Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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INNOVATION REPORT

Bracing for the Storm: One Health Care System's Planning for the COVID-19 Surge

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Problem: University of Washington Medicine (UW Medicine), an academic health system in Washington State, was at the epicenter of the first outbreak of the COVID-19 pandemic in the United States. The extent of emergency activation needed to adequately respond to this global pandemic was not immediately known, as the evolving situation differed significantly from any past disaster response preparations in that there was potential for exponential growth of infection, unproven mitigation strategies, serious risk to health care workers, and inadequate supply chains for critical equipment.

Approach: The rapid transition of the UW Medicine system to account for projected COVID-19 and usual patient care, while balancing patient and staff safety and conservation of resources, represents an example of an adaptive disaster response.

Key Insights: Although our organization's ability to meet the needs of the public was uncertain, we planned and implemented changes to space, supply management, and staffing plans to meet the influx of patients across our clinical entities. The surge management plan called for specific actions to be implemented based on the level of activity. This article describes the approach taken by UW Medicine as we braced for the storm.

"Plan for what is difficult while it is easy, do what is great while it is small."—Sun Tzu[1 (p. xiii)]

ADDRESSING THE PROBLEM

As the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) pandemic made its way across the globe in the beginning of 2020,[2–4] the University of Washington Medicine (UW Medicine) Emergency Operations Center (EOC) team began early preparations to manage a potential influx of patients. Historically, the focus of our EOC response has been a subduction zone catastrophic earthquake and tsunami scenario. However, since the West Africa Ebola outbreak in 2014, this preparation has included an unprecedented scale of EOC activation exercises and partnerships with governmental and nongovernmental entities across the region. When the first case of the coronavirus disease 2019 (COVID-19) in the United States was identified in Washington State on January 20, 2020,[5] EOC exercises had taken place just weeks prior. Although these past exercises helped us with the initial response and gave us some familiarity with roles within Incident Command, the intense and unique nature of this pandemic proved that these simulation activities only scratched the surface of our preparation needs as an organization and as a region.

The virus quickly spread through the area, and Seattle-King County and surrounding counties became the initial hot spots for COVID-19 in the United States.[6,7] As we prepared to respond to this evolving public health crisis, our health system engaged in all six key areas of The Joint Commission's Emergency Management standards: communications, management of staff, management of resources and assets, safety and security, utilities, and patient management.[8] With regard to communication—in those early days, as the pace of information coming in was fierce, we made rapid policy decisions and quickly disseminated that information to staff, providers, and patients. In managing resources and assets, we quickly developed models to understand our utilization rate of personal protective equipment (PPE), which was critical to understand and manage inventory, request additional supply from the strategic national stockpile, and implement conservation and preservation measures. We realized just how dire a situation we were in when we discovered that a month's worth of pre-COVID-19 PPE was gone within the first five days after we opened up our EOC. With regard to utilities, we converted additional space to be able to support negative air flow. To maintain safety and security, we implemented significant visitor restrictions and symptom monitoring to help guide patient and visitor access in the hospitals and clinics,

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and implemented a mandatory self-attestation screening practice for all employees.

SETTING

UW Medicine is an academic health system based in Seattle that serves a five-state region for quaternary care. The system comprises seven entities: UW Medical Center (Montlake and Northwest campuses), Harborview Medical Center (the only Level 1 adult and pediatric trauma center for the five-state region), Valley Medical Center, UW School of Medicine, UW Physicians (Professional Medical Group), 14 UW Neighborhood Clinics, and Airlift Northwest. Together as a system, UW Medicine provided care for 64,000 hospitalized patients, 1.8 million outpatient visits, and 200,000 emergency department (ED) visits annually in the pre-COVID-19 era. Within UW Medicine, there are 2,400 faculty, 4,800 students and trainees, and nearly 28,000 employees.

