since many units are now using more POCUS instead of standard imaging for the critically ill. We have also posted some of our board review lectures on demand for those who want to brush up on their critical care skills and knowledge.

Dr. Stephanie M. Levine

Pulmonary and critical care providers are now at the forefront of health care. Our patients, and now the greater public, are relying on our efforts and those of our teams. Amid this crisis, there is a renewed appreciation for the work all of you do; and with it, an opportunity for CHEST to lead and help ensure that the profession and our systems emerge stronger.

CHEST, unfortunately, had to reschedule the Bologna meeting due to the tragic situation in Italy and plans to reconvene the meeting June 24-26 of 2021. As of now, CHEST 2020 in Chicago is a go, but, of course, we will monitor that situation carefully. We have extended the deadline for abstracts and case reports to June 1, 2020, given the ongoing crisis. The team is busy planning for standalone and complementary online offerings to ensure seamless delivery of critical education in formats that cater easily to our newly formed habits.

CHEST staff have been working from home due to the Illinois shelter in place order but continue to work tremendously hard. They are implementing new areas to the website in an effort to improve the user experience by making information easier to find and more timely. In the publishing space, Dr. Peter Mazzone and the journal team have been receiving hundreds of COVID-related publications, which they have been reviewing and expediting for publication where appropriate. There will also be additional podcasts coming from our journal. The guidelines group has been working on shorter expert panel statements in the setting of rapidly changing evidence. And, to keep us all well, there are opportunities to share our personal feelings and experiences with treating those with COVID in video format on the website and across CHEST social media channels. The CHEST and the CHEST Foundation have initiated a new microgrants program and have reached out to over 150 ILD and COPD support groups across the country to offer them the opportunity to apply for a max $2,500 grant. So far, 7seven groups have requested support. These grants go directly to patients and caregivers and provide needed relief through provision of:

1. Groceries
2. Gift cards
3. Medical supplies (including PPE for patients)
4. Technology needed to communicate with their community and HCPs
5. Household supplies, cleaning supplies

In an attempt to assist our colleagues in New York City, a call went out for volunteers at the end of March and has resulted in over 200 volunteers and more than 400 inquiries from our members. Bravo!!! We want to thank our sister societies for joining our efforts during this time to help all of our respective members and, ultimately, those patients stricken with this terrible illness. As I don and doff my COVID gear, I hope you are all safe and well in this time of unprecedented change in our lives. I look forward to my next report in a few months, hopefully on a happier note.

Stay safe!
Stephanie

CHEST NETWORKS

3D printing. COVID-19 and pediatrics. Lung volume measurements. PAH and atrial septal defect.

Interventional and Chest Diagnostic Procedures

3D printing and pulmonology

Recent advances in 3D printing have enabled physicians to apply this technology in medical education, procedural planning, tissue modeling, and implantable device manufacturing. This is especially true in the field of pulmonology. Advancements in 3D printing have made personalized airway stents a reality, both by 3D printing-assisted injection molding or direct 3D printing.

Dr. Cheng

Airway stents have significantly evolved over the last half century. With use of silicone, bare metallic, and hybrid stents, pulmonologists have an ever-expanding option to address airway stenosis due to both benign and malignancy etiologies. Personalized airway stents hold the potential for advanced customization, minimizing pressure points, and improving airflow dynamics to increase mucus clearance. In January 2020, the US Food and Drug Administration (FDA) cleared patient-specific airway stents developed by Dr. Thomas Gildea of Cleveland Clinic. The patient-specific silicone stents are created using CT scans and 3D visualization software to generate a 3D-printed mold that was subsequently used to inject with medical-grade silicone. Two years earlier, a Duke University startup known as restor3D created the first direct 3D printed airway stent using a compressible biocompatible material with properties similar to that of silicone. Both of these stents have been used in patients with promising response.

As we look into the future, the field of pulmonology will experience significant changes with more adoption of 3D printing (ie, additive manufacturing). We may soon be able to create personalized airway prosthesis of any type (stents, spigots, valves, tracheostomies, t-tubes) for the benefit of our patients.

