The Covid-19 pandemic has forced medical centers to prepare for a growing number of critically ill patients. To stretch hospitalist and intensivist expertise and deploy additional physicians as needed to the front lines, the Department of Medicine at the Keck School of Medicine at the University of Southern California surveyed its entire faculty confidentially via SurveyMonkey to assess their comfort in performing common intensive care unit related procedures and inpatient care management, as well as their willingness to care for Covid-19-positive patients and their personal risk for severe sequelae of Covid-19 disease. Survey results were used to identify faculty for supplementary training and to devise a schedule for deployment in response to surges in Covid-19 admissions.

With more than 7 million cases of coronavirus across the United States and more than 200,000 deaths as of the end of September 2020, the Covid-19 pandemic has forced medical centers to prepare for the growing numbers of critically ill patients infected with this disease. As a result of an increase in hospital and Intensive Care Unit (ICU) admissions, health systems have had to stretch hospitalist and intensivist expertise and find ways to deploy additional physicians to the front line.

As cases started to grow in Los Angeles in March, it was evident that we needed a systematic process to deploy non-intensivists and non-hospitalists to the frontline. The problem, however, was not an easy one to solve. At that time, little was known about viral transmission, and guidance around personal protective equipment (PPE) and care strategies was constantly evolving. Furthermore, reports out of China, Italy and Spain reported high transmission rates to health care workers, ultimately impacting the delivery of care to patients. To prepare for the surge of patients, we developed a department-wide, dynamic faculty surge plan.
The Landscape

The Department of Medicine (DoM) at the Keck School of Medicine of the University of Southern California consists of ten divisions and more than 300 faculty members. Our faculty work in two distinct health systems, the Los Angeles County (LAC) +USC Medical Center and Keck Medicine of USC, each with separate leadership, structures, and processes. LAC+USC Medical Center is a 600-bed public hospital and is the largest safety net hospital in Los Angeles. Keck Medicine of USC comprises three hospitals: 300-bed Keck Hospital of USC, 60-bed Norris Cancer Hospital and 158-bed Verdugo Hills Hospital. A tertiary/quaternary referral center, Keck Hospital cares for patients with complex medical and surgical problems and performs heart, lung, liver and kidney transplantation. The Norris Cancer Hospital is part of the Norris Comprehensive Cancer Center and provides cutting-edge cancer treatments.

Guiding Principles

Minimizing harm and maintaining the safety of our faculty and patients formed the bedrock of our surge deployment process. To guide our decision-making, we anchored our plan around four principles. First, the deployment process had to protect faculty and trainees who were most vulnerable to negative sequelae of a SARS-CoV2 infection. Second, clinical services not related to Covid-19 care needed to be appropriately staffed so as not to compromise usual patient care. Third, faculty would be prioritized to areas that align closely with work they already do. And last, the partnership between department leadership, division chiefs and program directors was essential to the deployment strategy, because they have the most comprehensive understanding of clinical operations and the specific skills of their faculty.

Provider Assessment

The DoM designed a brief survey for faculty to self-assess their comfort in the following areas: performing common intensive care unit (ICU) procedures, ventilator management, proficiency in care coordination, family meetings, electronic medical record documentation and order entry. (Table 1) They were also asked about their willingness to care for Covid-19 positive patients and their risk for severe sequelae of Covid-19 disease (Figure 1). Using SurveyMonkey, the survey was sent to DoM faculty and results were kept confidential and only shared with the division chief. There was a 93% response rate. The survey is available as an appendix.(Appendix)
# Table 1. Key results from the faculty survey regarding proficiency of clinical skills needed

| ICU-Specific Skills                              | Proficient % (#) | Need a refresher % (#) | Limited or no experience % (#) | Total (n) |
|-------------------------------------------------|------------------|------------------------|---------------------------------|-----------|
| Airway management including intubation          | 7.64% (23)       | 20.27% (61)            | 72.09% (217)                    | 301       |
| Central line insertion                          | 14.62% (44)      | 38.21% (115)           | 47.18% (142)                    | 301       |
| Arterial line insertion                         | 16.28% (49)      | 32.56% (98)            | 51.16% (154)                    | 301       |
| Mechanical ventilation management               | 13.04% (36)      | 34.06% (94)            | 52.90% (146)                    | 276       |
| Hemodynamic management                          | 33.11% (97)      | 27.99% (82)            | 38.91% (114)                    | 293       |

| Other Clinical Care Skills                      |                  |                        |                                |           |
|------------------------------------------------|------------------|------------------------|---------------------------------|-----------|
| Input necessary documentation (H&P, progress notes, etc.) in the EMR | 79.39% (235)     | 8.45% (25)             | 12.16% (36)                     | 296       |
| Order entry into the EMR                       | 72.73% (216)     | 13.13% (39)            | 14.14% (42)                     | 297       |
| Conversation with patient and families regarding care plan and prognosis | 82.94% (248)     | 5.35% (16)             | 11.71% (35)                     | 299       |
| Clinical evaluation via telemedicine           | 50.90% (141)     | 17.33% (48)            | 31.77% (88)                     | 277       |