APPROACH/ITERATION AND PIVOTS

The extent of emergency activation needed to adequately respond was not immediately known. The evolving situation differed significantly from our prior practiced EOC simulations in that there was potential for exponential growth of infection, unproven mitigation strategies, serious risk to health care workers, and inadequate supply chains for critical equipment. Thus our organization's ability to meet the needs of the public was uncertain. Prior EOC simulations had been focused on how to initiate a response, notify EOC team members, and implement unit/department-specific response details (such as how to organize a patient for evacuation). These simulations were also created with the assumption that the emergency event would be short-lived, which is not the case for a pandemic response. We adapted as quickly as we could by creating long-range EOC staffing and communication plans and building out our EOC teams with members who would not be called back into a clinical care environment as part of the COVID response.

To better gauge expectations in terms of surge and develop targets for potential bed capacity, ICU beds, staffing, and equipment, we engaged the UW Medicine Institute for Health Metrics and Evaluation (IHME) on March 10 to develop a projection model for our system. Rapid initial projections estimated that our health system would need to surge to care for as many as 960 additional patients with COVID-19. We were also provided with projections for a mid-range as well as a low-range scenario, but given the unprecedented development of events at the time, we felt it was most appropriate to prepare using the worst-case scenario projection numbers. Having such numbers helped to guide our planning process as we began to implement significant health care delivery changes.

On March 16, 2020, elective and nonurgent surgeries and procedures were delayed with the intention of increasing internal bed capacity and conservation of PPE. This led to a 65% reduction in surgical volumes at one of our hospitals (UW Medical Center Montlake) and reduced the average daily census to roughly 60% to 70% from baseline across all our hospitals. In addition, rapid transitioning and scaling of clinics to preferred telehealth visits, including credentialing more than 2,000 clinicians, resulted in increased telehealth visits from 200 to 1,500 per day. De novo establishment of drive-through COVID-19 testing sites for patients with mild symptoms was intended to avoid overwhelming clinics and EDs.[9]

Using new information from both the United States and other countries, IHME subsequently released dynamic projections for COVID-19 cases and impact in each state in the United States.[10] These models estimated needed number of hospital beds, ICU beds, and mechanical ventilators. Over the subsequent weeks, it was clear that the physical distancing measures implemented in Washington State were "flattening the curve," giving our health care systems the ability to care for the surge of COVID-19 patients without being overwhelmed.[11]

Oversight

Following the announcement of the first known death due to COVID-19 in the United States at that time on February 28, 2020, and evidence of non-travel-related community transmission,[5,12] UW Medicine implemented a systemwide incident command structure, with each hospital activating its own incident command centers to align and coordinate response within the system. As part of the Hospital Incident Command System (HICS), we organized a subgroup in the Planning Section to focus solely on surge capacity planning across our inpatient and ED settings. We defined discrete phases of surge capacity, extrapolating based on modeling projections additional beds needed by acute care and ICU (Table 1). In our experience, the ability to have internal modeling in addition to regional and national projections for COVID-19 cases was helpful in planning for a potential surge. The level of support required for space, supplies, and staff at each phase could be initiated at the hospital or system level based on need.

Space

Identifying all additional areas in which acute care and ICU patients could be cared for was challenging. These spaces include the existing licensed bed footprint, as well as surge areas that could be leveraged to care for patients in the most efficient and careful way. Considerations for how to define a care area included proximity for code response, ability to cohort for PPE and staffing conservation, clinical infrastructure, and ability to convert airflow to negative pressure. For example, at one of our facilities, one surge area was

Table 1. Discrete Phases of Surge Capacity (Phases 0–3), Based on the Continuum of Standards of Care Definitions, Further Defined by Space, Supplies, and Staff Availability in Acute Care and Intensive Care

