Portable MR Imaging Is Now at Your Patient's Bedside
Assess brain injury immediately without moving the patient

The world’s first low-field, portable MRI – Swoop™ – gives your team the vital neuroimaging you need to quickly assess, treat, and monitor your patients. At the patient’s bedside. Without the risk, staff coordination, and time required for transporting patients to dedicated imaging suites.

Swoop™ can be stored in a nearby closet and driven down a hallway, directly to your patient’s bedside. Plug it into a standard wall outlet, and it’s ready to deliver high-quality imaging in less than 2 minutes.

When a patient requires serial monitoring, Swoop™ delivers on-demand, ongoing imaging and real-time information for immediate assessment and decision-making.

Diagnostic-grade T1-weighted, T2 fluid-attenuated inversion recovery (FLAIR), and diffusion-weighted imaging (DWI) sequences were obtained without adverse events or complications. JAMA Neurol. Published online September 8, 2020. doi:10.1001/jama Neurol.2020.3263

Reimagining Workflow in the Neuro ICU

When patients don’t require transport to obtain necessary imaging, the traditional workflow can be disrupted in ways that benefit the patient, as well as the clinical team. Consider how treatment protocols could be reimagined:

- Immediate, high-quality imaging (T1, T2, DWI, and FLAIR sequences)
- Ultra-portable
- No projectile risk in high-metal environments
- Open layout allows staff and loved ones to remain with patient
- Ready to start imaging in <2 minutes
- Initial scans viewable in 30 seconds
- Costs less than the service contract on traditional MRI
- Teleradiology (PACS integration or available Cloud PACS)

Clinical Experience: Yale New Haven Hospital (2019-2020)

Dr. Kevin N. Sheth, critical care neurologist at Yale University School of Medicine, published results in JAMA Neurology detailing his facility’s clinical experience using low-field portable MRI to assess patients with brain injuries in intensive care rooms.

Dr. Sheth’s team used Swoop™ to obtain point-of-care MRI examinations on 50 patients admitted to the neuroscience or COVID-19 ICUs at Yale New Haven Hospital from October 2019 to May 2020. Patients presented with ischemic stroke, hemorrhagic stroke, subarachnoid hemorrhage, traumatic brain injury, brain tumor, and COVID-19 with altered mental status.

Read more about facilities nationwide using Swoop™ in their Neurology ICUs, Emergency Departments, Pediatric Units, and more: hyperfine.io

Hyperfine Swoop™ is US FDA 510(k)-cleared for neuroimaging of patients of all ages. Currently available for sale in USA.

Watch: Clinical Experience at Yale New Haven Hospital

Listen as Dr. Kevin Sheth, critical care neurologist at Yale University School of Medicine, discusses his team’s clinical experience using Swoop™ for point-of-care evaluation of patients presenting with brain injuries, stroke, and COVID-19 altered mental status in this recent webinar with Hyperfine’s Chief Medical Officer, Dr. Khan Siddiqui.

Visit: http://bit.ly/AssessDI or scan QR code with your smartphone to watch.
Clinical Spotlight:

The Future of Critical Care Medicine

10
The Future of Sepsis Treatment

12
What the VIRUS COVID-19 Registry Can Teach About the Future of EHRs

Departments

Editor’s Message ...................................... 4
Message from Leadership .......................... 6
Section and Chapter News ......................... 28

SCCM Updates

Discovery VIRUS Registry Outcomes and STOP-VIRUS ICU Learning Collaborative .......... 14

Clinical Spotlight

The COVID-19 Double-Lung Transplant .......... 16
My COVID-19 Experience .......................... 18

ICU Liberation

Post-Intensive Care Syndrome Clinics ............ 20

Exploring Ethics

Managing Refusal to Accept a Brain Death Diagnosis ........................................... 24

Drug Shortages

Importance of Effectively Communicating Drug Shortages ...................................... 26
A Celebration of 50 Years

In celebration of the Society of Critical Care Medicine’s (SCCM) 50th anniversary, I reread the presidential address of SCCM co-founder Max Harry Weil, MD, MCCM, in which he emphasized the importance of a multiprofessional team and highlighted that “dedication to patient care will remain the central purpose of our Society.” Dr. Weil described a commitment to standards of practice that ultimately lead to guidelines for the organization of critical care units, and cited a commitment to education, stating, “The doors of our meetings and scientific sessions are wide open to all.”

Inspired by Dr. Weil’s message, I continued to read other presidential addresses (which can all be found on SCCM’s website at sccm.org/pastpresidents or by scanning the QR code). Each describes a thoughtful vision for critical care medicine with a common underlying theme: SCCM’s mission to secure the highest-quality care for all critically ill and injured patients. But how will critical care evolve as we navigate the future?

In This Issue: The Future of Critical Care

In his message, SCCM Past President Lewis J. Kaplan, MD, FACS, FCCM, reflects on how critical care has changed during our own careers and how we envision the next series of changes. In the clinical spotlight are lessons learned from two sessions from SCCM’s 50th Critical Care Congress. Bertalan Meskó, MD, PhD, provides his perspective on the future of critical care in the article “The Future of Critical Care Medicine.” The true innovation, he states, is not technology, but the most undervalued resource in healthcare—patients. The article “The Future of Sepsis Treatment” highlights the session “Surviving Sepsis 2071.”

The COVID-19 VIRUS Registry, created by Discovery, the Critical Care Research Network, is a first-of-its kind registry aimed at identifying global trends in ICU patients with COVID-19. The interplay between this registry and electronic health records is described in the article “What the VIRUS COVID-19 Registry Can Teach About the Future of EHRs.”

Finally, I invite you to read the article on Marie R. Baldisseri, MD, MPH, FCCM, called, “My COVID-19 Experience.” Dr. Baldisseri is a global leader in critical care medicine who shares her experience as a patient with COVID-19.

In closing, on the 50th anniversary of SCCM, I would like to recognize the founding members of our Society. I also would like to acknowledge the cochairs of the 50th Critical Care Congress: Jose L. Diaz-Gomez, MD, FASE, FCCM; Beth Taylor, DCG, AP, FCCM; and Lillian L. Emlet, MD, MS, FCCM, for their efforts and direction in providing our first virtual Congress. And I would like to thank Dr. Kaplan for his leadership during this unprecedented year and welcome Greg S. Martin, MD, MSc, FCCM, as he begins his role as the 50th president of SCCM. I hope you enjoy this edition of Critical Connections on the future of critical care. And always remember, “If you don’t know where you are going, you’ll end up someplace else.”
The critical care community has made an incredible impact on the world. We are looking forward to recognizing these key accomplishments, as well as the opportunity to reconnect with our members, colleagues, and friends at the Society of Critical Care Medicine's (SCCM) 51st Critical Care Congress.

Take advantage of these opportunities at the largest multiprofessional critical care event of the year:

- **Collaborate** with members of the entire multiprofessional team to solve complex challenges and remove barriers to improving care
- **Engage in hands-on workshops** and interactive debates hosted by renowned faculty from around the globe
- **Explore the latest technologies** and tools from more than 100 exhibitors that are changing the way we work

Save the Date!

**Registration opens summer 2021 at sccm.org/congress**
Major Milestone Anniversaries Often Drive Both Celebration and Introspection, Raising Key Questions About Historical Origins and Future Directions. The Society of Critical Care Medicine (SCCM) addressed those very questions when we virtually celebrated its 50th anniversary at Critical Care Congress. While we all anticipated a gala in-person event to launch our celebration, the pandemic has shifted, well, everything.

Whirlwind changes to the delivery of critical care marked this past year. Novel spaces, new team members, and at times—like right now—overwhelming patient surge. And yet, despite such rapid and visible transformation of spaces and duties, at its core, critical care remains unaltered. How can such statements be reconciled? By examining our origins, heritage, and trajectory, we can explore whether where we are is truly different from where we started—and how that might shape where we are going.

The origin of critical care is different from the origins of the critical care profession. Critical care is related to urgent, acute, and emergent care in that it occurs when and where need arises. Battlefield medical and surgical care may be the ultimate expression of each of those aspects of care. These notions harken back to the prophetic words of SCCM’s founders who advanced the idea that “critical care is a concept, not a location.” Providing critical care in a novel intensive care unit, in an austere environment, or during emergency medical services transport perfectly reflects these notions decades after they were initially articulated.

Critical care professionals use a team-based approach to care for the critically ill and injured. Increasingly advanced technology informs that care and is supplemented by precision laboratory or imaging data. And yet, regardless of how much information is available or how it is visualized, the team cares for a patient in a bed, often accompanied by family or other surrogate decision-makers during a period of high stress and vulnerability. Our usual processes have been derailed this year by the need to reduce virus transmission and preserve scarce resources, including personal protective equipment.

As anticipated, you discovered novel ways to engage with families, consultants, and trainees using digital platforms—just as we did to deliver Congress to you this year. Remote learning using digital platforms expanded the horizons of medical education and linked colleagues around the world. Social media (SoMe) emerged as a source for both medical information and perspectives, defining a truly global medical community. These change the “how” of critical care, but not the “what” or “why.” The “what” is critical illness or injury, and the “why” is to care for patients, our foremost privilege and goal.

We have undergone similar evolution if you consider how we document medical care. Gone are the days of writing with a treasured fountain pen—yes, I miss writing with a medium nib and blue-black ink! Instead, charts have ballooned under an endless series of clicks, checkboxes, and smart phrases. We still document the same history, data, thought processes, and outcomes, but use a different medium nib and blue-black ink! Instead, charts have ballooned under an endless series of clicks, checkboxes, and smart phrases. We still document the same history, data, thought processes, and outcomes, but use a different platform. The need for information transmission to provide clarity for all involved in care remains unaltered. These changes in “how” do not alter content, and they clearly do not lead us astray from education and high-quality care delivery in a team-based format.

Information streams are now so vast that it sometimes seems like an insurmountable task for the unaided human brain to integrate all of it into a coherent whole. Patient surge during disasters such as the current pandemic further challenge clinicians’ ability to do so. Machine learning and artificial intelligence are poised for launch into the clinical space to help with condition screening, early warning of emerging conditions such as sepsis, radiology, or pathology data assessments, and perhaps therapeutic agent dose adjustments. In order to integrate such techniques into clinical care we will likely need new partners and new ways to think about how we use information. Data science, data sharing, and data visualization techniques are likely to be one of the new important “how” changes to our practice.

Tele-critical care blossomed during the pandemic as one way to help address the influx of critically ill patients that outstripped local
critical care resources. Not every hospital was equipped to participate in one of the existing and more standard methods of remotely linking patients and clinicians. Novel approaches such as the National Emergency Telecritical Care Network (NETCCN) grew from focused efforts to develop a universally deployable approach to fill that gap. SCCM is proud to have supported such efforts. Tele-critical care was not the only tele-approach to vastly expand during the pandemic. So too did tele-health for routine follow-up, medication dose adjustment, and even wound surveillance. Therefore, tele-health also harkens back to our founders’ words by emplacing care where it is needed, not geographically fixing it in a specific location.

