Critical Care Medicine: Lessons From an Unprecedented Pandemic

COVID Activated Emergency Scaling of Anesthesiology Responsibilities (CAESAR): The CAESAR ICU Initiative

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Why CAESAR ICU?

It was about 10 p.m. EST on a Friday night in late March. My phone rang and "George Williams" came up on the screen. "Ashish, we have an urgent job at hand…"

These are unprecedented times. Indeed, we have now been with COVID-19 for nearly six months or more. We have used different terminology and colloquial language to describe our existence as "the new norm" in various forms. As the SARS-CoV-2 invaded different regions of the United States in early March and escalated to a primary surge, critical care physicians all across the country were forced to work at way beyond their normal capacity. Being anesthesiologists trained in the practice of critical care medicine, we feel uniquely positioned to be the providers best suited to handle the altered pathophysiology that is characteristic of this complex syndrome. While the pandemic wreaked havoc across health systems in the country, we were forced to make decisions we had never made before, and triage resources based on stringent criteria that changed on a daily basis. As the supplies of ventilators and ICU beds dried up, so did another critical resource … the "intensivist." Combined with the knowledge that there was a huge supply/demand mismatch for critical care providers in the U.S. at baseline, the pandemic had now stretched us to our limits (asamonitor.pub/3fYjuAh). Traditional ICU doctors were exhausted, overworked, or themselves a victim of disease and suffering in some combination. As contingency plans developed, to manage the next wave of casualties, we immediately turned to our operating rooms and PACU environments where we could use a fleet of "non-conventional" anesthesia ventilators to salvage the situation. In these settings, our colleagues in anesthesiology were well positioned to take care of these critically ill patients. Knowing this need to rapidly train the large workforce of anesthesiologists in the country to be first responders for critically ill COVID-19 patients, the ASA, APSF, SCCM, and SOCCA rapidly set up a core group that was tasked with the development of an easy-to-use, practical, informative, and broad-based education module for the use of an anesthesiologist not trained in critical care to handle the crisis. The project was aptly named COVID Activated Emergency Scaling of Anesthesiology Responsibilities (CAESAR), or the CAESAR ICU initiative.

Conception of topics

Most topics for CAESAR were simplistically a division by organ systems, in a typical systems-based approach to critical care that all of us have grown up with. We covered everything from the central nervous system, to pulmonology with a focus on the basics of mechanical ventilation, to the cardiac side of things with an emphasis on septic shock and shock secondary to COVID, just to name a few. In addition, we had sections on endocrinology, nutrition, infection management, kidneys, fluids, and hematology as well. Last, but certainly not the least, we covered the ethical issues that seemed so very important in handling these patients with care and compassion as they "die alone" in the ICU. While the anesthesiologist would not be expected to cover ECMO, we did include a brief basics of ECMO so, at the least, screening criteria and basic management skills would be provided. Each of these sections were written up as brief chapters with an aim to have them limited to a couple of pages at most, and attempted to supplement them with an easy-to-comprehend podcast of the covered material in the text, so these could be listened to on-the-go or in dire circumstances in the heat of battle (asamonitor.pub/3kFfGqP).

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Team allocations

Teams were allocated based on self-selected areas of expertise and team members identified during the very first phone call for the group together. If ever a crisis brought together teamwork and commitment, they were here in the CAESAR ICU group. It took just about a week or slightly more to finalize and publish all of our allocated sections and materials on the ASA website, a few more days to record our podcasts, and another two weeks to submit, and very soon afterward to receive acceptance to publish a full manuscript (asamonitor.pub/2FlnwpL). To put perspective to this, please take a minute to ingest this data and timeline and understand that here was a group of critical care doctors that was working, with most being pushed to their limits by the pandemic. We can only but salute the entire CAESAR ICU team