Continuum of Care Definitions for Standards of Care	Conventional Capacity: The spaces, supplies, and staff used are consistent with daily practices within the institution. These spaces and practices are used during a major disaster event that triggers activation of the facility Emergency Operations Plan.		Contingency Capacity: The spaces, supplies, and staff used are not consistent with daily practices but provide care to a standard that is functionally equivalent to usual patient care practices. These spaces or practices may be used temporarily during a major disaster event (when the demands of the incident exceed community resources).	Crisis Capacity: Adaptive spaces, supplies, and staff are not consistent with usual standards of care but provide sufficiency of care in the setting of a catastrophic disaster (that is, provide the best possible care to patients given the circumstances and resources available). Crisis capacity activation constitutes a significant adjustment to standards of care.
	Phase 0 Normal ADC by bed type (ICU/Acute Care) prior to March 2020	Phase 1 90% full to set up beds by total and/or by type of bed	Phase 2 When Phase 1 is 90% full, surge into a location that has clinical infrastructure, not part of the staffed bed count	Phase 3 When Phase 2 is 90% full, surge into a location with no existing clinical infrastructure (for example, no medical gases, need to use emergency power).

ADC, average daily census.

created by converting a clinic space to accommodate inpatient care. Unfortunately, this area was geographically farther away from the rest of the inpatient units in the hospital. To support the strategy of cohorting for resource preservation and be in closer proximity for code response, additional rearrangements were made to move long term care patients from their location to the converted clinic space. The long term patient care unit was then subsequently further converted to accommodate COVID-19–related acute care and ICU–level patients. Although we did not need to establish alternate care sites, these nontraditional care settings should be considered as part of any surge response plan.[13]

Supplies

As we considered the existing and alternative locations where patients could receive care, we needed to ensure that appropriate and adequate supplies and equipment would be available in those locations. Table 2 lists the common supplies and equipment that we could allocate to each clinical care space. The clinical operational leaders at each hospital would determine the number and types of supplies needed across the phases of surge.

Improving systems to track and communicate about days of critical supply of all types in inventory was recognized as imperative, but a clear visualization into the days of supply on hand of key PPE items such as various types of masks (for example, N95, procedure masks), eye shields, powered air purifying respirators, gloves, gowns, swabs, disinfecting wipes, hand sanitizers, thermometers, and paper bags in a supply chain dashboard was crucial. In the early days, the lack of such a system negatively affected our ability to plan, and significant resources were ultimately required to achieve this functionality.

Staff

In our staffing projections, in addition to nursing and medical staff, we accounted for patient care technicians, environmental services (EVS), laboratory staff, pharmacy staff, food and nutrition teams, respiratory therapists (RTs), and trained observers of the PPE donning and doffing process that we dubbed "dofficers" who are there for the safety of our staff. Ensuring the safety of our frontline staff as they encountered COVID patients or patients under investigation was a top priority for our organization. We recognize the challenges of adding additional staff, but we believed this was critically necessary to support our frontline team members. In the beginning, our nurses filled the role of dofficers. As we gained more experience with caring for COVID patients over weeks to months, and as we saw the number of COVID patients decline, medical assistants and patient care technicians filled the role as well. The dofficer role occasionally slowed the workflow of frontline team members, but our frontline team members were grateful to have the dofficers there for their personal safety. We deployed the dofficer concept early in our response to COVID, as we felt it was critically necessary to support our staff as best as we could in those early, uncertain times.

For acute care nursing, we planned for redeployment of staff from ambulatory clinics and perioperative areas. For critical care, there were notable anticipated shortages for RTs and critical care nurses. To cover these needs, all clinical staff with previous RT and critical care nursing experience were asked to be part of clinical labor pools, and

Table 2. Common Supplies, Equipment, and Staff Potentially Needed at Each Clinical Care Space