Above I have shared some glimpses into the more recent changes in critical care as well as hospital- and office-based care. It is clearly not an exhaustive recounting, but it is characteristic of innovation, adaptation, and the integration of available resources into caring for patients with complex and acute illness or injury. As we continue to embark on SCCM’s 50th year, I invite you to pause and reflect on how care has changed during your career, and how you might envision the next series of changes. Share those insights in your chapters, specialty sections, and teams. Then, share them with the taskforce that President Greg S. Martin, MD, MSc, FCCM, is charging to delve into all of those changes to forecast how our future may evolve. This past year will substantially impact the future of critical care and has irrevocably changed my professional life. It has been an honor and a privilege serving as your 49th President. Of one thing I may be absolutely certain: SCCM will be served by an exceptionally capable 50th president!
The Future of Critical Care Medicine

Bertalan Meskó, MD, PhD, was six years old when he was introduced to science fiction. He read a scientific encyclopedia for children, then saw movies such as The Terminator and Back to the Future and was hooked. He was enthralled by what seemed like limitless possibilities, and he decided he wanted to pursue a career in science and ultimately become a doctor. He imagined all the advanced technologies like virtual reality and artificial intelligence (AI) that would exist by the time he went to medical school to help him learn to be a better doctor.

That vision did not become his reality. He made it to medical school but was forced to study three-dimensional topics in two-dimensional textbooks. It was not what he envisioned. Then about two years ago, Dr. Meskó finally met science fiction. He heard about a headset that used augmented reality to teach human anatomy. He tried it, and it became a defining moment in his life.

“A holographic image of a body appeared before me,” Dr. Meskó said. “It had a beating heart. I could dissect it without physical limitations—and without the formaldehyde smell. I could dissect just the bones, just the muscles. I could study anatomy like never before.”

Dr. Meskó shared that memory as part of his presentation “Future of Critical Care Medicine” at the Society of Critical Care Medicine’s 50th Critical Care Congress. As director of The Medical Futurist Institute, Dr. Meskó explores what the future of medicine will look like. In his eyes, this connection between healthcare and science fiction matters.

Traditionally, healthcare has not been a field open to innovation, Dr. Meskó explained, often because physicians prefer to do things the way they have always done them, or because there is a fear of the unknown. But innovation is here, and it is critical for the medical field to embrace it, he said. To demonstrate this point, Dr. Meskó shared an illustration of a woman having her arm scanned with a portable ultrasound. Above her head is a screen broadcasting a physician on a feed. Beside her is a 3D printer. In the background is a drone dropping medical supplies. It looks like science fiction, Dr. Meskó said, but in reality, it captures healthcare innovation in Rwanda, a country on the cutting edge of adopting digital technology.1

Technological innovations are developing at breakneck speeds, from watches that track a person’s heart rate and sleep patterns to genetic and microbiome testing. When Dr. Meskó considers healthcare’s future, though, technology is not his primary focus. The true innovation facing the industry is one built on what he calls the most underused resource in healthcare—patients.

“What has been going on in healthcare in the 21st century is not a technological revolution, but a cultural transformation. While it was initiated by amazing technologies, at its core, healthcare has been going through a transition.”

— Bertalan Meskó, MD, PhD

“Patients will be able to do even more,” Dr. Meskó said, “and they would love to contribute because they have a lot to contribute to the medical decisions you make with them. This is the patient from the future.”

With this in mind, Dr. Meskó suggested that changes to healthcare organizations be made with the patient in mind. Patients should also feel empowered to have their voices heard. While the patient-caregiver relationship will change, so too will the tools available to healthcare professionals, and that starts with AI as a new resource in healthcare—patients.
member of the medical team. “It’s going to be your best assistant ever,” Dr. Meskó said. “You have to know about it, you have to acknowledge it and learn how to use it and work with it.”

Dr. Meskó and his team at the Medical Futurist Institute publish studies about the role AI will play in the future, analyze trends and the impact of automation on medical specialties, and explore what role AI can play in achieving precision medicine. Dr. Meskó believes AI will:

- Create better-organized healthcare logistics
- Reduce the time it takes for an experimental drug to go from concept to market
- Improve working conditions for medical professionals while saving lives
- Find new associations between risks and diseases
- Reduce the time physicians spend on information technology and electronic health records
- Help forecast future disease outbreaks and pandemics
- Become unbeatable at specific, data-oriented tasks

Beyond advances in AI, augmented reality and machine learning will become valuable tools in a physician’s toolbox. “Augmented reality can help medical students prepare for delicate situations,” he said. “It can help them prepare for emergencies by putting them through the same scenarios dozens of times instead of living through one in real life. Machine learning can help physicians make better decisions by making sure to put all relevant information into their hands while dealing with their patients.”

There are limits to what these technologies can do. Technology will not solve every challenge clinicians face today, and it will not replace clinicians. What it can do is be a partner, and that’s where Dr. Meskó returns to his passion for science fiction. In his eyes, science fiction forces people to ask “What if?” more often. What if you could use a 3D printer to create customized medications for your patients? What if algorithms could be taught empathy? What if we become a multi-planetary species?

Some people may feel it is daydreaming to dedicate time to these types of questions, but Dr. Meskó considers it preparation. “In medical school, we are told to focus on problems today and try to solve them,” he said. “But one of the major elements of being a physician is anticipation, trying to find out what might happen next. This is a skill every physician has, but it can and should be upgraded by looking more into the future. Science fiction does this job while also entertaining us and challenging our mindset.

“By playing with the ‘What if?’ question, you gradually prepare yourself for whatever is coming next. It’s not about losing your profession or technology replacing you. It’s about you being augmented by new technologies while you are caring for your patients. I think that’s a vision worth fighting for.”

References and disclosures: see page 33
Sepsis continues to affect Americans and hospital patients across the United States. The Centers for Disease Control and Prevention (CDC) estimates that approximately 1.7 million adult Americans develop sepsis each year; this is more than the entire population of Phoenix, the fifth-largest city in the country. Approximately 270,000 of these patients die from sepsis. Just as alarming is the fact that one out of every three patients who die in a hospital had sepsis. Physicians and researchers have learned more about sepsis from clinical trials and studying its complexity at the cellular level, but perhaps the most important concept to date is the need for early detection.

“The biggest obstacles to surviving sepsis include early diagnosis and treatment—getting to a medical facility that can manage sepsis quickly,” said Christa A. Schorr, DNP, MSN, RN, FCCM, a clinical nurse scientist at Cooper University Hospital in Camden, New Jersey, USA. “Physicians have recognized that sepsis is an emergency where early diagnosis and appropriate treatment truly can make the difference in survival.”

Dr. Schorr moderated a conversation about the future of sepsis as part of the Society of Critical Care Medicine’s 50th Critical Care Congress. “Surviving Sepsis 2071” featured presentations by Dr. Schorr; Hector R. Wong, MD, FCCM; Michael J. Morowitz, MD; Judith Hellman, MD; and Shamim Nemati, PhD. Topics ranged from biomarkers and predictive analytics to microbiomes and immunomodulation.

One challenge with treating sepsis is the variety of reactions that come with it. As Dr. Schorr explained, some organs may require support from a ventilator, dialysis, or medication to maintain blood pressure. “Some patients recover in a few days, where others may be hospitalized for weeks to months,” she said. “Many survivors of sepsis experience challenges after hospital discharge including physical, cognitive, and mental health issues. In some cases, the organ failure is too overwhelming for the body and results in death.”

To understand who has sepsis and, more importantly, how it may impact them, physicians can turn to biomarkers. Dr. Wong, a member of the Division of Critical Care Medicine at Cincinnati Children’s Hospital Medical Center, explained that, traditionally, people consider biomarkers in a diagnostic situation—essentially to understand who has or does not have sepsis. Biomarkers have the potential to do far more than that, he explained. They can be used for prognostic enrichment, such as evaluating whether patients who have sepsis are at low or high risk for a bad outcome. They also can be used toward predictive enrichment and allow clinicians to estimate who among the high-risk patients are likely to positively respond to a particular therapy.

Immunomodulation is another type of intervention that has been considered to help treat sepsis. Dr. Hellman, vice chair for research...
in the Department of Anesthesia and Perioperative Care at the University of California, San Francisco, explained that researchers have conducted clinical trials over the course of several decades to try to target acute inflammation to treat sepsis. These trials focused on agents that block or reduce proinflammatory responses, agents that block proinflammatory mediators or their receptors, and corticosteroids that have a broad effect on immune function. These trials were unsuccessful, Dr. Hellman explained, although retrospective analysis suggests that some of the antimediator therapies might protect certain patient subgroups.

In contrast, endogenous immunomodulation appears to be a potential option for treating patients with sepsis. This process, in which endogenous factors and pathways fine-tune innate immune responses and inflammation, appears to lead to beneficial responses, including wound repair and the restoration of immune homeostasis, Dr. Hellman said.

Dr. Hellman also shared her laboratory’s research into the role cannabis plays in affecting acute inflammation. This research is focused on the endocannabinoid system, a system still with significant unknowns, she said. “Despite the use of cannabis products to manage symptoms associated with inflammation, the immune effects of cannabis and the intrinsic role of the cannabinoid system in regulating immune functions are not well understood,” Dr. Hellman said.

Her laboratory is currently studying the endocannabinoid system in infection models of sepsis and trying to figure out how to study the system in humans. “Cannabis-derived cannabinoids are widely being used for medicinal and recreational purposes,” Dr. Hellman said. “We need to better understand their effects and their mechanisms of action in order to use them wisely. The endocannabinoid system may represent a novel target for immunomodulatory therapies.”

In her presentation, Dr. Schorr examined the challenges and failures faced in sepsis research over the past 30 years. She believes that the panelists’ presentations represent promise and hope for the future of sepsis treatment. “Recovery from sepsis, both short term and long term, is a fertile area for research and quality improvement,” Dr. Schorr said. “As demonstrated in this session, researchers are studying methods to stratify patients using biomarkers and other tools including artificial intelligence, which we may add to the sepsis toolbox. Over the next five years, sepsis treatment will become more streamlined with consideration and emphasis for the individual, type of infection, chronic conditions, and patient-related goals of care.”
What the VIRUS COVID-19 Registry Can Teach About the Future of EHRs

Chaos—That is the word that comes to mind when Smith Heavner, BSN, MS, RN, PCCN, thinks about electronic health records (EHRs). And he is not alone. In 2019, a joint study by researchers at Stanford University, the Mayo Clinic, and the American Medical Association found that healthcare professionals graded EHRs with an F for usability. The researchers conducted a survey, to which more than 5000 physicians responded, giving EHRs a usability score of 45%. In contrast, in a similar study, Google received a usability score of 93%, while ATMs, GPS, and Microsoft Excel all fared better (82%, 71%, and 57%, respectively) by comparison.