Disclosure: Dr. George Cheng is a cofounder of restor3D.

George Cheng, MD, PhD, FCCP
Steering Committee Member

Pediatric Chest Medicine

COVID-19: Pediatric story of a new pandemic

In December 2019, an outbreak of pneumonia identified to be caused by 2019 novel coronavirus (2019-nCoV) emerged in Wuhan, China, possibly originating from the local wet market selling many species of live animals. A novel member of enveloped RNA coronavirus was identified in samples of BAL fluid from a patient in Wuhan.

It has since rapidly spread globally to countries across six continents. As of early April, 1,286,409 cases have been reported worldwide with 337,933 cases (9,600 deaths) in the US (https://coronavirus.jhu.edu/map.html) with more cases and deaths every day. Most of these initial reports of COVID-19 (COronaVIrusDisease) in children are from China. Fever (60%) and cough (65%) were the most common symptoms. Procalcitonin elevation (80% and co-infection (80%) were prominent clinical findings. Consolidation with surrounding halo sign (50%) and ground-glass opacities (60%) on CT scan were typical radiologic findings. Almost all children recovered with-

Dr. Rao

out needing intensive care support.

Increased IgM COVID-19 antibody levels observed in three neonates raise questions of potential in-utero transmission (Kimberlin et al. *JAMA* 2020 Mar 26. doi: 10.1001/jama.2020.4868). One study provided evidence for persistent fecal shedding and possibility of fecal-oral transmission (Xu et al. *Nat Med* 2020 Mar 13. doi: 10.1038/s41591-020-0817-4).

Initial reports show that children appear to be at similar risk of infection as adults, though less likely to have severe symptoms. Young children, particularly infants, are more vulnerable to infection (Dong et al. *Pediatrics*. 2020 Apr. doi: 10.1542/peds.2020-0702); (Bi et al. *medRxiv* 2020 Mar 27. doi: 10.1101/2020.03.03.20028423v3). Thus far, few deaths have been reported in the pediatric age group. Trials are being conducted on a war footing to find a cure and a vaccine.

Harish Rao, MD, MBBS
Steering Committee Member

Pulmonary Physiology, Function, and Rehabilitation

Controversies and the clinical value of lung volume measurements

Lung volumes are often measured by body plethysmography or gas dilution. Their clinic importance in decision making is unclear. Though measured differently, predicted sets obtained by plethysmography from Caucasian populations are often used for gas dilution measurements (Ruppel GL. *Respir Care*. 2012 Jan;57[1]:26). Recently the Global Function Lung Initiative (GLI) felt lung volume data were insufficient to develop universal reference equations (Cooper B, et al. *Breathe* (Sheff). 2017 Sep;13[3]:e56-e64). ERS/ATS guidelines recommend adjusting Caucasian predicted values depending on race, without advising how to adjust the confidence limits. Their algorithms show if the VC is normal, lung volumes are unnecessary, though it is not unusual to see a normal VC with reduced TLC. Does this suggest the VC is more important than the TLC, even if lacking predicted volume equations for non-Caucasians? Because combined obstructive and restrictive abnormalities occur simultaneously, recommendations state severity of impairment be determined by the FEV_1 percent of predicted rather than TLC (Pellegrino R, et al. *Eur Respir J*. 2005;26:948). The value of quantifying other volumes such as FRC and ERV in conditions such as obesity and musculoskeletal defects is also not clear. In obstruction, volumes can indicate air trapping or hyperinflation measuring RV and RV/TLC. Though cutoffs of <80% and >120% of predicted are often used, guidelines discourage this practice, recommending using predicted equations based on age, race, height, and sex, with statistical limits of normal (Ruppel GL. *Respir Care*. 2012 Jan;57(1):26).


Dr. Chaaban


Dr. Morris

Further research is needed to define comprehensive racially appropriate predicted equations for lung volumes to support their clinical applicability in decision making, as well as if predicted values by plethysmography are applicable to values obtained from gas dilution.