Supplies and Equipment	Staffing
• Alaris channels	• Medical staff
• Alaris pumps	• ICU RN
• Bedpans	• Acute Care RN
• Bed/stretcher	• PCT
• Biohazard bins	• Trained observer ("dofficer")
• Biohazard plastic bags	• ED RN
• BiPAP	• Triage RN
• Cardiac monitors	• ED PCT
• Commodes	• Respiratory Therapy
• Crash cart	• EVS
• EKG leads	• Lab
• Emergency department sani-can	• Pharmacy
• Emergency department triage tent	• Food and Nutrition
• Glide scopes	• Radiology
• Glide scopes disposable blades	
• Glucometers	
• Handheld ultrasounds	
• Heated wash station for tent	
• Isolation carts	
• Linen carts with bags	
• Mechanical ventilators (invasive, noninvasive, transport)	
• Medication crushers	
• Monitor electrocardiogram cables	
• Monitor noninvasive blood pressure cuff cables	
• Monitor pressure monitoring cables	
• Monitor SaO_2 cables	
• Ophthalmoscope/otoscope	
• Overbed tables, Mayo stands	
• Oxygen regulator	
• Oxygen tanks	
• Patient care chairs with built-in dividers	
• Pillows	
• Portable hand sanitizer and mask station	
• Portable, washable patient room dividers	
• Potable water for tent	
• Pyxis/automated dispensing cabinet	
• Regular plastic bags	
• Reusable SaO_2 clip sensors	
• Stethoscopes	
• Suction	
• Telemetry monitors	
• Tele-video chat monitors	
• Thermometers, oral	
• Ultrasound machine for point of care	
• Vital signs monitors	
• Workstation on Wheels	

BiPAP, bilevel positive air pressure; EKG, electrocardiogram; PCT, patient care technician; ED, emergency department; EVS, environmental services.

models where RTs and critical care extenders could work under the direct supervision of licensed RTs and critical care nurses were established. The concept of cohorting COVID patients into a specific unit helped significantly with these staffing models, allowing for better use of nurse (or other staff) extenders, as did PPE training and trained observers. Considerations for where this concept could be employed were ability for the entire unit to be converted to a negative pressure area; reduced training need for ancillary staff (for example, EVS, food and nutrition) to be trained on proper use of PPE; ability of the unit to accommodate both ICU and acute care patients, as necessary; and fewer staff needed as dofficers.

Thankfully, we did not surge beyond Phase 1 at any entity and did not need to redeploy staff from the clinical labor pool into unfamiliar areas. That said, staff who were identified as available to be redeployed to an acute care unit or ICU were trained in preparation for that role and oriented to the unit(s) where they may have been asked to work.

The organization of medical staff during the surge response, including residents and fellows, was inextricably

tied to the plans to expand clinical care spaces across the phases of response. To meet and respond efficiently to provider staff needs across the system, all medical staff and trainees were placed in provider pools to potentially be redeployed based on their scope of practice. When a clinical care area such as the ICU, acute care, ED, or urgent care determined a need for additional provider staffing, one could be readily identified based on availability and temporarily redeployed to that area. This allowed expanded care needs to be distributed across a variety of clinical departments and residency and fellowship programs.

Our approach with attendings and advanced practice providers varied slightly from residents and fellows. For the former group, each clinical department asked everyone to self-rate their ability to work in the ICU, acute care, ED, or urgent care based on their own comfort level to practice independently or with guidance in that clinical space. Given the unique scheduling demands of trainees across a multitude of training programs, we sought to establish a balanced deployment process that used a diverse cohort of trainees across the graduate medical education (GME) community.[14] This prevented any one training program's educational priorities from being overwhelmed by surge response. An electronic Web-based interface was created that allowed training programs to populate individual trainee availability for redeployment in response to surge demands. The training programs could detail future availability, and information could be aggregated across all GME to give a comprehensive view of all residents and fellows that could be redeployed for these efforts. This tool was built by a departmental software developer who works closely with GME.

Residents and fellows could then be reassigned to one of the four clinical care areas based on their scope of practice and daily availability. Both medical staff and resident/fellow provider groups could request to be excluded from this provider pool based on personal health concerns (for example, pregnancy, immunocompromised status, or medical condition). The GME office and central HICS coordinated closely to anticipate needs. The efficiency of the trainee redeployment process was greatly bolstered by the coordinated, aggregated availability data of trainees within the digital platform.

All clinical care areas were designed using a team structure to allow for redeployed medical staff, residents, and fellows to be directed and supported by an intensivist, hospitalist, or emergency medicine attending up to Phase 2 of the surge plan. Given the risks of health care worker infection, the involvement and participation of learners (nursing, medical, and other health professional students) in clinical care was paused for all students.