Usability is a major frustration with EHRs. They were supposed to make life easier for clinicians. This is one of the biggest problems for Mr. Heavner. “Electronic health records have let us do a lot of things when it comes to healthcare and they’ve let us be a lot more efficient,” said Mr. Heavner, a manager for clinical trials research at Prisma Health in Greenville, South Carolina, USA, who has been involved in collecting COVID-19-related data for Prisma Health’s network of hospitals since the outset of the pandemic. “The promise was we’d be able to see everything [about a patient] in an EHR, but implementation wasn’t as seamless as we would have liked.”

Mr. Heavner has a unique perspective on EHRs. Not only has he been involved with data collection at his own hospital, he is also a core committee member for the Viral Infection and Respiratory Illness Universal Study (VIRUS), a first-of-its-kind registry that seeks to identify global trends regarding COVID-19 patients in the ICU. VIRUS was created by the Society of Critical Care Medicine’s Discovery, the Critical Care Research Network.

The primary goal of the registry is to create a real-time database of current ICU and hospital care patterns that can be used to evaluate the safety and observational effectiveness of COVID-19 practices. To track in real time, VIRUS must be able to collect data from the EHRs of each registrant in the study. This is where Mr. Heavner comes in—and where the chaos begins.

The reason for the chaos lies in the data, or, more specifically, the variations in the data. This is not just because different hospitals and health systems use different EHRs. Nearly every institution customizes its EHR to some extent; the problem with this is that the data structures are not always compatible. Mr. Heavner said that his own hospital and two nearby health systems use the same EHR software but even they are unable to extract most data from one another because of inconsistencies in data collection and storage.

“I can see if a patient was also a patient at [one of the other health systems] and look at some of their key information,” said Mr. Heavner. “I can review some of the provider notes, but things like test results and medications don’t flow over seamlessly because they’re stored differently. If you’re dealing with one patient at a time, you can deal with that clinically, but I’ve got 4500 patients admitted to Prisma Health with COVID-19. There is no way I can go through each of those and pull their data.”

More than 500 healthcare sites from dozens of countries around the world are currently participating in VIRUS. With hundreds of variables and thousands of potential data points for each patient, automating the data extraction process is essential. Mr. Heavner and several other site leads formed the Practical EHR Export Pathways as a subcommittee of VIRUS to look at developing tools and resources to make that automatic extraction process possible.

Mr. Heavner shared the code he and his colleagues at Prisma Health used to collect their own data. That code was generated after he spent the first two months of the pandemic working with an informaticist and engaging stakeholders from critical care, infectious diseases, and other specialties to identify which data could be extracted and which data were relevant.

“My hope through sharing that code was that other people can benefit from the logic that we wrote into it,” he said. What he found was that sites with accessible informaticists were often able to quickly take the code and use it to either directly pull the necessary data or adapt it to change variables to reflect their institution’s data structure. For a number
of sites, though, that was not an option, partly because of the lack of an informaticist but more so because of how the data were tabulated. “We realized pretty quickly it wasn’t going to be a one size fits all,” Mr. Heavner said, “and that the real value we could provide to each other was to come together routinely and talk about the variables that we were having trouble with and to talk about what some potential solutions could be.” His experience with VIRUS has reinvigorated his desire for common data models for all institutions to follow in their EHRs. These models exist and are in place in some institutions, meaning that their data can be culled far more efficiently and effectively. That decision and, more significantly, the transition takes time. More immediately, Mr. Heavner offered three pieces of advice for any institution to consider to better use EHR data to its advantage.

- **Some data is better than no data.** “Even if we can’t all get how many hours of invasive ventilation someone received, if everyone can get a checkbox that on December 8, this person was or was not intubated on a nonmechanical ventilator, that’s still very useful information.”

- **Recognize and leverage the employees who express interest in data.** “We frequently hear from some of the people participating in the VIRUS registry that every time they try to ask about data, about participating in this type of work, they’re told no, the burden of work is too high, we’re not even going to talk about it. If we can get a little bit of engagement, even if you can’t automate the entirety of study, if you can automate a few dozen pieces of information, that saves a lot of time for the people participating in the study and it can also be really valuable information.”

- **Reach out to the VIRUS team.** “We have a number of site leads who have approached us and are willing to provide coaching and peer-to-peer mentoring. That can be very helpful to have someone who has more informatic knowledge talk through what are the better questions to ask your team.”

As for the future of EHRs, Mr. Heavner does not know what they will look like. Maybe machine learning will be able to decipher the inconsistencies in data collection and clean it up for human researchers to use. Maybe there will be a tool that uses natural language processing to take a narrative note written or dictated by a physician and extract key bits of information for an EHR. Whatever the future of data collection and EHRs look like, there is no need to wait for it, he said. That, more than anything else, is what he has learned from his experience with VIRUS. "Long term, maybe we’ll have advanced artificial intelligence algorithms doing some of this work for us, but that doesn’t mean we can’t in the meantime make steps to label all our data the same so that we can dump data from multiple health systems together and know that there is a bucket of that data that will line up,” Mr. Heavner said. "We’ll know everyone is classifying blood pressure the same way, everyone is documenting height and weight the same way, and we can pull all of that data together easily to do large-scale analyses.”
SCCM Update

Discovery VIRUS Registry Outcomes and STOP-VIRUS ICU Learning Collaborative

NINE MONTHS AFTER DISCOVERY, THE CRITICAL CARE RESEARCH NETWORK, LAUNCHED THE VIRAL INFECTION AND RESPIRATORY ILLNESS UNIVERSAL STUDY (VIRUS), the first global COVID-19 registry to track ICU and hospital care patterns in near real-time, researchers have identified sizable variations in practice and outcomes among hospitals, prompting action to unearth the causes and inform improved and equitable care. A partnership between Society of Critical Care Medicine (SCCM) and Mayo Clinic, VIRUS continues to grow and is launching the Structured Team-Based Optimal Patient-Centered Care for Virus COVID-19 (STOP-VIRUS) ICU Learning Collaborative. The collaborative aims to turn key learnings into specific recommendations to ensure that ICUs are better prepared for the ongoing pandemic as well as future viral pandemics.

VIRUS was created by SCCM’s Discovery, the Critical Care Research Network. VIRUS is the first global COVID-19 registry to track ICU and hospital care patterns in near real-time. Recognizing the value in gathering consensus data during a pandemic (in light of the lack of such timely information during the Ebola outbreak) VIRUS was launched in May 2020 and has grown to include over 65,000 adult and pediatric hospital admissions at 297 sites in 25 countries and more than 1000 pediatric hospital admissions at 69 sites in nine countries and continues to welcome new sites. Learn more about the registry and how to join at sccm.org/virus.

The key finding that has emerged from the registry is the sizable variation in practice and outcomes that cannot be explained by patient characteristics, with hospital mortality ranging from 20% to 80% among hospitals. “Because there is no definitive treatment for COVID-19 as of now, our focus is to learn from high-performing hospitals’ practice and disseminate those findings to all,” said Rahul Kashyap, MD, MBBS, MBA, Mayo Clinic researcher and principal investigator of the VIRUS COVID-19 Registry. “That led us to partner with the Centers for Disease Control and Prevention (CDC) for support to convey key learnings based on experiential observations.”

STOP-VIRUS

This is where the STOP-VIRUS ICU Learning Collaborative comes in. Via a cooperative agreement, the CDC provided funding for new content for SCCM’s online COVID-19 Rapid Resource Center, critical care support programs for clinicians who are not critical care professionals, and collaborative activity.

STOP-VIRUS consists of two parts. In the first part, the collaborative is inviting sites at various stages of implementation to participate and share what they have tried and what has and has not worked in caring for critically ill patients. The second part involves a series of qualitative interviews with the participating sites to ascertain which practice variations have translated into patient care.

“STOP-VIRUS is an important first step in understanding the drivers of practice variation, as well as evaluating the effects of simple quality improvement interventions on outcome disparities in COVID-19,” said Allan J. Walkey, MD, MS, Boston University Medical Center researcher and co-principal investigator.

The benefits of participation include access to Mayo Clinic’s online CERTAIN (Checklist for Early Recognition and Treatment of Acute Illness and Injury) Programs for instruction, collaborative learning, and weekly discussions and multiprofessional peer coaching to help improve adherence to best practices.

The collaborative is accepting applications from sites in the United States and its territories. All sites must be participating in VIRUS, have at least three months of data from 2020, and feature a multiprofessional team with a critical care physician, nurse, pharmacy leader, and respiratory therapist. The goal is to include 15 adult ICUs and 5 pediatric ICUs. The collaborative plans to conclude at the end of September 2021. Learn how to apply at sccm.org/stopvirus.

VIRUS

The first outcomes of VIRUS were outlined in the article “Outcomes of Patients With Coronavirus Disease 2019 Receiving Organ Support Therapies: The International Viral Infection and Respiratory Illness Universal Study Registry” published in the March 2021 issue of Critical Care Medicine. The infographic reflects data from this article. View the VIRUS COVID-19 Registry dashboard at sccm.org/virus for the latest information.

More than 20 manuscripts are being prepared for publication during the next several months. Additionally, sites have been invited to submit ancillary study ideas drawing on registry data. Of the 150 proposed, more than 60 have been approved.

“We are working to bring results on practice variations to the scientific community as soon as they become available,” said Vishakha Kumar, MD, MBA, co-principal investigator and associate director of research for Discovery at SCCM. “There is a need to design and study novel medications based on data generated from the registry, and we welcome new sites to join, contribute their data, and be part of this important effort.”

VIRUS is collaborating with a variety of entities to coordinate findings and disseminate key learning. In addition to the CDC, these include the American College of Radiology, the American Heart Association, the International Severe Acute Respiratory and Emerging Infection Consortium (ISARIC), PointClickCare, and the U.S. Food and Drug Administration through collaboration with CURE ID.

The VIRUS COVID-19 Registry will remain open until at least April 2022 and may be extended.

Join the VIRUS Registry now at sccm.org/virus

Learn more about the STOP-VIRUS Collaborative at sccm.org/stopvirus

+1 847 827-6869
OUTCOMES OF PATIENTS WITH COVID-19 ON ORGAN SUPPORT

GLOBAL VIRUS REGISTRY

20,608 patients - COVID-19 (+)

<table>
<thead>
<tr>
<th>MORTALITY</th>
<th>LOS (MEDIAN DAYS)</th>
<th>DISCHARGE HOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Organ Support</td>
<td>8.2%</td>
<td>6.0</td>
</tr>
<tr>
<td>Mechanical Ventilation</td>
<td>40.8%</td>
<td>15.8</td>
</tr>
<tr>
<td>Mechanical Ventilation &amp; Vasopressors</td>
<td>53%</td>
<td>17.8</td>
</tr>
<tr>
<td>Mechanical Ventilation, Vasopressors &amp; RRT</td>
<td>71.6%</td>
<td>20</td>
</tr>
</tbody>
</table>

RRT: New Renal Replacement Therapy

There were no missing data regarding mortality, discharge disposition. Data regarding hospital length of stay were missing for 43 patients (0.4%).

