

Rural Healthcare Center Preparation and Readiness Response to Threat of COVID-19

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For years, healthcare systems have attempted to transform themselves into highly reliable organizations. At the onset of the COVID-19 pandemic, the American healthcare industry watched from television screens thinking, “This will not reach us.” And yet, as of March 26, the US had surpassed both China and Italy in total number of confirmed COVID-19 cases.¹ Since implementation of the Affordable Care Act (2010), we have been compelled to adopt the concept of population health and embrace responsibility for the healthcare outcomes of our respective populations. Like many organizations, rural healthcare systems have incrementally transitioned to such a paradigm. Amid the COVID-19 outbreak, it is evident that perhaps we must reach dire circumstances in order to realize that population health management is truly our reality. Therefore, our institution has implemented a broad range of system-wide changes to curtail the spread of this outbreak and anticipate the upcoming needs of the patients we serve.

Our rural, 267-bed, tertiary-care teaching hospital is the primary institution among a 5-hospital healthcare organization—the Guthrie Clinic—which serves approximately 770,000 individuals across 12 counties within the northern Pennsylvania and southern tier New York areas. Located in Sayre, PA, Robert Packer Hospital is the primary institution within a nonprofit organization that serves the region as a level II trauma center and is home to Guthrie Air, a regional aeromedical helicopter program. Our other sites include Cortland Regional Medical Center, Corning Hospital, Towanda Memorial Hospital, and Troy Community Hospital. Together, we offer a wide range of inpatient and outpatient services and perform an average of 19,000 surgical and 16,300 endoscopic procedures annually. We are home to residency programs in family, internal, and emergency medicine, pharmacy, and surgery, as well as fellowship programs

in gastrointestinal and cardiovascular disease. We also serve as a site of clinical rotations for trainees among a broad variety of healthcare fields, including medical students. Within our primary hospital alone, we see an average of 15,500 admissions and well over 1 million clinic visits each year. Our organization employs 6,500 individuals and therefore serves as one of the largest employers in the region.

As early as January, the leadership team at the Guthrie Clinic began surveilling the spread of COVID-19 with 1 dilemma in mind: if this hits us how will we protect our vulnerable population? As cases began emerging in our surrounding counties, our organization mobilized to protect the health of our at-risk patients. In the surrounding counties Robert Packer Hospital serves, 72.3% of patients are Medicare (55.2%) and Medicaid (17.1%), and 45.3% have a household income of \$50,000 or less.² Because our population health strategies specifically address improving the health and outcomes of patients with chronic diseases in light of social determinants, the COVID-19 crisis became the biggest immediate threat to our communities.

IMPLEMENTATION OF SCREENING PROCESSES

To better protect our patients, staff, and providers from exposure to COVID-19, our hospital implemented a screening process in early February for visitors and employees. This screening process evolved over time as more information about the virus became available and national recommendations changed. It began with limiting access for individuals who had recently travelled to China. Screening was then expanded to include individuals who either had a personal travel history or had been in contact with persons who had recently travelled to China, Italy, or Iran. Initially, screening occurred only in areas containing our most susceptible patients—the ICU and oncology wing. This transitioned to our current practice of closing all entrances except 2, where all entering individuals are required to have their temperature checked via an infrared thermometer and answer a screening questionnaire. Those with temperatures above a designated cutoff undergo a medical workup and are

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not allowed into patient areas. Visitation has been incrementally restricted to only allow visitors under exceptional circumstances.

CONSERVATION OF PERSONAL PROTECTIVE EQUIPMENT

Given the severe local and national shortages of personal protective equipment (PPE) such as procedural masks, N95 respirators, eye protection, gowns, and gloves, we have instituted policies to help conserve these valuable resources. By doing so, we hope to prolong our ability to serve the healthcare needs of our region while still providing adequate personal protection to our healthcare providers.

One such guideline describes the appropriate indications to use standard, droplet, or full barrier precautions in order to avoid unnecessary consumption of PPE while ensuring the safety of patients, visitors, and employees in circumstances where the risk of viral transmission is high. Restrictions have also been implemented on the number of providers entering each room. For instance, on the surgical service, only 1 resident may enter the patient's room during morning rounds. Meanwhile, patient evaluations performed as part of surgical consultations are carried out by the senior resident alone. This limits the number of residents each patient is exposed to, and vice versa. Some services have elected to rotate 1 attending physician to round on all patients on service, to limit the number of providers within the hospital. Additionally, fit testing of N95 respirators has been suspended to conserve their use for clinical encounters. Local donations for unused PPE have also been welcomed.