Evolution

Our surge plan evolved over time in an iterative fashion. It was critical to have discrete and consistent definitions for each phase of the surge response and outline a comprehensive list of support needed to make each area operational (staffing, equipment, supplies, information technology [IT] infrastructure, medical record infrastructure and build-out, and revenue cycle build-out). Within each support category, there was an associated checklist to facilitate an efficient transition to a fully operational patient care area (Appendix 1, available in online article). These included procuring equipment, as identified, for each area; evaluating IT infrastructure and implementing measures to bring the area onto the clinical Wi-Fi system; assessing the medical record system to ensure that the bed was visible and available for a patient to be admitted; and coordinating with the revenue cycle team to ensure bandwidth to support the work associated with additional beds in the system. Our IT team was extremely nimble in response and published its experience on how the IT services were able to support the organizational response to COVID.[15]

Readily outlining staffing needs was complicated and took many iterations as well as broad stakeholder engagement. The ability to flex and adjust based on the latest information coming in and using revised projection numbers as appropriate were vital to the entire process of engaging the leaders and communicating to the frontline providers, staff, and patients.

OUTCOMES

Given how fluid the situation has been, until we were fairly certain that the curve had flattened and we were past the peak phase, we met as a surge planning group every day to update plans, identify staffing needs, train team members to provide clinical care in a new clinical area or location, and make decisions to secure the rental or purchase of specific supplies/equipment. Additional work on space planning has included opening a clinical care tent near the ED to allow for triage and urgent care provision, allowing the actual ED space and its providers to tend to patients presenting with concern for COVID-19 and other medical emergencies. With regard to supplies, we proceeded with purchases and rental agreements for additional beds and cots, as well as purchases of additional supplies listed in Table 2 to support us through Phase 2. Beds, cots, and other equipment/supplies not needed for immediate use were held in storage trucks, and need was evaluated on a regular basis.

A regional COVID coordination center (RC3) was established in our health system, in collaboration with Public Health and our local Healthcare Coalition. The purpose of the RC3 is to function as the central resource in our region and state to facilitate the placement of COVID patients to appropriate and available facilities. The RC3 is housed at Harborview Medical Center, where it also serves as the Disaster Medical Control Center for our region, so the placement of the RC3 here was a natural fit. The support of other health care facilities and of our Healthcare Coalition were, and continue to be, essential to the success of this

operation. For example, when the number of COVID-19 cases rose dramatically in the central and eastern parts of the state, the RC3 helped coordinate the transfer of patients to our region, where there was more capacity, particularly for those patients requiring ICU support.

There were financial and resource use implications of planning for the unknown and bracing for the worst-case scenario as well. The unused cots and bed rentals will be returned, other purchased items will be stored for future use, and delayed procedures and surgeries will be rescheduled to fill unoccupied beds in the hospital. The total toll of such required decisions has led to a financial strain for many health systems trying to find their way back to the new norm.

For staff, we provided training for those who might be redeployed to serve as critical care nurses, developed a just-in-time educational module on critical care for medical staff and residents/fellows, and asked all clinical departments and residency/fellowship programs to speak with their providers about the possibility of being redeployed to a clinical care area where providers are needed within the system. This just-in-time critical care training for noncritical care–trained providers is available on our publicly available COVID-19 resource site.[16]