Risk Adjusted Hospital Mortality Range:

- 40.8%
- 71.6%

Median Odds Ratio: 1.69

*This infographic reflects data published in the article “Outcomes of Patients With Coronavirus Disease 2019 Receiving Organ Support Therapies: The International Viral Infection and Respiratory Illness Universal Study Registry” from the March 2021 issue of Critical Care Medicine.
That was the exact scenario that faced Mayra Ramirez. Ms. Ramirez, a 28-year-old Chicago-based paralegal, followed stay-at-home orders and worked from home at the onset of the pandemic in March 2020. In April, she developed concerning symptoms—fatigue, low fever, and loss of taste and smell. At first, she thought her symptoms were related to neuro-myelitis optica, an autoimmune disease with which she had previously been diagnosed. But, on April 26, it became clear that something else was wrong when she could not make it from her bed to the bathroom without falling over.

Ms. Ramirez was admitted to Northwestern Memorial Hospital and 10 minutes later was diagnosed with COVID-19 and intubated. For six weeks she remained on a ventilator as ECMO worked on her lungs. “This virus overwhelmed Mayra’s lungs,” said Beth Malsin, MD, in a Northwestern Medicine press release.1 “For many days, she was the sickest person in our COVID ICU and possibly the entire hospital.”

Dr. Bharat watched as Ms. Ramirez’s condition failed to improve. He had been involved with the hospital’s COVID-19 task force since the pandemic began, and for months he had witnessed patient after patient die as a result of permanent lung damage. Early on, he wondered whether replacing the damaged lungs could prevent some of these patients from dying.

To answer that, he and his team first needed to better understand what the virus was doing to the lungs. A warm autopsy program was developed that allowed Northwestern physicians—with family consent—to open the chests of patients who had died from COVID-19 within one hour of their death, study their anatomy, and take tissues for analysis. This procedure not only provided key information about the impact of the virus but also made it possible for the team to identify when the virus fully leaves a person’s body.

To explain what they saw and to understand the havoc the virus can wreak on the lungs, Dr. Bharat likened COVID-19 to an earthquake. “If
you have a major earthquake and the whole house gets leveled, then you have to replace that house," he said. "That's what COVID does to some patients who develop this type of damage. The earthquake of COVID is so severe that the fundamental framework is destroyed and there is no way to recover these lungs."

That was the case for Ms. Ramirez, whose lungs were irreversibly damaged. Her body was clear of the virus, but her only chance of survival appeared to be a double-lung transplant. Until that time, the procedure had not been performed on anyone with COVID-19 in the United States. Ms. Ramirez’s mother consented, and her name was added to the transplant waiting list.

On June 5, less than 48 hours later, Dr. Bharat performed the transplant. When Ms. Ramirez woke up afterward, she knew she was in the hospital, but she did not know why. "I was really confused," she said. "I knew something was different with myself. I thought I was living in someone else's body. I couldn't recognize myself."

With new lungs, Ms. Ramirez had to relearn how to perform countless actions she never thought twice about before. "I was a complete vegetable," she said. "I could barely wiggle my toes. I could barely lift a finger. Learning how to use your new lungs entails pretty much everything right now because I'm in crisis," she said.

More than six months later, she is still adjusting to her new lungs. While she longs for a return to normalcy, she is grateful for Dr. Bharat's willingness to try something that had never been done before. "Dr. Bharat was a very courageous person to take the risk of ruining his reputation or potentially ruining the lung transplant program at Northwestern," she said. "He didn't care about any of that. He was just focused on saving me and doing what he could to advance medicine."

Ms. Ramirez did not intend to share her story with the public, but when she was told that her experience could potentially save other people whose lungs were shaken by the COVID-19 earthquake, she acquiesced. Sure enough, physicians in Washington, DC, heard the story and contacted Dr. Bharat. They had a 43-year-old man whose lungs were badly damaged by COVID-19 and they wanted to know if he was a possible transplant candidate. The patient was transferred to Northwestern and became the third COVID-19 patient to receive a double-lung transplant from Dr. Bharat.

Every day, Dr. Bharat receives three to five new patient referrals. Gauging whether or not someone is a viable candidate depends on a number of factors. First, is a double-lung transplant a medically sound option for the patient? An ideal candidate has only single organ failure, Dr. Bharat said. Also, the virus must have already cleared their body. In most cases, the Northwestern team also prefers that the patient be awake and able to participate in the conversation. Another important criteria is proximity, since transplant patients are expected to remain near the transplant facility for a full year after the transplant.

Realistic expectations are also necessary. To date, Dr. Bharat has performed 10 transplants for patients with COVID-19. All 10 of the patients Dr. Bharat transplanted are alive and recovering, but there will be hardships along the way. Patients and their families need to understand that, he said. "It's always easy to say, 'We want to do everything to save our loved one,' or for a patient to say, 'I want to do everything right now because I'm in crisis,' but they also need to be fully informed about the aftercare," Dr. Bharat said. "They're going to be required to take specific medications for the rest of their lives, they're going to have to see their doctors, they're going to have to deal with potential rejection and infection complications as they arise, so we need to be fully transparent. It's our duty as physicians and surgeons to make sure they understand."

He also believes it is his duty to share his experience, and he has done that by consulting with a number of centers interested in performing similar transplants. Dr. Bharat and a team of clinicians and researchers at Northwestern published a study featured on the December issue cover of Science Translational Medicine that demonstrated how COVID-19 causes permanent lung damage and how transplants can be a solution for such serious injury.

"One of the things that this paper and our work has shown is a paradigm change in the context of lung transplants," Dr. Bharat said. "Lung transplants have not been considered to be a treatment option for patients with end-stage lung disease resulting from infectious causes." It is his hope that the findings not only help more patients recover from COVID-19 but also help push the field forward.

"As a medical community, when we get a roadblock and we face a problem for which the textbooks don't have an answer, we have to always try to go beyond and think of how to make the difference, that should be part of our daily approach," Dr. Bharat said. "Because of the tremendous pressures that we have as healthcare providers and so many competing risks, the drive to innovate goes down quite a bit. If we can make a little innovation in small ways—it doesn't have to be a double-lung transplant—I think we can make the care of our patients substantially better."
IT IS THE FINAL WEEK OF 2020, AND MARIE R. BALDISSERI, MD, MPH, FCCM, IS EXHAUSTED. Sure, there is the mental drain from a year unlike any she has ever experienced as an intensive care unit (ICU) physician, but at the moment it is the physical fatigue that is wearing on her. Dr. Baldisseri is used to swimming one mile every day, the equivalent of roughly 70 laps in the pool. But today, she manages just a single lap before shortness of breath forces her to stop. An internist at University of Pittsburgh Medical Center (UPMC) Presbyterian Shadyside in Pittsburgh, Dr. Baldisseri is one of approximately 20 million people in the United States who tested positive for COVID-19 in 2020. It’s been seven weeks since her initial diagnosis, and this is the first day she has even thought about trying to get back in the pool.

“There are very salient reminders that the disease isn’t gone yet,” she said. “It’s left some things in its wake, which is very different from any other illness I’ve ever had. It’s scary because you feel a little bit helpless. You want to push yourself, but you don’t want to push yourself to the point where you take two steps back.” Dr. Baldisseri is confident she will recover, unlike the more than 2.5 million people worldwide who have died in 2020 from COVID-19. Her story, however, remains a cautionary tale of how quickly and dramatically COVID-19 can wreak havoc.

Dr. Baldisseri saw the impact of COVID-19 earlier than most in the United States. In March 2020, as northern Italy struggled with a surge of COVID-19 patients, Dr. Baldisseri was consulting with Istituto Mediterraneo per i Trapianti e Terapie ad Alta Specializzazione (ISMETT), a transplant hospital in Palermo in southern Italy. With her background in global health and disaster medicine, she was helping the hospital manage its surge capacity and prepare for what felt like an inevitable rise in cases.

For many years, Dr. Baldisseri has served as an educator for SCCM’s Fundamental Critical Care Support programs. In 2010, she led a team of critical care professionals to Haiti after its devastating earthquake, and in 2012 she served as editor of SCCM’s Preparing Your ICU for Disaster Response. She was scheduled to travel to Italy and offer aid on site, but travel restrictions prevented her from going abroad. Instead, she offered virtual assistance and helped ISMETT prepare for the patient surge by helping with management of staff, space, and equipment.

Unfortunately, as the number of cases in Italy improved, the number in the United States worsened. Dr. Baldisseri joked with a colleague in Italy about needing the Italians to now turn around and offer surge management advice to Americans, but in reality she recognized it was no joking matter.

“We all knew that it was going to be terrible,” she said. “I’ve lived through [Middle East Respiratory Syndrome], I’ve lived through [severe acute respiratory syndrome], I’ve lived through H1N1. I wasn’t a novice when it came to critically ill patients with viruses. It was pretty clear to most of us that this was going to be a really bad virus.” Dr. Baldisseri figured it was only a matter of time before she tested positive for COVID-19. As an ICU physician, she spent months in contact with COVID-19 patients. She was vigilant, though. She washed her hands. She always wore a mask. She did what she could to stay safe.

Initially, Dr. Baldisseri was not even sure she had COVID-19. She had muscle aches, low blood pressure, and a fever, but she came up with excuses that explained each symptom. It was only when her husband, Srinivas Murali, MD, who has never called in sick to work in his entire career, said he could not work that she
realized they both likely had COVID-19. On November 12, her self-diagnosis was confirmed.

The fatigue she felt was unlike any she had ever experienced before. Simply getting up off the couch or out of a chair required tremendous amounts of energy. She has asthma and she was concerned that the virus could cause her asthma to spiral out of control. She contacted her pulmonologist, who prescribed a steroid as a preventative measure. Dr. Baldisseri routinely checked a pulse oximeter at home to analyze her blood oxygen levels, and she clearly saw that her oxygen saturation was not improving with the steroid. She told herself that her asthma was causing this, but five days after her positive test, she called her pulmonologist. He told her what she did not want to hear.

“This isn’t your asthma, you need to come to the hospital,” Dr. Baldisseri remembered him saying. “For me, that was a defining moment.” She was admitted to a room on one of the hospital’s COVID-19 floors. One of her symptoms was vasoplegia, which caused her blood pressure to continually drop. Her team balanced the amount of fluid administered to her to allow her blood pressure to increase without allowing the fluids to leak into her lungs. Her team monitored her heart rate. They thought that, as long as she was able to communicate with people, she should be fine. Her blood pressure did increase, and she was feeling good—so good that she asked if she could take a shower.