Source: Department of Medicine, Keck School of Medicine
Needs Assessment: Care Domains

As part of the planning process, we identified all the care domains in both health systems in which faculty would need to be deployed in the event of a surge, as well as the level of risk of exposure to Covid-19 in those domains. A total of six care domains were identified with increasing risk of exposure to Covid, including outpatient telemedicine, outpatient in-person visits, inpatient non-Covid-19 hospital medicine, inpatient non-Covid-19 ICU, inpatient Covid-19 hospital medicine, and inpatient Covid-19 ICU.

Responses from DoM Survey Regarding Care for Covid-19 Positive Patients

Are you greater than 65 years old, immune compromised, and/or have pre-existing conditions that preclude you from providing direct clinical care?

- I am not a clinician: 10%
- Yes: 17%
- No: 73%

Are you willing to provide direct clinical care to COVID-19 patients?

- I am not a clinician: 12%
- Yes: 37%
- Only if absolutely needed: 42%
- No: 9%

Source: Department of Medicine, Keck School of Medicine
NEJM Catalyst (catalyst.nejm.org) © Massachusetts Medical Society
Risk Stratification and Personal Characteristics

The next step involved matching information gained from the survey with the specific roles and responsibilities of faculty members. Using survey information, division chiefs were asked to rank each faculty member from 1 through 6 in each of the care domains based on the individual’s suitability. The process considered a faculty member’s willingness to care for Covid-19 patients, personal circumstances that limited a faculty member’s ability to work in certain care spaces (including health-related issues or family situations), and their best place to provide care in the different domains (e.g., telemedicine, critical care). Faculty were ranked highest in care domains where their skillset was best suited to match the need of the environment. Faculty who it was felt should not work in a particular care area were ranked “N/A” in those domains.

Preparing Faculty for Deployment

The lists supplied by the division chiefs were centrally maintained in the department. To ensure faculty members would be successful in their area of deployment, the hospitalists and intensivists created orientations to the Covid-19 patient care areas and designed processes and protocols that would support physicians unfamiliar with those clinical spaces. We used Microsoft Teams as a web-based collaboration tool and regularly updated the “Covid-19 Updates and Communication” team folder with the most current processes and protocols related to Covid-19 care practices. Also, physicians who were best suited to be deployed to the ICU were prioritized to receive “Critical Care for the Non-Intensivist” training organized by the Division of Pulmonary, Critical Care and Sleep Medicine (PCCSM).

“

To ensure faculty members would be successful in their area of deployment, the hospitalists and intensivists created orientations to the Covid-19 patient care areas and designed processes and protocols that would support physicians unfamiliar with those clinical spaces.”

Each week, division chiefs provide a list of faculty members who are available for “surge duty.” In order to minimize the stress of having to learn new and evolving Covid-related processes at each of the institutions, faculty were assigned to be deployed in the health system where they felt most comfortable and practiced most often. Faculty were then slotted into a backup schedule by location, based on their suitability to each care domain. The backup schedule was published weekly for deployment the following week when cases were rising.

Collaborating Beyond the Department

Leveraging expertise beyond the DoM was important to support non-intensivists in surge deployment. We collaborated with the Departments of Surgery and Anesthesia to develop specialized airway and procedure teams to support the frontline intensivists in the ICU. Intensivists
from all departments came together to discuss the literature, develop protocols, and align practices so that care could be seamlessly provided regardless of the intensivist’s primary specialty.

**Determining Surge Status and Deployment Schedule**

The stress experienced by the DoM was determined by both the number of patients in each of the hospitals and the providers available to care for them. Keeping a pulse of the patient needs in both care settings was important to managing the appropriate deployment of faculty.

We worked with leaders in both health systems to understand how each hospital was going to increase the capacity of Covid-19 ICU beds. The Divisions of General Internal Medicine (GIM) and PCCSM then developed a faculty surge model based on the number of beds to match the increased capacity.