KEY INSIGHTS/DISCUSSION

At the time of this writing, many states are experiencing a decline in the number of COVID-19 hospitalizations from their peak. Similarly, in the state of Washington, after five weeks of continuing rise and a prolonged plateau phase, we have experienced a gradual decline in the overall number of hospitalizations. As we reflect on the surge plan that was developed, and all the individuals that came together to think through how such a plan would be operationalized, we are thankful for the process and benefits it has brought to our institution to be ready for the next wave of COVID-19 or the next pandemic. That said, the medical surge capabilities and objectives outlined in the Health Care Preparedness and Response Capabilities document published by the Office of the Assistant Secretary for Preparedness and Response do not account for a long-term surge event or the complications of sharing staff and resources, particularly in a resource-constrained environment. UW Medicine did develop specific plans for inpatient and ED operations as recommended in the capabilities guidance. We also shared strategies with other health care partners in the region through meetings facilitated by the Healthcare Coalition and the Washington State Hospital Association. We are grateful the work of our region is very collaborative and allows for information and resource sharing. One example of this collaboration was regarding visitor policies. The Infectious Disease Preparedness and Surge Response section of the capabilities planning guidance recommends collaborating with the health care coalition to ensure uniformity. This strategy proved valuable, as people across our region had similar experiences regarding visitor policies, regardless of which health care facility they visited. Another area in which we excelled was the quick development of infection prevention policies and protocols. The UW Medicine system developed dozens of COVID-19 reference and guidance documents, which have been made available to all health care organizations on a public resource site.[16] Many of these address questions related to surge planning, and select documents related to PPE conservation and allocation can be accessed in Appendices 2–4, available in online article.

Projections and Plans

The natural course and severity of impact of a pandemic are difficult to predict, given the dynamic nature of a novel infection. Thus, as we have seen, projections can vary widely over time as new conditions are incorporated into the model (such as social distancing and mortality rate). Planning for the next wave of COVID-19 or the next pandemic calls for organizations to prepare based on best available projections, but they must also be able to adjust and adapt quickly. Part of the challenge in responding to a global pandemic emergency is that the crisis has an impact on every health care organization, and everyone is challenged with shortages in critical supplies and staff. Thus, it is even more crucial for organizations to have a surge plan in place with defined phases. Each organization will need to determine its own thresholds, but identifying space to surge into—such as the infusion unit and the postanesthesia care unit—or opening up alternate care sites, ensuring a process to redeploy clinical and nonclinical staff to patient care areas, and allocating an appropriate supply of key items are all critical for the plan. Although a disruption to the supply chain can severely affect the amount of PPE available on site, organizations should be able to track number of days of critical PPE in stock and try to maintain a 30-day supply along with mitigation plans to substitute specific equipment as needed. There are calculators available to help organizations determine the number of PPE days on hand,[17] but our supply chain team developed a display dashboard that was available to all clinical and administrative leaders working in the EOC, where the average daily use of PPE over the previous three and seven days ("burn rate") was used to calculate the number of days on hand for individual supply items. In addition, organizations can identify strategies to optimize their existing supply of PPE in times of shortages.[18] Similarly, there can be disruption to the number of available staff and providers. In the case of a pandemic influenza, it has been estimated that up to 35% of health care staff may not be able to work due to personal illness or the need to care for family members or children due to school closure.[19] All planning needs to be developed in conjunction with available projection models, which may depend on factors such as prevalence of the virus in the community and

impact of public health interventions. The planning needs to start early and be updated frequently (and sometimes daily, as was the case in the early days of COVID-19).

We conducted several debriefs with our EOC teams along the way, using the feedback to make adjustments as needed. The top items that came back were a need for more position-specific training in HICS, a more refined process for the expedient implementation of new policies, and improved communications. An in-depth after-action review was conducted with all staff across UW Medicine, and although at the time of this writing we are still compiling feedback, we anticipate similar results.

Guidance and Standards on Preparedness

As part of the planning to respond to emergencies, we believe The Joint Commission can provide additional guidance as part of its emergency preparedness standards. For example, minimum standards can be set for EOC exercises for various emergency situations, including scenarios that have supply chain shortfalls, and guidelines on membership for an emergency management committee. Training for hospital leaders on disaster preparedness and management in HICS may also be helpful. In our experience, using the HICS was very helpful in keeping our response organized, coordinated, and effective, but many of our leaders had completed only the minimum training (Incident Command System [ICS] 100 and 200 online) and had not implemented the roles beyond an exercise environment of a few hours. When we realized that the duration of this emergency was going to be for the long haul, we brought on board multiple team members from throughout the system to serve in roles within the EOC on a rotating basis. We realized early that the response would continue for quite some time, so we trained people three-deep in each of the command and general staff roles to mitigate burnout and account for absences in the event someone became ill. We brought on board an external consultant to conduct initial ICS training for all those who may be called to serve a role in the EOC and may not have had ICS training previously. The consultant also provided job coaching for the first week of response, which proved very helpful to many individuals who were new to EOC operations. The ICS training was felt to be invaluable by many of the participants, and we realized only after this that there were many individuals serving in the EOC at the hospital and entity level who would have benefitted from this training. We also quickly pivoted to running our EOC virtually, to account for appropriate social distancing. We used a combination of Microsoft SharePoint pages and Teams to facilitate information sharing and kept a rigid planning clock of regularly scheduled meetings to maintain awareness and alignment with all initiatives under way for the response. This was an adjustment made in rapid fashion, and our teams were flexible and adapted quickly to the change.