That was a mistake. Although her blood pressure had improved, it still was below normal. Her low blood pressure combined with the hot water from the shower caused her to collapse. A rapid response team was alerted and Dr. Baldisseri was resuscitated. Thinking back on the experience still makes her cringe.

“You’re naked in the shower and 12 to 15 people come rushing in, and it’s just not an experience you want to share with people,” she said. She was groggy after the incident, but she clearly heard her attending physician say that she should be fine. Her blood pressure did increase, it still was below normal. When the attending physician disagreed, he followed her wishes. Dr. Baldisseri confessed that she was trying to direct her own medical care instead of listening to the experts around her. In hindsight, she realized her irrationality.

“Being an ICU physician for so long and seeing so much death in the ICU, I was petrified,” she said. “I thought, if I go to the ICU, I’m going to die.” Fortunately though, this self-diagnosis was correct. She began to improve, and within a week she would be discharged. But before she was discharged, she received a call from her husband saying his oxygen saturation level was concerning and that he was going to drive himself to the hospital. With the shower episode still fresh in her mind, Dr. Baldisseri insisted he call emergency medical services instead.

Dr. Murali was taken to the hospital and immediately admitted to the ICU. He did not require a ventilator but remained there for more than 10 days. By that time, Dr. Baldisseri had been discharged. Beyond her own health, she was most focused on the well-being of their three adult children, none of whom are in medicine and are not used to seeing their parents sick.

“For them to have two parents critically ill at the same time, I tried to keep them from losing it,” Dr. Baldisseri said. “When I look back on it, the hardest thing we had to do was to try and keep our family sane. That was hard.” One of the ways she coped with her experience was by talking about it, something that was surprising for her. UPMC offered physician support services before the COVID-19 pandemic, but Dr. Baldisseri had never taken advantage of them. She received a call from an emergency medicine physician as part of a physician support group, and they started to talk. This became a daily routine and Dr. Baldisseri quickly began looking forward to it.

“She was separate from the situation, but understanding,” Dr. Baldisseri said. “She wasn’t a member of my family, she wasn’t a friend, she was a voice on the phone. It really helped me a lot to be able to talk with someone. It was really life-saving.” Her COVID-19 experience has been educational for her in ways that she never imagined. She has spent her career working with critically ill patients, but it was not until she became a patient herself that she truly understood the anguish they often face.

“What I’ve learned is tremendous humility,” she said. “Our patients go through an incredible ordeal, and as empathetic as we are to their plight, until you’ve been a patient, it is hard to relate. I’ve always considered myself sympathetic to ICU patients and the indignities they have to suffer, but I certainly am more aware of it now, and I know, and hope, that will make me a better physician.”

SCCM COVID-19 RESOURCES

sccm.org/disaster/covid19

SCCM is rapidly developing and deploying resources to respond to coronavirus disease 2019 (COVID-19).

Access:
• Complementary training for non-ICU clinicians to prepare treating critically ill and injured patients.
• The latest COVID-19 research and articles from SCCM’s critical care journals.
• Thought leadership articles on the most pressing issues.
• Well-being and burnout management services.

COVID-19 RAPID RESOURCE CENTER

sccm.org/covid19rapidresources

The COVID-19 Rapid Resource Center offers:
• More than 600 educational articles, presentations, webcasts, and microlearning developed specifically for clinicians.
• Relevant resources curated from the CDC, IDSA, and other organizations.
• Peer reviewed and regularly refreshed content to ensure the latest information.
• The latest COVID-19 research and articles from SCCM’s critical care journals.
THE PREVENTION, RECOGNITION, AND MANAGEMENT OF POST-INTENSIVE CARE SYNDROME (PICS) HAS COME TO THE FOREFRONT IN CRITICAL CARE AND WITH IT COMES THE EMERGENCE OF THE PICS CLINIC. Also known as post-ICU, ICU follow-up, or ICU recovery clinics, PICS clinics are commonly multidisciplinary team clinics developed to address a broad spectrum of unmet needs after critical illness. These clinics have been associated with reduced hospital readmission and reduced time to readmission. They help clinicians gain a better understanding of the patient experience to improve their ICU care. Experts from three organizations shared their experiences and discuss what prompted them to start a clinic and the challenges and successes they have had along their journey.
**Why did you start your PICS clinic?**

**Dr. Sevin:** At Vanderbilt, we had been studying long-term outcomes after critical illness for some time, but in 2011 a family member of our ICU director was admitted to our unit. The struggles they faced after she left the hospital, despite deep knowledge of critical illness and plenty of resources, led us to ask, “If our ICU director is struggling to help a family member after critical illness, what’s happening to the rest of our patients?” That was the final push for us to open the clinic and ask patients who survived the ICU to come back for follow-up.

**Dr. Torbic:** Although we were implementing interventions in the ICU unit to help prevent PICS, we were aware of the high rates of impairment following ICU discharge, which often go unrecognized, so we sought to establish a clinic for ICU survivors to help us identify deficits early so that interventions could be implemented. Because of potential benefits for both patients and caregivers, we felt that a PICS clinic would be a valuable addition to our institution.

**Dr. Rogan:** We developed the program at Penn Medicine because we had a large percentage of patients who survived their ICU stay, and it has been found that more than 80% of ICU survivors experience elements of PICS. One afternoon at our ICU leadership meeting, I asked how those present felt about ICU diaries. Everyone was really excited about the idea, so we pursued it.

**Who comprises your PICS clinic team?**

<table>
<thead>
<tr>
<th>Team Members</th>
<th>Vanderbilt University</th>
<th>Cleveland Clinic</th>
<th>Penn Medicine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical care pharmacist</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Nurses and nursing assistants</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Nurse practitioner</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Respiratory therapist</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Physician, intensivist, pulmonary specialist</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Case manager or social worker</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Psychiatrist or psychologist</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Physical therapist</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Chaplain</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Quality improvement advisor</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

“How do you fund your program?”

**Dr. Sevin:** Our ICU director was an early advocate and sponsor. He helped us secure recurring clinic space and set up staffing, and our team was motivated to integrate involvement in the clinic into their regular jobs. We have no dedicated funding outside of grant funding for specific projects. This has limited us in some ways but has also given us an element of freedom to experiment, change, and grow over the years. With the increased demand for post-ICU care in the setting of COVID-19, we will likely need additional support to care for these patients.

“Another potential benefit is impacting burnout; our ICU staff work so hard with the sickest patients. When we see a patient in post-ICU clinic who is doing well because of the great care provided, it is a powerful motivator for the folks still working hard in the ICU.”

– Carla M. Sevin, MD

**How do you fund your program?**

**Dr. Sevin:** Our ICU director was an early advocate and sponsor. He helped us secure recurring clinic space and set up staffing, and our team was motivated to integrate involvement in the clinic into their regular jobs. We have no dedicated funding outside of grant funding for specific projects. This has limited us in some ways but has also given us an element of freedom to experiment, change, and grow over the years. With the increased demand for post-ICU care in the setting of COVID-19, we will likely need additional support to care for these patients.

**Dr. Torbic:** As we were developing our clinic, we incorporated a financial analyst who helped us develop a budget for our clinic and ensure that all members of our multidisciplinary team had dedicated time to attend clinic. We were able to set up billing for specialists in our clinic. We have been fortunate to have the support of the Respiratory Institute at the Cleveland Clinic and the departments of physical therapy, psychiatry, and pharmacy, who have been supportive of expanding coverage to the PICS clinic. This has allowed us to use our existing staff and resources rather than bringing in additional support.

**Dr. Rogan:** Our medical director received a small grant, which funded our initial purchase of the ICU diaries and provided snacks at our in-person support groups. Once we started receiving feedback about the programs, hospital leadership was willing to fund them.

**What goals or metrics did you define to measure the program’s success?**

**Dr. Sevin:** To me, success is having a patient in front of us whom we can help. It is a lot of work to identify, recruit, and schedule patients, but every single patient we see in clinic has a need we can meet. We have also seen a number of other benefits that can be difficult to quantify: catching safety events, such as abandoned inferior vena cava filters or lines, correcting medication errors, preventing readmissions with timely outpatient care, and connecting patients and families to resources that may help them have a better recovery, or at least avoid coming back to the hospital. Another potential benefit is impacting burnout; our ICU staff work so hard with the sickest patients. When we see a patient in post-ICU clinic who is doing well because of the great care provided, it is a powerful motivator for the folks still working hard in the ICU.

**Dr. Torbic:** Overall metrics used to measure success of our PICS clinic include hospital readmission rate, time to hospital readmission, and number of referrals to additional services.
“By maintaining both in-person and virtual visits, we have been able to see more patients, which is crucial, given the influx of ICU survivors needing ICU follow-up post-COVID-19. The option for a virtual visit also helps patients who are concerned about coming to clinic during the pandemic and patients who live in distant cities or have issues with transportation.”

– Heather Torbic, PharmD, BCPS, BCCCP

specialists or therapists. Additionally, each of the specialty services within our clinic use metrics specific to their department to measure their impact on patients in clinic. For example, pharmacists measure the number of medication interventions they make. Furthermore, we utilize qualitative metrics, such as patients’ and families’ satisfaction. We are closely following our clinic metrics to identify opportunities for improvement.

**Dr. Rogan:** Our goals were to establish the programs and gain participation. We made changes along the way based on feedback from our participants.

**What barriers have you encountered, and how did you overcome those barriers?**

**Dr. Sevin:** There are many. For us, getting patients who can benefit into clinic remains a process, because patients often experience many transitions of care between the ICU and home. But the main barrier is the lack of awareness about PICS and thus the lack of established models to screen for and treat the problems associated with PICS. Patients and families are not always able to connect the problems they are having to their critical illness or the care they received in an ICU. If they are not attending an ICU recovery clinic, the clinicians caring for them may not have a lot of experience with PICS or know how to treat it.

**Dr. Torbic:** Initially, we experienced challenges identifying clinic space and ensuring availability of a large team of busy interdisciplin ary healthcare professionals. Now that schedules and space have been established, our biggest challenges have been identifying the right population to attend our clinic, improving the patient triaging and recruitment process, reducing our patient no-show rate, and maintaining a good flow through clinic to be respectful of everyone’s time. To reduce no-show rates our advanced practice providers have been placing reminder calls to patients and confirming their availability for clinic.

**Dr. Rogan:** Attendance at our groups was low for several months, so I worked harder to recruit participants. I did this by making phone calls, mailing letters, emailing the information, posting flyers that included a QR code to our website, and speaking directly to family members of current patients. I made starting ICU diaries a priority by making it part of my morning rounds on each patient to identify who qualified and who needed one started. Our inclusion criterion is simply having been intubated greater than 48 hours.