Said A. Chaaban, MD
Steering Committee Member
Zachary Q. Morris, MD
NetWork Member

Pulmonary Vascular Disease

Pulmonary hypertension associated with atrial septal defect in adults: Closing time?

Up to 10% of adults with atrial septal defects (ASDs) can develop pulmonary arterial hypertension (PAH) according to European Guidelines on pulmonary hypertension (PH) (Galie, et al. *Eur Heart J*. 2016;37[1]:67). If ASD closure is considered, they propose a pulmonary vascular resistance index (PVRi) <4 Wood units (WU) m^2 as a safe cutoff. Higher PVRi carries a higher operative risk, warranting evaluation in specialized PH centers.

American guidelines (Stout, et al. *Circulation*. 2019 Apr 2;139[14]:e698) recommend closure in symptomatic patients with a net shunt (Qp/Qs) of >1.5:1. Closure appears safe if pulmonary artery (PA) systolic pressure is <1/2 systemic blood pressure, and PVR / systemic vascular resistance is <0.3. They recommend specialized evaluation for higher pressures and to avoid closure once a net right to left shunt is present (Qp/Qs <1.0).

However, in severe cases, experienced centers have reported some success with a "treat-and-close" approach if post-therapy PVR reaches <6.5 WU (Bradley, et al. *Int J Cardiol.* 2019;291:127).

Finally, consider the following when evaluating ASD-associated PAH: 1. A thermodilution cardiac output method should not be used to calculate PVR/PVRi because of confounding recirculation from the intracardiac shunt (Kwan, et al. *Clin Cardiol.* 2019;42[3]:334). Qp is used instead and is calculated using Fick equation, requiring accurate oxygen saturation measurements. 2. Mixed venous saturation (MvO_2) is needed to determine Qs, and PA saturation cannot be used as MvO_2 surrogate. MvO_2 must be calculated using superior and inferior vena cava saturations. 3. Some patients with idiopathic PAH may have a small coexisting ASD that is not responsible for the abnormal hemodynamics. Closing the ASD in those cases would be contraindicated. 4. Patients may have more than one type of coexistent congenital heart defect.


Dr. Soto

Francisco J. Soto, MD, MS, FCCP
Steering Committee Member

This month in the journal *CHEST*®

Editor's Picks

BY PETER J. MAZZONE, MD, MPH, FCCP
Editor in Chief

Fighting the novel coronavirus together with you.
By Dr. J. Li.

The Evolving Landscape of e-Cigarettes: A Systematic Review of Recent Evidence.
By Dr. J. Bozier, et al

Comparative Safety and Effectiveness of Inhaled Corticosteroid and Long-Acting Beta2-Agonist Combinations in Patients With COPD.
By Dr. T-U Chang, et al.