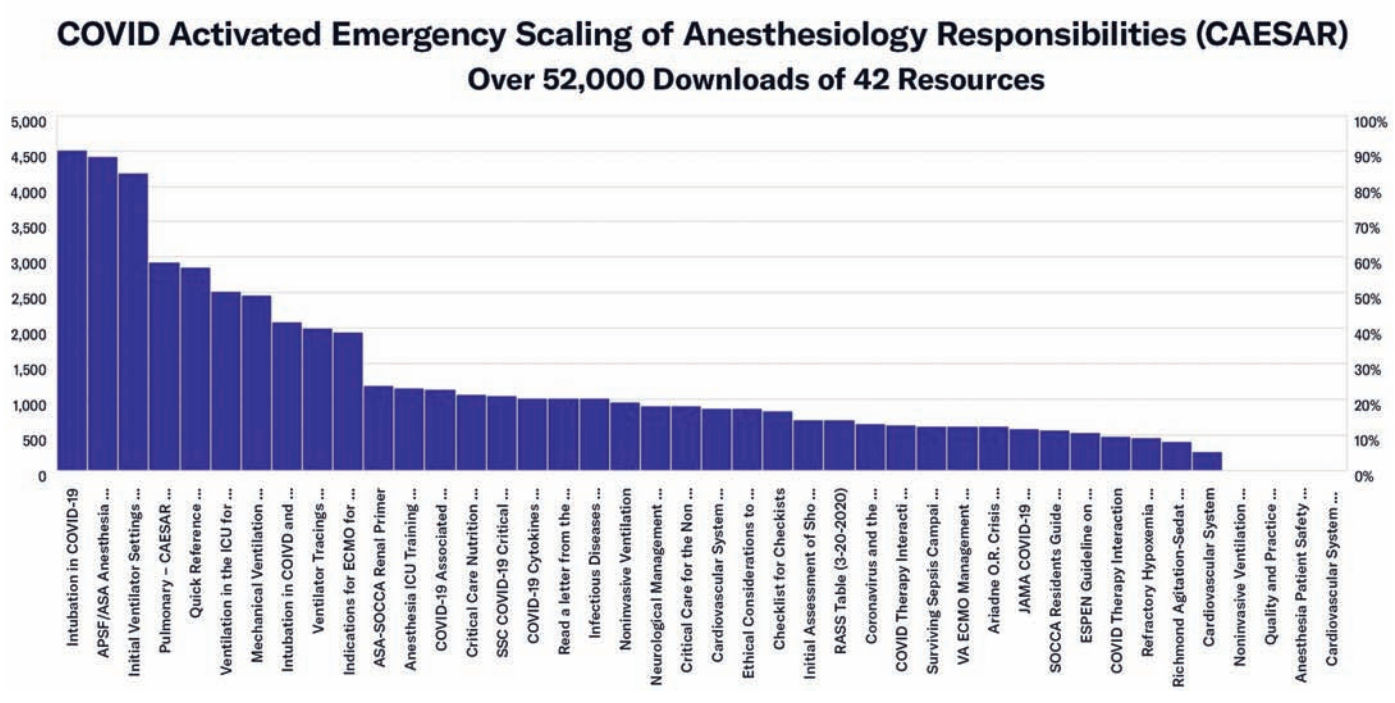

Figure 1: Overall Resource Utilization for CAESAR ICU Components

mentioned below for their tireless efforts in planning, programming, and taking this to completion.

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ASA resource utilization

It was crucial that ASA be involved in the utilization of the CAESAR ICU initiative. Key personnel from ASA staff were involved in the conception, development, and management of the product. Through their direction, the entire initiative was launched within a week on the ASA website and made available free of charge to all ASA members, as well as outside readers.

COVID Activated Emergency Scaling of Anesthesiology Responsibilities (CAESAR)

Top 10 Downloaded Resources		
1	Intubation in COVID-19	4,503
2	APSF/ASA Anesthesia Machines as ICU	4,423
3	Ventilators	4,180
4	Initial Ventilator Settings and Adjustments in the ICU	2,928
5	Pulmonary	2,863
6	Quick Reference	2,529
7	Ventilation in the IC for Anesthesiologists	2,475
8	Mechanical Ventilation	2,090
9	Intubation in COVID and P.F. Ratios	2,010
10	Ventilator Tracings	1,960

Figure 2: Top 10 Downloaded CAESAR ICU Resources

Priority dissemination

Priority dissemination of the product was important; hence, the initiative was also written up as a manuscript and published as an expedited publication in the prestigious and widely respected *Anesthesiology* journal. By ASA statistics, and at the time of the writing of this piece, the CAESAR ICU product (42 resources) was downloaded 52,000 times (Figure 1). The top-10 downloaded resources included mechanical ventilator and pulmonary management of COVID-19 patients (Figure 2) This was an incredible feat and could not have been possible without the constant assistance of ASA staff, who deserve our gratitude. We also initiated a 24/7 hotline staffed by members of the committee to to help manage COVID patients in New York City during the surge. Through this product, we hoped that non-intensivists as well as ICU staff could further the standard care that should be offered to COVID-19 patients in ICUs as well as non-ICU scaled situations such as PACUs or ORs.

COVID-19 has wreaked havoc on society, and health care workers have risen to the challenge with courage and poise. CAESAR was a great initiative and team endeavor that shared knowledge and practice principles across specialties and made these available as expeditiously as possible within and without the ASA membership to all health care workers alike. While we sincerely hope that our colleagues in anesthesiology would best utilize these resources, we certainly encourage utilization from all critical care providers with the ultimate aim of improving patient outcomes. ■

Mobilizing Resources for the General Anesthesiology Community

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As the COVID-19 pandemic spread quickly, a shortage of personal protective equipment (PPE) compromised efficient patient care and provider safety (*Lancet* 2020;395e90-1). Across the country, coalitions of volunteers, including designers, engineers, and members of the maker community, such as GetUsPPE.org and Make4Covid.co, helped design, manufacture, and distribute essential equipment for health care workers and first responders. With the temporary closure of production facilities and disruption of international supply chains during the pandemic, such efforts enabled the procurement of scarce supplies through creative problem-solving like 3D printing.

Before taking advantage of these resources, health care entities had to account for several issues. For example, demand for PPE needed to be anticipated and products procured through non-standard sources needed to be assessed for compliance with applicable regulatory policies and distributed to the places in need. Anesthesiologists were vital in coordinating these efforts; for instance, by providing input on the design and requirements for equipment. PPE produced and distributed included N95 masks, face shields, powered air purifying respirator (PAPR) hoods, and air pumps. Novel supply chains and local production infrastructure developed during the COVID-19 pandemic could be utilized for health care emergencies in the future. Anesthesiologists, in collaboration with the greater community, played a pivotal role in the creation of these innovative product solutions.

Mitigating the ventilator shortage

Besides the lack of PPE, there was also a shortage of intensive care unit (ICU) ventilators (*N Engl J Med* 2020;382:e41).

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Some of the institutions located in the epicenters of this pandemic successfully utilized anesthesia machines to support these patients requiring mechanical ventilation. The utilization of anesthesia machines in ICU patients, however, creates specific challenges such as excessive condensation in the circuit and rapid exhaustion of CO_2-absorbers (asamonitor.pub/3kFfGqP). To tackle this challenge, the ASA Committee on Critical Care Medicine established a hotline service consisting of manufacturers and provid-

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