**How did you adapt when the COVID-19 pandemic hit?**

**Dr. Sevin:** Luckily, we had already started a telemedicine version of our clinic for ICU recovery when COVID-19 hit, so we were able to continue our ICU recovery clinic apace. The clinic went all virtual for a while, but we are now back to in-person as well as telemedicine visits. We’ve had to expand to accommodate increased demand for post-COVID-19 care.

**Dr. Torbic:** At the start of the pandemic, the State of Ohio issued a lockdown, which prevented us from seeing patients in clinic in person. To ensure that patients still received the appropriate post-ICU care, we began seeing patients virtually via telemedicine. Although we have resumed seeing patients in person in clinic, we still give patients the option of a virtual appointment. By maintaining both in-person and virtual visits, we have been able to see more patients, which is crucial, given the influx of ICU survivors needing ICU follow-up post-COVID-19. The option for a virtual visit also helps patients who are concerned about coming to clinic during the pandemic and patients who live in distant cities or have issues with transportation.

**Dr. Rogan:** The support group went entirely online. Before that we had in-person meetings at the hospital.

**What advice would you offer institutions that are interested in setting up a PICS clinic?**

**Dr. Sevin:** My best advice is to just start. While planning and preparation are important, we learn so much about what patients and families need by seeing them in clinic. An institution can always adjust and change the clinic format to fit the needs of the population it is serving but serving is the surest way to find out what those needs might be.

**Dr. Torbic:** Determine your purpose, identify a motivated team, ensure leadership support, and utilize available resources. As we were creating our vision for our PICS clinic, we met frequently and worked to ensure that we had the right people at the table, as this was essential to our success. Everyone approached the clinic from a different perspective to ensure that all vital aspects of the clinic were considered. We also sought input from other institutions that had already implemented PICS clinics to gain insight on challenges and successes they encountered to help us begin our journey.

**Dr. Rogan:** Understand that you won’t get it right the first time. Be patient with yourself, and adjust every few months, such as changing the time or location of the group to see if you gain attendance. Reach out to members of SCCM or CAIRO, who can also offer advice.
Make Your Impact on Critical Care!

Become a member of the Society of Critical Care Medicine (SCCM) and you will enjoy the many benefits of SCCM membership. Membership benefits include collaboration with other critical care professionals, becoming involved in committees that make a difference, joining a local chapter and specialty sections, accessing Critical Care Medicine, and more. SCCM membership connects you with an extensive network to help you make a bigger impact on patient care.

Choose the membership that is right for you!

- **Select Members**
  - Discounts on SCCM resources
  - Subscription to Critical Connections
  - Access to online collaboration with members
  - Membership in specialty sections
  - Free abstract submissions for Critical Care Congress®
  - Access to more than 1,000 online education materials
  - Subscription to Critical Care Medicine, the #1 critical care subspecialty journal
  - Free standard U.S shipping for online purchases made in the SCCM Store**
  - Opportunities for involvement on committees
  - Eligibility to vote and hold office
  - Eligibility to apply to the ACCM*
  - Eligibility to apply for grants and receive preferred awards
  - Free SCCM live webcasts
  - Early registration for SCCM events
  - Private lounge and invite to special events at Critical Care Congress
  - Free ACCM fellowship for FCCMs
  - Free On Demand products and select ePublications
  - Subscription to an exclusive eNewsletter

- **Professional Members**

- **Associate Members**

“SCCM has really been a highlight of my professional life. It has provided me with an opportunity to work with some outstanding individuals from around the world, all with the same purpose. SCCM is singularly the best society I’m involved with.”

— Pamela A. Lipsett, MD, MHPE, FCCM, Johns Hopkins Hospital

Join SCCM today by visiting sccm.org/join or call Customer Service at +1-847-827-6990.

© 2021 Society of Critical Care Medicine
The Society of Critical Care Medicine, SCCM, and Critical Care Congress are registered trademarks of the Society of Critical Care Medicine.

*American College of Critical Care Medicine application fee included
** Restrictions apply. See website for details.
Managing Refusal to Accept a Brain Death Diagnosis
A Care Ethics Approach

Case
A man in his early twenties was transferred to the intensive care unit (ICU) by his father for a second opinion after sustaining a gunshot wound to the head. Examination on arrival was consistent with severe traumatic brain injury (TBI) and central herniation syndrome. His Glasgow Coma Scale score was 3, he had no response to noxious stimuli, and he had fixed and dilated pupils. However, his gag reflex was intact. Neuroimaging studies confirmed skull bone fractures, intracranial hemorrhage, global cerebral edema, and central herniation.

The neurointensivist described a very poor prognosis to the patient’s father, with minimal hope for regaining consciousness. The father disputed the prognosis and wanted care to prolong his son’s life, including CPR if necessary. Despite maximal medical management, the patient’s neurologic status deteriorated, and his clinical examination later met criteria for brain death. Two separate brain death examinations by different intensivists were performed. An apnea challenge test was consistent with brain death and a confirmatory EEG demonstrated absence of electrical brain activity. The patient was declared dead by neurologic criteria in accordance with the guidelines of the American Academy of Neurology.1

The patient’s father challenged the declaration of death and insisted that the patient be treated aggressively with mechanical ventilation, vasopressors, nutrition, hydration, and antibiotics as his body demonstrated signs of septic shock. Out of respect for the patient’s body and the father’s grieving process, the critical care
team deferred extubation on the evening of his death in the hope that the father would be more accepting the following morning. However, the father demanded indefinite treatment and resisted any attempts at extubation. With significant efforts from social workers and persistent requests for active treatment from the father, who worked for a health insurance company, the patient was accepted at an outside care facility for palliation. He had a cardiac arrest within a few days of transfer.

Ethics Analysis

In this distressing case, the patient has been determined to be brain dead, thus satisfying legal criteria for death. But his father disputes this determination, not on religious or cultural grounds but rather out of profound distrust. His distrust compels him to set aside the medical decision-making partnership of patient (surrogate) and physician and assert his authority over goals and plans of care. He insists on pursuing his son’s recovery, an impossible goal that, strictly defined, is futile. This case occurred in the wake of the highly publicized Jahi McMath case and elicited significant moral distress from healthcare professionals who invested resources, time, and effort caring for the patient’s body for 4 days while the hospital and ICU leadership struggled to develop a process for responding to family requests for indefinite treatment after brain death.

A principlist approach to this case would note ethical obligations to beneficence and respect for the autonomy of a patient. However, given that the patient is dead, what are the intensivist’s obligations for facilitating his autonomy? Had the patient himself espoused religious or cultural objection to death determined by neurologic criteria, the intensivist would do well to engage with surviving family, their religious or cultural authorities, and hospital resources such as spiritual services, social work, palliative care, and ethics to find common ground going forward. Principlism also posits an obligation to distributive justice. This is perhaps perceived more acutely by intensivists than by other physicians. As stewards of the ICU, an intensivist understands that ongoing support of a brain-dead patient’s body potentially displaces an incoming salvageable patient, adds to medical costs, generates moral distress, and disproportionately siphons energy and time from other patients.

However, complex cases like this can also be understood through other ethical lenses. A care ethics analysis would argue that the principlist approach deploys only abstract, impartial rules that miss the unique particulars of each case. A care ethics analysis relies on situated attention—particularly to inequalities imposed by vulnerability and dependence. In this case, rather than framing the father as just an equal partner at the table of medical decision-making, a care ethics approach would uncover more about him and his son, including aspects such as the criminal violence that caused his son’s TBI, the patient’s young age, and his being an only child to a single parent. In a care ethics approach, the special responsibilities the healthcare professionals have in this case would be considered. If these responsibilities are not within the scope of the immediate bedside team, they might be optimally attended to through social work, spiritual care, or with members of the father’s own community.

Care ethics aligns with virtue ethics in emphasizing the necessity for a moral agent to not only morally reason but to also feel morally. This results in decisions and actions that are situationally attuned, accomplished in the right way, at the right time, and with the right motivation. Emotions are complex in this case; the patient’s circumstances evoke compassion and the father’s grief arouses sympathy, but the father’s hostility also triggers a very human fight-or-flight response. Care and virtue ethics call each healthcare professional to transparent self-reflection with others in the moral community. Because this journey is unlikely to arrive at a tidy, unambiguous conclusion, the healthcare professionals will also require care for each other.

Reflecting on the past 50 years, the ethical dilemmas surrounding brain death have evolved from questions about when and how to withdraw or withhold life-sustaining treatments, including basic nutrition and hydration, to how to limit requests for inappropriate care and indefinite accommodation after brain death. The conflict is usually framed as one between ethical principles of beneficence and promoting autonomy. Yet a strictly principlist approach may go only so far. Now healthcare professionals are struggling to balance these same principles with other ethical frameworks such as care or virtue ethics that cultivate attention to the unique situations of an ethical dilemma, emphasize interdependency, and seek to maintain just and caring relationships.

Louanne M. Carabini, MD, MA, FASA, is an anesthesiologist at Northwestern Memorial Hospital in Chicago, Illinois, USA. She has practiced neurocritical care for over 10 years and serves on the hospital Ethics Committee.

Kathy Johnson Neely, MD, MA, HEC-C, is the medical director of the Medical Ethics Program at Northwestern Memorial Hospital in Chicago, Illinois, USA.
Drug Shortages have become pervasive. The ways in which hospitals and hospital systems manage ongoing shortages vary widely across the United States and the world. Unfortunately, these shortages have affected the most vulnerable patients in the intensive care unit, an effect that is exacerbated by the ongoing COVID-19 pandemic. A study found that, from 2001 to 2016, of almost 2000 reported drug shortages, 51% were drugs used in critical care. As critical care professionals, we are forced to pivot frequently to adapt to available medications while minimizing the impact to patient care.

Communicating drug shortages to frontline physicians, advanced practice providers, and pharmacists remains a challenge because the line of communication is large and complex. Information must travel from the manufacturer to the distributor to the system pharmacies to the frontline clinicians and, in many cases, more intermediaries. Outside of an individual hospital or hospital system, drug shortages are initially reported by manufacturers to distributors or directly to hospitals. Often there is no advance warning of a potential shortage to allow hospitals to develop alternative solutions.
plans. The American Society of Health-System Pharmacists (ASHP) held a Drug Shortages Summit, where it was determined that there is inadequate communication of drug shortages and that reports of drug discontinuations or interruptions are usually not received until a shortage has fully evolved.²

However, the Food and Drug Administration (FDA) Safety and Innovation Act, passed in 2012, now requires manufacturers of drugs that are life-supporting, life-sustaining, or used in emergency medical care or surgery to notify the FDA of potential drug discontinuances and the reason for the discontinuance, whether permanent or temporary. Manufacturers must inform the FDA at least six months prior to the date of interruption or as soon as practicable.³ The FDA reports these shortages on its website,⁴ but this reporting relies on manufacturers communicating shortages in a timely manner. The ASHP also maintains a website to communicate drug shortages to hospital systems.⁵

Hospital pharmacies typically have a task force or committee tasked with keeping track of and managing drug shortages. These committees often meet on a weekly basis to monitor current inventory, availability, and trends of commonly used medications. If a pharmacy were to alert frontline clinicians to all of the drugs on shortage, there would be a distinct element of clinician fatigue and the list would likely be ignored. For example, at Northwestern Memorial Hospital, the shortage list routinely contains more than 100 different drugs and is reviewed weekly. The Shortages Committee determines which shortages are severe enough to require a change in prescribing practices and then to be communicated to clinicians. Messaging typically includes the nature of the shortage, the medication impacted, concentration and route of impacted medication, expected length of shortage, and alternatives.