Much guidance has been developed on PPE supply chain, allocation and distribution, conservation and preservation, and reprocessing and reuse.[17,18] The Joint Commission guidance for resources and assets states that health care organizations need to be able to stand alone for 96 hours, without resupply. Recommendations on what items should be stockpiled to facilitate the ability to do this would be helpful in streamlining preparedness. Currently all health care organizations need to individually develop a list they believe to be best. Having an outlined best practice and recommendation would facilitate the development of a standard practice in this area.

As one can imagine, the resources needed to support each phase varied quite dramatically, particularly when we planned the support of Phase 3. The idea of altering standards of care may be foreign to many, even those in health care. We had conversations about the phases of care to inform and plan for the possibility that, at some point, we might not be able to continue to provide conventional standard of care for all patients. We held several educational and information sessions to define and describe conventional care, contingency care, and crisis level of care.[20,21] As we had never been in a scenario in which crisis level of care needed to be considered beyond a tabletop exercise, it was important that our health system leaders, in coordination with Public Health (Northwest Healthcare Response Network—the regional health care coalition), clearly articulate under exactly what situational circumstances the health officer would implement crisis standards of care. Crisis standards of care should be reserved for when all other avenues of response have been exhausted. As such, it is just as important to understand that reusing masks, using medications off-label, and patients sleeping in cots outside of a usual hospital room are not crisis standards of care. These points were emphasized using all of the communication modalities of our organization—general updates on our COVID-19 information website, weekly systemwide town halls, and a video posted by the chair of the UW School of Medicine Department of Bioethics and Humanities.[22] Although these types of decisions on standards of care are made based on the unique circumstances of the event and the location, and nationally many experts have done tremendous work on developing guidelines for crisis standards of care, The Joint Commission has an opportunity to provide additional guidance for hospitals and staff in an effort to facilitate alignment on this topic and ensure that it is addressed within organizational Emergency Operations Plans.

Amid our surge planning, one key message we have consistently conveyed to our providers and staff is that their safety and well-being, along with that of our patients, is our organization's highest priority. Despite all the reports of lack of testing availability and PPE shortages across the country, health care organizations must have critical planning conversations to ensure the safety and success of all dedicated members of the health care team.

NEXT STEPS/CONCLUSION

We were a health care organization in the region where COVID-19 made landfall in the United States, and we braced ourselves for the worst, developing plans for a surge in patient volume and acuity that did not meet the level of initial dire projections. Although we are relieved to see that the peak of the curve was not what we once feared, we remain vigilant and prepared for the pandemic's evolution over time. Even as we prepare to enter into the recovery phase and restart some of the clinical care that had been put on hold, we are mindful of the possibility of a resurgence of COVID-19 in our community, and how quickly we can rescale back up to meet the next surge. The experience and the lessons learned in the first few months, along with the novel ways of better tracking the rate of virus transmission and projected hospitalization and resource utilization rates in the region, will be helpful and should be incorporated into the health care organization's surge management plan.