Sharing your philanthropic dollars

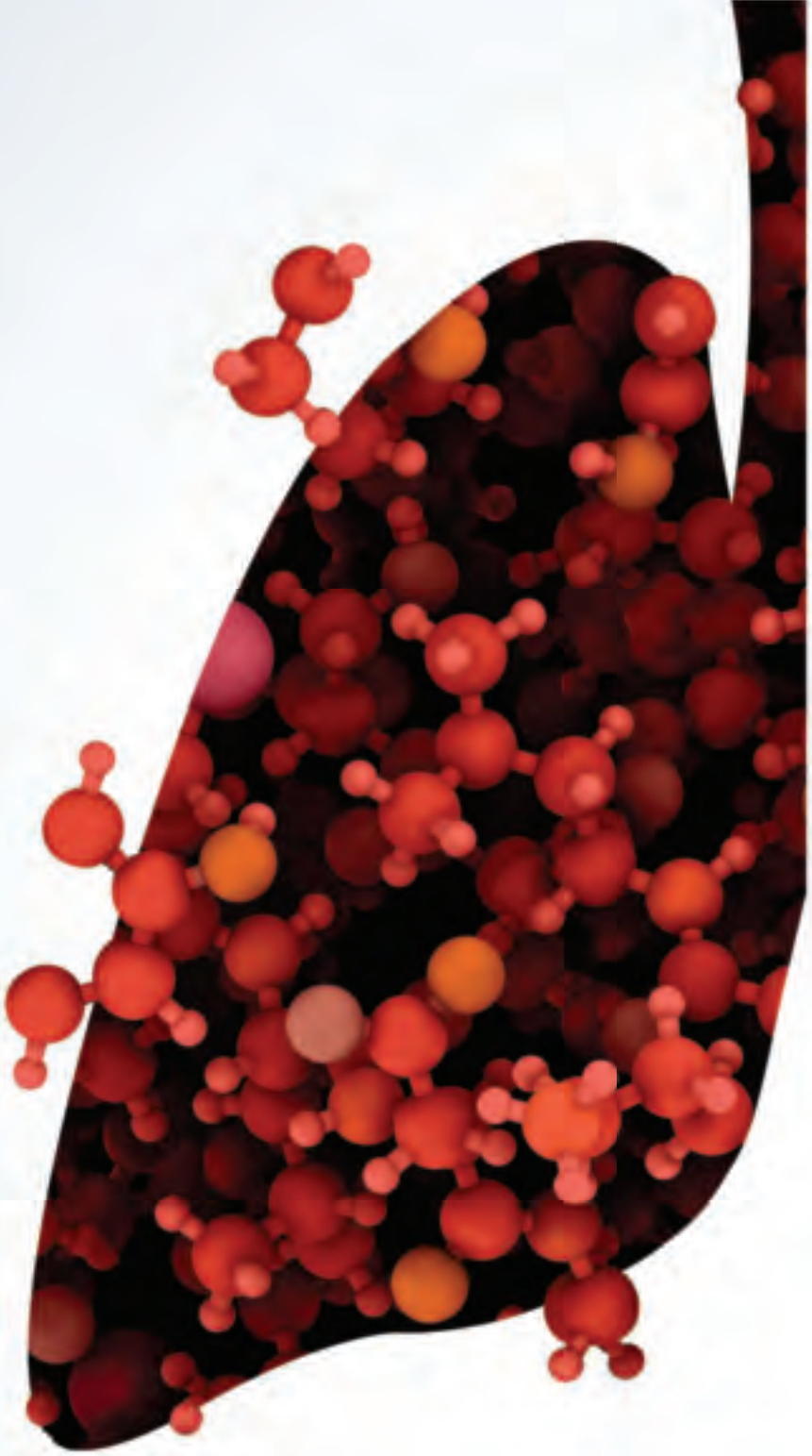
Amid the COVID-19 pandemic, we are filled with gratitude because of the support you have provided the CHEST Foundation. Along with our sincere thanks, we wanted to share how your philanthropic dollars are being put to use fulfilling the urgent needs of our community during this crisis. Specifically, the CHEST Foundation is:

1. Continuing to provide reliable educational materials and resources that support our clinicians, their patients, and caregivers;
2. Actively working with manufacturers and vendors from around the globe to secure life-saving equipment for US hospitals; and
3. Partnering with other leading health-care organizations to increase our impact in vulnerable and at-risk communities.

These are just some of the ways the CHEST Foundation and CHEST are rallying to support the fight against COVID-19. To see more of what we are doing, and to keep an eye out for future resources, please visit us here: https://bit.ly/3bKAGI2. We will continue to identify new ways in which we can support the efforts of our health-care providers and serve as a leading resource for patients, caregivers, and those we consider "at-risk, noninfected" populations.

Additionally, the CHEST Foundation's redesigned website will be launching May 1! Be sure to visit us at chestfoundation.org to view and share our clinician-authored patient education guides with anyone who needs them.

Thank you for providing your generous support, which has allowed us to develop these much-needed resources. We would not be able to do it without you.



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