Drug shortages are communicated through several different outlets, with messages tailored to different groups. Shortages can be communicated via team meetings, email, or hospital intranet. The electronic medical record (EMR) system can also be leveraged to communicate shortages by utilizing best practice advisories or including restriction information in the order. However, implementing changes into the EMR can be cumbersome and not worthwhile, especially for shortages that are expected to be short-lived.

Providing quality care during the era of drug shortages is certainly challenging. Managing these drug shortages can be even more challenging and is extremely complex. It is vital that hospital pharmacies not only monitor these shortages carefully but communicate them along with alternatives to frontline clinicians to allow for the best patient care. Relevant shortage information, however, must be targeted to the right clinician at the right time. If the information is not relevant to the clinician, it will be ignored and future updates that may be relevant will be ignored as well.
Anesthesiology Section
The Anesthesiology Section wishes to extend our extreme gratitude and admiration to all of the healthcare professionals dedicating their time and energy to the COVID-19 pandemic. While much of our time has been spent adjusting our critical care practices and focus, the Anesthesiology Section continues to meet and evolve to serve our members’ needs. We would like to thank all of the section members, committee members, and the steering committee members for your participation and hard work during a very challenging time. We hope our ever-increasing member growth and engagement continue.

The Anesthesiology Section had a very productive 2020 and successful engagement in the 50th Critical Care Congress. The Anesthesiology Section Business Meeting took place on Tuesday, February 16, 2021, as a virtual happy hour with breakout rooms for everyone to get to know each other. It was remarkably well attended and resulted in engaged, productive discussions about our future directions while reflecting on our past successes. The meeting was hosted by the Annual Reception Committee, chaired by Talia K. Ben-Jacob, MD, MS, and Chair-Elect Erin Bennett, MD, MPH.

Clinical Pharmacy and Pharmacology Section
The Clinical Pharmacy and Pharmacology (CPP) Section Mentor-Mentee Program provides section members with guidance in a variety of areas. If interested, contact Meagan Latham, PharmD, BCPS, BCCCP (Meagan.Latham@franciscanalliance.org) or Scott D. Nei, PharmD, BCPS, BCCCP (Nei.Scott@mayo.edu).

The CPP Journal Clubs are held on the third Friday of every month at 2:00 p.m. Eastern Time. Watch for announcements of upcoming webinars and microlearning programs on COVID-19. For more information, contact Mojdeh S. Heavner, PharmD, BCPS, BCCCP (mheavner@rx.umaryland.edu) or Melissa Chudow, PharmD, BCCCP (mchudow@usf.edu).

Visit the Research Forum (https://bit.ly/3kInsfGF) to access quarterly Ask Me Anything events, a grant funding database, research discussions, research consultations, and manuscript/grant review services. View the monthly CPP Pharmacotherapy Literature Update on SCCM Connect and Twitter. Contact Alexander H. Flannery, PharmD, BCPS, BCCCP (alex.flannery@uky.edu) or Brandon P. Hobbs, PharmD (brandon.hobbs@orlandohealth.com) for more information.

Patient Safety Updates provide quarterly summaries of patient safety-related literature and alerts and are available on SCCM Connect. Contact Earnest Alexander Jr, PharmD, FCCM (ealexander@tgh.org) or Christy C. Forehand, PharmD, BCCCP (cforehand@augusta.edu) to become involved.

The CPP Practice Advancement Committee is developing a practice-based survey characterizing ICU pharmacy services, a time-motion study evaluating pharmacist-to-patient ratios and burnout, leadership succession pathways within SCCM, a needs assessment survey to prioritize practice advancement initiatives, and a gap analysis of the current state of critical care pharmacy practice. Contact Mitchell S. Buckley, PharmD, BCCCP (Mitchell.buckley@bannerhealth.com) or Christine M. Groth, PharmD, BCCCP, FCCM (christine.groth@urmc.rochester.edu) to become involved.

Nursing Section
We hope you enjoyed this year’s virtual Congress. Thank you to all of the excellent nursing speakers this year. The Nursing Section Business Meeting was held on Tuesday, February 16, 2021. There was a brief section update followed by updates from various subcommittees and breakout sessions for all members.

The section would like to say CONGRATULATIONS to the 10 members of the section who were inducted as fellows in the American College of Critical Care Medicine (FCCM) this year. Involvement and engagement are key components to obtaining this distinction and we are proud to see nurse members obtain this honor. The application for FCCM is currently open.

The section would like to congratulate Lauren R. Sorce, PhD, RN, on her election to the Executive Committee and Sheila A. Alexander, BSN, PhD, RN, FCCM, on her election to the Designated Nursing Seat on Council.

Physician Assistant Section
As the COVID-19 census continues to rise, the Physician Assistant (PA) Section Steering Committee would like to thank all frontline
healthcare professionals for your dedication to caring for the critically ill and injured and wish for your health and safety during these trying times.

The PA Section Mentorship Committee has been hard at work. There has been tremendous interest from section members interested in being a mentor or mentee. Danielle Miltz, PA, has been hard at work making the matches. There are well over 10 pairs so far, and we appreciate all who are participating. If you are interested in becoming a PA mentor or mentee or are just interested in someone to talk to about critical care, please reach out to Danielle at dmiltz@alum.emory.edu.

The PA Section Social Media Committee recently created a Twitter account for posting all things critical care. Please follow @physassistICU to receive the latest updates.

Did you know that many PAs who are members of SCCM are not members of the PA Section? It is free to join and very important to our section. You can easily join by logging in to MySCCM, clicking Update Profile under your picture, and navigating to the Sections tab to add the PA Section. If you have any questions, please reach out to the PA Section Membership Committee, Kathleen P. Thompson, MS, PA-C (parks@bcm.edu) or Sarah Monchar, BA, MS, PA-C (sarahmonchar@hmhn.org).

The PA Section Fellowship Committee has reached out to advanced practice provider critical care fellowship programs across the United States in an effort to strengthen our relationships, offer support, and increase involvement to the next generation of critical care providers. The responses have been great so far.

Congratulations to Susan B. Stempek, PA-C, MMSc, MBA, who was chosen to represent PAs as a member of the prestigious American College of Critical Care Medicine (ACCM) Fellowship Services Committee. Another big congratulations to Scott P. Sherry, MS, PA-C, FCCM, who was selected to be the 2022 vice chair of the ACCM’s Credentials Committee!

Pediatrics Section

The Pediatrics Section Steering Committee hopes that you had a productive 50th Critical Care Congress. While the virtual format might have lacked the traditional face-to-face interactions with our multidisciplinary membership, it created interesting possibilities such as experiencing high-quality content in real time or on demand from the comfort of our homes and offices.

We want to take this opportunity to highlight three members of the Pediatrics Section who received important awards during Congress.

Martha A.Q. Curley, RN, PhD, FAAN, received the 2021 Drs. Vidyasagar and Nagamani Dharmapuri Award. This award recognizes an individual for sustained exemplary and pioneering achievement in the care of critically ill and injured children. Award recipients have distinguished themselves by achieving international professional prominence due to personal character, leadership, eminence in clinical practice, advocacy, and outstanding contributions to the field of pediatric critical care medicine.

Karin Reuter-Rice, PhD, CPNP-AC, FAAN, FCCM, received the 2021 Norma J. Shoemaker Award for Critical Care Nursing Excellence. This award recognizes an SCCM nurse member who demonstrates excellence in critical care clinical practice, education, and/or administration.

Ashok P. Sarnaik, MD, FCCM, received the 2021 Shubin-Weil Master Clinician/Teacher Excellence in Bedside Teaching Award. The Shubin-Weil Award honors an SCCM member who is a role model of excellence in both the teaching and ethical practice of critical care. Dr. Sarnaik embodies all the attributes expected from a recipient of this prestigious award, which is particularly fitting as he retired this year from an illustrious career spanning nearly half a century dedicated to pediatric critical care.

Congratulations Drs. Curley, Reuter-Rice, and Sarnaik!

Surgery Section

The Surgery Section, like all of us, is looking forward to what the rest of 2021 has in store and fervently hopes that the worst of the pandemic is behind us. The recent 50th Critical Care Congress left us inspired and motivated to continue the important work of the section and we hope that you feel the same. Remember, no contribution is too small and there are a multitude of opportunities to participate in the Surgery Section.

The section’s genealogy and historical perspective was presented at Congress and a follow-up manuscript will be published. We hope that this will raise awareness about the amazing things our predecessors have done to advance surgical critical care.

The Education Committee continues to promulgate timely clinical content for our membership and for the broader community via Congress. Upcoming efforts will focus on massive transfusion protocols and other relevant topics. We hope you enjoyed the Year in Review: Surgery. The references can be found on SCCM Connect.

The Membership Committee reached out to all surgical critical care fellowship programs and invited those programs whose directors are SCCM members to participate in the Sponsored Fellows Program (SFP) if they do not already participate. Additionally, all program directors were encouraged to join SCCM if they are not already members and to participate in the SFP. This is yet another example of the benefits of SCCM membership.

The Patient Safety Committee is focusing their efforts on the impact of COVID-19 on surgical critical care and seeking to partner with the vitally important National Trauma Research Action Plan.

The Education Committee wrote the questions for the ever-popular Critical Care Quiz Show held on January 11, 2021. Although this was the first-ever virtual competition, the event was very successful and remained enjoyable to all who participated. Congratulations to all who participated in the contest!
Membership in the Surgery Section is open to all SCCM members. Surgeons should designate our section as their primary section on their personal SCCM profile page. Pharmacists, advanced practice providers, and all others who are interested in surgical critical care are also encouraged to designate our section. All are welcome!

Lastly, The Surgical Section thanks Susan L. Evans, MD, MBA, FCCM, for her steady and focused leadership as Surgery Section chair. We are indebted to her for her efforts, which have kept our section moving forward through very difficult and trying times. We look forward to continued success from our incoming chair, Salman Ahmad, MD, FACS, FCCM.