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SUPPLEMENTARY MATERIALS

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REFERENCES

1. Sunzi. The Art of War, Boston: Shambhala, 2005. Translated by T. Cleary.
2. Zhu N, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med.. 2020 Feb 20;382:727–733.
3. Patel A, et al. Initial public health response and interim clinical guidance for the 2019 novel coronavirus outbreak—United States, December 31, 2019–February 4, 2020. MMWR Morb Mortal Wkly Rep.. 2020 Feb 7;69:140–146.
4. World Health Organization. Novel Coronavirus(2019-nCoV). Situation Report 15. Feb 4, 2020. Accessed 29 September 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200204-sitrep-15-ncov.pdf?sfvrsn=88fe8ad6_2.
5. Holshue ML, et al. First case of 2019 novel coronavirus in the United States. N Engl J Med. 2020 Mar 5;382:929–936.
6. Bhatraju PK, et al. Covid-19 in critically ill patients in the Seattle region—case series. N Engl J Med. 2020 May 21;382:2012–2022.
7. Washington State Department of Health. 2019 Novel Coronavirus Outbreak (COVID-19). 2020. Accessed 29 September 2020. https://www.doh.wa.gov/Emergencies/COVID19.
8. The Joint Commission. Emergency Management standards. 2020 Comprehensive Accreditation Manual for Hospitals (E-dition). Oak Brook, IL: Joint Commission Resources, 2020.
9. Seattle Times Seattle-Area Health Care Systems Begin Drive-Thru Coronavirus Testing for Patients. Blethen R.. Mar 17, 2020. (Updated: Apr 3, 2020.) https://www.seattletimes.com/seattle-news/health/seattle-area-health-care-systems-begin-drive-through-coronavirus-testing-for-patients/.
10. Murray CJL. Forecasting COVID-19 impact on hospital bed-days, ICU-days, ventilator-days and deaths by US state in the next 4 months. medRxiv. Epub 2020 Mar 27. Accessed 29 September 2020. https://www.medrxiv.org/content/10.1101/2020.03.27.20043752v1.
11. Institute for Health Metrics and Evaluation. COVID-19 Projections. (Updated: Sep 24, 2020.) Accessed 29 September 2020. http://covid19.healthdata.org/united-states-of-america.
12. McMichael TM, et al. Epidemiology of Covid-19 in a long-term care facility in King County, Washington. N Engl J Med. 2020 May 21;382:2005–2011.
13. Centers for Disease Control and Prevention. Considerations for Alternate Care Sites. (Updated: Apr 14, 2020.) Accessed 29 September 2020. https://www.cdc.gov/coronavirus/2019-ncov/hcp/alternative-care-sites.html.
14. Meo N, et al. Redeploying residents and fellows in response to covid-19: tensions, guiding principles and early lessons from the University of Washington (manuscript under review). 2020.
15. Grange ES, et al. Responding to COVID-19: the UW Medicine Information Technology Services experience. Appl Clin Inform. 2020;11:265–275.
16. UW Medicine. UW Medicine COVID-19 Resource Site. 2020. Accessed 29 September 2020. https://covid-19.uwmedicine.org/Pages/default.aspx.
17. Centers for Disease Control and Prevention. Personal Protective Equipment (PPE) Burn Rate Calculator. (Updated: Apr 7, 2020.) Accessed 29 September 2020. https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html.
18. Centers for Disease Control and Prevention. Optimizing Supply of PPE and Other Equipment During Shortages. (Updated: Jul 16, 2020.) Accessed 29 September 2020. https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/index.html.
19. Scientific Pandemic Influenza Group on Modelling. SPI-M Modelling Summary. Nov 2018. Accessed 29 September 2020. https://assets.publishing.service.gov.uk/

government/uploads/system/uploads/attachment_data/file/756738/SPI-M_modelling_summary_final.pdf.
20. Christian MD, et al. Introduction and executive summary: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. Chest. 2014;146:8S–34S.
21. Hick JL, Barbera JA, Kelen GD. Refining surge capacity: conventional, contingency, and crisis capacity. Disaster Med Public Health Prep. 2009;3:S59–S67.
22. University of Washington Department of Bioethics and Humanities. COVID-19: Ethics FAQ. Dudzinski D. Mar 27, 2020. Accessed 29 September 2020. https://www.youtube.com/watch?v=6QPwTZIlGNI.