With early reports from China and Italy communicating increased SARS-CoV-2 infections amongst healthcare workers, we developed a method to gauge the stress that GIM and PCCSM faculty were experiencing due to workforce attrition. Faculty members who were directly exposed to Covid-19 patients were being placed in quarantine for 14 days during the first 6 weeks of the pandemic. The “stress” within the divisions was determined by color (Table 2). The surge plan would be activated when the stress within GIM or PCCSM was red. When the workforce was determined to be at black (the highest stress level), we would reach out to faculty outside of the DoM. Each color category was coupled with assigned action items related to communicating the current status to faculty and preparing for the next stage of the surge.

Information regarding patient numbers from each health system and the “stress” within each of the divisions was gathered twice a week. The data were then presented to the DoM division chiefs

| Level       | Description                                                                 | Action                                                                                                           |
|-------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| White       | Normal operations “Pre-Covid-19”                                            | None                                                                                                             |
| Green       | “New Normal” operations with adjustments to teams and staff made due to Covid-19. Faculty are being redeployed internally within the division. Do not anticipate needing help. | None                                                                                                             |
| Yellow      | Operations adjusted within the division due to need for additional providers or loss of providers. Covering all services is requiring more ‘stretch’ on the division and the division chief is getting concerned that he/she may not have enough people. Anticipate needing outside help within days to a week if things continue. | • Division chiefs inform Chair and DOM Surge Team that there is an increased possibility of providers needing to be pulled to provide inpatient medical care  
  • VC Q & S and Chair share information to division heads to inform faculty of potential need to activate backup schedule  
  • Division heads give heads up to faculty |
| Red         | Division chiefs no longer have enough staff to support the care that is needed to maintain operations. Providers from other DOM specialties will be needed to continue to provide care in the ICUs and floors | • Inform Chair and Division Heads that backup plan will be activated  
  • Activate back-up plan |
| Black       | DOM does not have providers to support current staffing needs in any of the divisions | DOM Surge planning team will connect with other departments in KSOM and Keck Physician Labor pool to staff inpatient services |

Source: Department of Medicine, Keck School of Medicine
twice weekly as our “Surge Status” so that each division could anticipate how close we were as a system to needing to deploy faculty. (Table 2)

**Putting it All Together**

From mid-April to the end of May, the Vice Chair of Quality and Safety published a list of faculty members available for surge duty. While social distancing practices and stay at home orders initially flattened the curve in Los Angeles, reopening has brought a new influx of patients into our health systems. We continue to monitor the stress across the department weekly and fortunately have been able to manage the increasing numbers without activation of our surge plan. The most significant challenge hospitals face is the inability to predict the need for additional ICU staffing moving forward. In response to the Department’s surge plan, faculty members have expressed gratitude for the level of preparation the Department has done to thoughtfully deploy faculty efficiently in the event of a sudden increase in cases. Our surge plan allows us to quickly identify and deploy additional frontline care providers at short notice during these unprecedented and unpredictable times.

**Appendix**

Faculty Skills Survey

**Santhi Iyer Kumar, MD**  
Vice Chair of Quality & Safety, Department of Medicine, University of Southern California Keck School of Medicine

**Zea Borok, MD**  
Chief, Division of Pulmonary Critical Care & Sleep Medicine, University of Southern California Keck School of Medicine

Disclosures: Santhi Kumar and Zea Borok have nothing to disclose.

**References**

1. Center for Disease Control. 2020, Accessed September 29, 2020, [https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html](https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html)

2. Secon H. 2020, ‘Nearly 3,400 Chinese healthcare workers have gotten the coronavirus, and 13 have died’ *Business Insider*, 4 March, accessed 17 March 2020, [https://www.businessinsider.com/healthcare-workers-getting-coronavirus-500-infected-2020-2](https://www.businessinsider.com/healthcare-workers-getting-coronavirus-500-infected-2020-2)

3. Borghese L, Di Donato V, Ruotolo N, et al. 2020 ‘Nearly 1 in 10 of Italy’s infected are health care workers’ *CNN*, 22 March, accessed 25 March 2020 [https://edition.cnn.com/world/live-news/coronavirus-outbreak-03-22-20/h_e27a10efe9dfe61900b2ae6f3e13189](https://edition.cnn.com/world/live-news/coronavirus-outbreak-03-22-20/h_e27a10efe9dfe61900b2ae6f3e13189)
4. Mantovani C. 2020, ‘Over 90,000 health workers infected Covid-19 worldwide: nurses group’ Reuters, 6 May, accessed 8 May 2020, [https://www.reuters.com/article/us-health-coronavirus-nurses/over-90000-health-workers-infected-with-covid-19-worldwide-nurses-group-idUSKBN22I1XH](https://www.reuters.com/article/us-health-coronavirus-nurses/over-90000-health-workers-infected-with-covid-19-worldwide-nurses-group-idUSKBN22I1XH)