**Delaware Chapter**

The Delaware Chapter launched in February 2020 just before the pandemic hit the United States. As a result, our plan quickly changed from in-person meetings to Zoom. We have been sponsoring quarterly talks by local experts on critical care, including a talk on extracorporeal membrane oxygenation by Ray Blackwell, MD, and a talk on ketamine for sedation in the ICU by Shriji Amin, PharmD. If you live or work in Delaware, we would love to have you join. For additional information on the Delaware Chapter, please contact Michael T. Vest, DO, at michael.vest72@gmail.com.

**Texas Chapter**

The Texas Chapter welcomed a new year at SCCM’s 50th Critical Care Congress, and we are excited to announce several new leaders. We also presented our annual awards for Outstanding Member and Excellence in Service for the categories of Education, Clinical Practice, and Research. Congratulations to all of the nominees and winners in each category.

The chapter continues to offer high-quality programming to further our mission of providing educational opportunities, professional resources, and a chance for networking with other critical care professionals from across the region in order to improve the quality of critical care. The chapter also distributed treats to various ICUs across the state to show appreciation to our frontline workers. We are excited to start the new year and begin planning our annual symposium and community events. If you are interested in attending the symposium or learning more about the work the Texas Chapter is doing, please visit our website: www.sccmtexaschapter.org. Follow us on Facebook, Twitter @scctxchapter, and Instagram for the most up-to-date notifications of our activities.

**Southeast Chapter**

The Southeast Chapter of SCCM serves Alabama, Arkansas, Louisiana, Georgia, Kentucky, Mississippi, and Tennessee and continues to promote the highest quality of care for critically ill patients.

Our chapter started off this quarter by hosting our annual leadership retreat virtually, allowing our executive board, committee chairs, and site coordinators to meet, brainstorm, and plan for the year ahead.

In September, the chapter was proud to join forces with Sepsis Alliance to promote the Sepsis Awareness Superhero Challenge in the Southeast region. Sepsis Awareness Superheroes from all over the world joined together to raise funds for sepsis awareness and initiatives by completing a mile either walking, running, swimming, dancing, kayaking, or otherwise staying active. Southeast Chapter members raised over $1900, and the chapter was able to contribute an additional $5000 to the cause.

In November, the chapter hosted Lewis J. Kaplan, MD, FACS, FCCP, FCCM, past president of SCCM and professor of surgery at the University of Pennsylvania Perelman School of Medicine. His talk “Viral Leadership” highlighted challenges as well as triumphs of leading during the COVID-19 pandemic, underlining the value of collaboration within each organization as well as between different organizations.

Our chapter remains highly committed to serving all critical care healthcare professionals during this global pandemic, and we are strongly dedicated to creating a medical community that promotes inclusivity and raises awareness regarding social and health disparities in our Southeast region. If you reside in the chapter region and are interested in hearing more about our events and how to get involved, follow us on Facebook or Twitter @SCCMSE or visit our website at sccmse.org.

**Carolinas/Virginias Chapter**

The Carolinas/Virginias Chapter of SCCM continues to support our critical care heroes who have worked tirelessly throughout this year!

We are excited to announce that we have increased the frequency of chapter newsletter publication to every other month in order to increase chapter engagement and communication! Please check out our chapter website at www.cvcsccm.org to find chapter updates about Twitter journal clubs, chapter newsletters, educational opportunities, and committee involvement.

The Mentorship Committee has provided an excellent Mentor-Mentee Program for our chapter. Please contact Melanie Smith, PharmD, at smithmela@musc.edu for more information on how to become involved as a mentor or mentee.

The Carolinas/Virginias Chapter has several committees that provide excellent opportunities for networking, collaboration, and professional growth! These committees include Communications, Education, Membership, Mentorship, Nominations, Outreach, and Research. If you are interested in joining any of these committees or would like more information about how to get involved, please fill out our new “Join a Committee” form on the website’s home page or email cvcsccm@gmail.com.

Please follow us on social media to stay up to date with chapter news! Find us on Facebook at SCCM Carolinas/Virginias Chapter (CVCSCCM) and on Twitter: @CVCSCCM.
SMOFLIPID (lipid injectable emulsion), for intravenous use

BRIEF SUMMARY OF PRESCRIBING INFORMATION

This brief summary does not include all the information needed to use SMOFLIPID safely and effectively. Please see full prescribing information, including Boxed Warning for SMOFLIPID (lipid injectable emulsion), for intravenous use at www.freseniuskabinutrition.com/products/smoflipid.

INDICATIONS AND USAGE

SMOFLIPID is indicated in adults as a source of calories and essential fatty acids for parenteral nutrition (PN) when oral or enteral nutrition is not possible, insufficient, or contraindicated. SMOFLIPID is indicated in adults as a source of calories and essential fatty acids for parenteral nutrition (PN) when oral or enteral nutrition is not possible, insufficient, or contraindicated.

DOSE AND ADMINISTRATION

The recommended daily dosage in adults is 1 to 2 grams/kg per day and should not exceed 2.5 grams/kg per day. SMOFLIPID 1000 mL is supplied as a Pharmacy Bulk Package for admixing only and is not for direct infusion. Prior to administration, transfer to a separate PN container.

CONTRAINDICATIONS

Known hypersensitivity to fish, egg, soybean, or peanut protein, or to any of the active ingredients or excipients.

Severe hyperlipidemia or severe disorders of lipid metabolism with serum triglycerides > 1,000 mg/dL.

WARNINGS AND PRECAUTIONS

• Death in Preterm Infants: (see BLACK BOX WARNING)

• Hypersensitivity Reactions: SMOFLIPID contains soybean oil, fish oil, and egg phospholipids, which may cause hypersensitivity reactions. Cross reactions have been observed between soybean and peanut oil. Signs or symptoms of a hypersensitivity reaction may include: tachypnea, dyspnea, hypoxia, bronchospasm, tachycardia, hypotension, cyanosis, vomiting, nausea, headache, sweating, dizziness, altered mentation, flushing, rash, urticaria, erythema, pyrexia, or chills. If a hypersensitivity reaction occurs, stop infusion of SMOFLIPID immediately and undertake appropriate treatment and supportive measures.

• Risk of Catheter-Related Infections: Lipid emulsions, such as SMOFLIPID, can support microbial growth and is an independent risk factor for the development of catheter-related bloodstream infections. The risk of infection is increased in patients with malnutrition-associated immunosuppression, long-term use and poor maintenance of intravenous catheters, or immunosuppressive effects of other concomitant conditions or drugs.

• Fat Overload Syndrome: This is a rare condition that has been reported with intravenous lipid emulsions. A reduced or limited ability to metabolize lipids accompanied by prolonged plasma clearance may result in a syndrome characterized by a sudden deterioration in the patient’s condition including fever, anemia, leukopenia, thrombocytopenia, coagulation disorders, hyperlipidemia, fatty liver infiltration (hepatomegaly), deteriorating liver function, and central nervous system manifestations (e.g., coma).

• Refeeding Syndrome: Reintroducing calories and protein to severely undernourished patients with PN may result in the refeeding syndrome, characterized by the intracellular shift of potassium, phosphorus, and magnesium as the patient becomes anabolic. Thiamine deficiency and fluid retention may also develop.

• Aluminum Toxicity: SMOFLIPID contains no more than 25 mcg/L of aluminum. During prolonged PN administration in patients with renal impairment, the aluminum levels in the patient may reach toxic levels. Preterm infants are at greater risk because their kidneys are immature, and they require large amounts of calcium and phosphate solutions, which contain aluminum. Patients with renal impairment, including preterm infants, who receive parenteral intakes of aluminum at greater than 4 to 5 mcg/kg/day can accumulate aluminum to levels associated with central nervous system and bone toxicity. Tissue loading may occur at even lower rates of administration of PN products.

• Fat Overload Syndrome: SMOFLIPID contains soybean oil, fish oil, and egg phospholipids, which may cause hypersensitivity reactions. Cross reactions have been observed between soybean and peanut oil. Signs or symptoms of a hypersensitivity reaction may include: tachypnea, dyspnea, hypoxia, bronchospasm, tachycardia, hypotension, cyanosis, vomiting, nausea, headache, sweating, dizziness, altered mentation, flushing, rash, urticaria, erythema, pyrexia, or chills. If a hypersensitivity reaction occurs, stop infusion of SMOFLIPID immediately and undertake appropriate treatment and supportive measures.

• Hepatic Impairment: Parenteral nutrition should be used with caution in patients with hepatic impairment. Hepatobiliary disorders are known to develop in some patients without preexisting liver disease who receive PN, including cholestasis, hepatic steatosis, fibrosis and cirrhosis (PN associated liver disease), possibly leading to hepatic failure.

OVERDOSE

In the event of an overdose, fat overload syndrome may occur. Stop the SMOFLIPID infusion until triglyceride levels have normalized. The effects are usually reversible by stopping the lipid infusion. If medically appropriate, further intervention may be indicated. Lipids are not dialyzable from serum.

REFERENCES:
SMOFlipid®
Lipid Injectable Emulsion, USP 20%

Be **S.U.R.E.** about your lipid injectable emulsion (ILE)

SMOFlipid follows expert recommendations to the letter.

S  Supplement parenteral nutrition with lipids¹
U  Use alternative ILEs as a source of energy and essential fatty acids²
R  Reduce the load of soybean oil³
E  EPA- and DHA-containing ILEs should be considered⁴,⁵

SMOFlipid is indicated in adults as a source of calories and essential fatty acids for parenteral nutrition (PN) when oral or enteral nutrition is not possible, insufficient, or contraindicated. **Limitations of Use:** The omega-6: omega-3 fatty acid ratio and Medium Chain Triglycerides in SMOFlipid have not been shown to improve clinical outcomes compared to other intravenous lipid emulsions. **Contraindications:** Known hypersensitivity to fish, egg, soybean, or peanut protein, or to any of the active ingredients or excipients. Severe hyperlipidemia or severe disorders of lipid metabolism with serum triglycerides >1,000 mg/dL.

**WARNING: DEATH IN PRETERM INFANTS**
- Deaths in preterm infants after infusion of intravenous lipid emulsions have been reported in the medical literature.
- Autopsy findings included intravascular fat accumulation in the lungs.
- Preterm infants and low-birth-weight infants have poor clearance of intravenous lipid emulsion and increased free fatty acid plasma levels following lipid emulsion infusion.

Please see Brief Summary of Prescribing Information including **Boxed Warning** for SMOFlipid on the next page.
References and Disclosures

Pg 8: The Future of Critical Care Medicine


Pg 10: The Future of Sepsis Treatment


Pg 12: What the ViRUS COVID-19 Registry Can Teach About the Future of EHRs


References and Disclosures

Pg 20: Post-Intensive Care Syndrome Clinics: Lessons Learned from Three Centers


Pg 24: Managing Refusal to Accept a Brain Death Diagnosis: A Care Ethics Approach


Pg 26: Importance of Effectively Communicating Drug Shortages