While the death toll from coronavirus disease 2019 (COVID-19) has surpassed 240,000, the less appreciated ravage has been excess morbidity and mortality from patients who have forgone essential care due to patient fears of contracting COVID-19 in health care settings and to policy makers’ restrictions of care activities to ensure capacity for patients with COVID-19.

Preserving that capacity is well intended, but what is missing from the interface between policy makers and the clinician community is a mutually understood framework for contemplating triggers for responsible deceleration of non-COVID-19 activities to manage the community COVID-19 load. In caring for more than 80,000 COVID-19 inpatients in HCA Healthcare’s multistate health system, the 5S Framework—Surge, Space, (life) Support, Staffing, and Supplies—that we developed has proved useful in making such decisions.

**Surge**

The war against COVID-19 begins with data. The concept of “flattening the curve” has entered the vernacular. Although the general goal is that fewer individuals become ill simultaneously, the specific goal is to reduce the surge of simultaneously critically ill individuals who may require intensive care and life-supporting technologies, such as ventilators. However, most projections operate at the national or state level; greater granularity is essential not only to understand rates of infection in a community, but also to specifically predict demand for general medical beds, intermediate and intensive care, or mechanical ventilation. The first “S”—Surge (in the community or relevant catchment area of service)—constitutes the fact base of community-level rates of COVID-19 transmission and surge projections upon which policy and health system operating decisions should be made.

**Space and Life Support**

While optimizing the management of space is a prerequisite to both managing surge as well as scaling up or down other clinical operations, it is in many ways the easiest domain to model. Generally, intensive care unit (ICU) capacity can be enhanced by adapting postsurgical, telemetry, or other environments. Consolidating care for patients with COVID-19 or “cohorting” patients reduces staff, visitor, and other patient exposures to COVID-19, reduces the aggregate use of personal protective equipment (PPE), and increases the proficiency of staff in COVID-19 care. With increasing knowledge of COVID-19’s pathophysiology, proportionally fewer ventilators (and ICU beds) may be required than early in the pandemic, though the use of high-flow oxygen and bilevel positive airway pressure may tax oxygen delivery capacity and intermediate care space. Understanding rates of ventilation among hospitalization rates and community incidence of COVID-19 is critical to projecting ICU needs.

Volume is affected not only by the number of simultaneous patients receiving care, but also by their average length of stay (LOS). In our experience, we are able to describe a linear relationship between COVID-19 patient age and LOS. Every year of additional age adds 0.07 days to LOS, so a 60-year-old patient will require approximately 3 days more inpatient care than a 20-year-old patient.
Staffing

Staffing has proved to be the most complex challenge in meeting the needs of COVID-19 and non-COVID-19 patients alike. Beyond risk tolerance for occupational exposures, underlying caregiver burnout propelled many who were able to retire, take leave, or move to lower-risk roles, especially if they or members of their household were chronically ill or vulnerable because of age. Many mid-career health care workers also experienced the impact of a spouse's job loss, the closure of daycare facilities, and the new burden of remote schooling. Nursing and clinical productivity has been affected by relocation of staff from normal activities and specialties to support less familiar services, including providing COVID-19 care. The learning curve moving from an outpatient environment to inpatient or critical care is steep.

Increased demand for nursing during local COVID-19 surges, in conjunction with accelerated attrition, has led to competition and bidding wars for temporary nurses. One of the unique adaptations has been rehiring retirees to serve as resource clinicians to provide guidance and oversight to relocated staff, especially in specialty areas. In such roles, resource personnel with deep experience in a particular specialty can provide oversight and guidance for nurses, physicians, and other staff who have been relocated from their usual duties, expanding both capacity and competency. Over the past few months, health systems have begun learning how to balance the anticipated COVID-19 patient load with other clinical and operational demands.

Supplies

The COVID-19 pandemic exposed significant vulnerabilities in the global health care supply chain. The combination of geographic and manufacturer consolidation amplified by a decades-long drive to efficiency through just-in-time inventory management ensured diminished surge capacity for PPE and other critical items. Health systems implemented elaborate processes to obtain and manage these supplies. The federally imposed discipline of reporting supply stocks has formalized considerations of patient capacity in the context of fluctuations in community COVID-19 rates.

COVID-19 testing has assumed unique importance in the management of surge capacity. In the absence of rapidly available testing, all “persons under investigation” must be treated as COVID-19 positive, thus consuming similar quantities of PPE until cleared. Health systems’ real-time awareness of resources on hand and incoming supply availability defines capacity for both COVID-19 and other patients.

Conclusions

The 5S Framework facilitates informed and productive interactions between health system operators and policy makers when making critical decisions about meeting community demand for health care resources for COVID-19 and non-COVID-19 patients during surge conditions. Like many innovations defined in battle, it will have utility in contemplating community health care needs assessment now and in the future.
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REFERENCES