POSTPONEMENT OF ELECTIVE PROCEDURES

To conserve human and material resources and prevent further transmission of coronavirus, prompt de-escalation of elective surgical and endoscopic procedures was initiated. This took place over a 1-week period to allow physicians and other advanced practitioners time to discuss the importance of this decision with their patients. Given the anticipated impact this decision would have on patients and their families, we wanted to allow sufficient time for patients to have their questions and concerns addressed, while formulating alternative treatment plans with their provider. Although this transition has been difficult, by conserving resources in this fashion, we have been able to facilitate uninterrupted execution of urgent and emergent cases. This is expected to gain further importance as the number of confirmed cases of COVID-19 increases across the US.

EXPANSION OF TELEHEALTH

Each clinical encounter with a patient exposes both patient and provider to the risk of viral transmission. Therefore, our organization has significantly limited the number of in-person clinic visits. Annual physicals, routine screenings, and immunizations have been postponed. Long-term, this may be detrimental to patient care and the patient-provider relationship. One means to mediate this impact is through expansion of telehealth. In the past, only postoperative virtual visits were reimbursed by Medicare and Medicaid. However, with the recent approval for telehealth expansion by the Centers for Medicare and Medicaid Services, our organization began using telehealth during routine office visits, as well as uncomplicated postoperative visits and certain new patient encounters. It is our hope that a substantial portion of outpatient care may continue via this mechanism. At present, we have 252 providers actively performing remote office visits, with a total of 415 now having access to the platform. This is compared with only 12 providers previously using the telehealth system (Figs. 1 and 2). This remarkable increase in telehealth providers was accomplished within 10 days, and activity is expected to markedly grow in the coming weeks.

WORKFORCE MANAGEMENT

As alternative means of patient care are used and elective procedures postponed, there is less need for support staff to be physically present within the hospital. To reduce

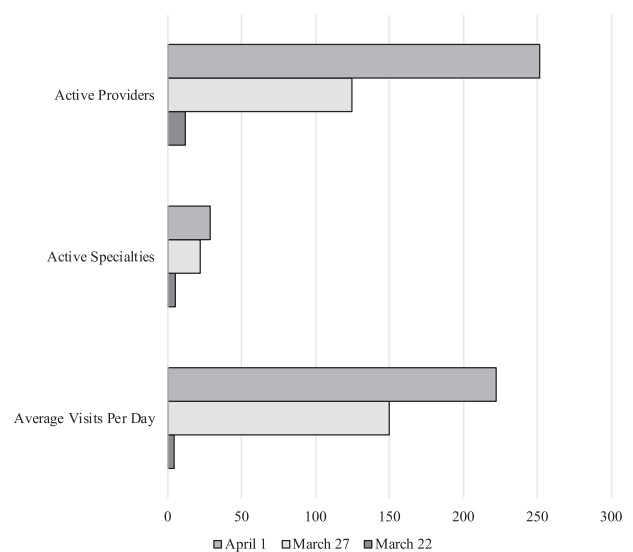


Figure 1. Telehealth capabilities. Demonstration of the rapid increase in the number of providers actively using telehealth in their clinics. Within 10 days, an increase was seen in the number of active providers, specialties, and average patient visits per day.

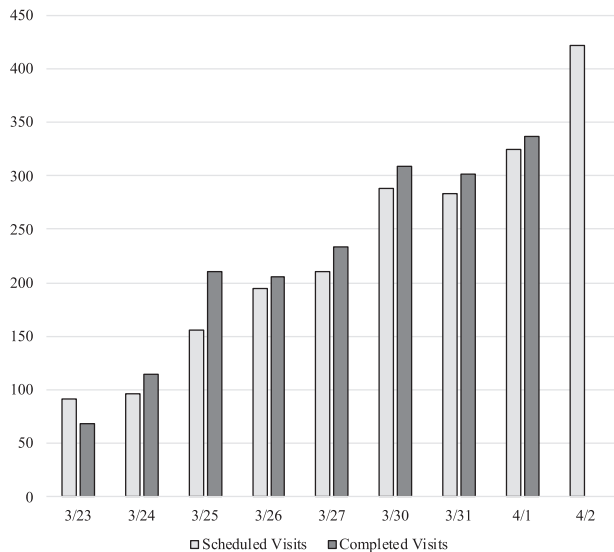


Figure 2. Telehealth visits. As telehealth was expanded across our organization, we saw an increased number of completed and scheduled remote clinic visits.

unnecessary exposure to patients and employees, nonessential personnel have been directed to work remotely. The gift shop, employee gym, cafeteria seating area, and coffee shop have been closed. Ultimately, some outlying clinical offices were consolidated to a single location.

Certain categories of employees were not eligible to work from home. This included employees directly involved in patient care or hands-on support positions. Some employees were reassigned to other departments, thereby maximizing workflow in areas with the highest demand. For instance, several nurses working within the preoperative and recovery areas were redeployed to the ICU, which has seen an increased number of new admissions.

Due to limited parking space, most employees had previously been required to park within an offsite lot and ride the shuttle to the hospital. Parking availability for employees required to be physically present at work has since been expanded to minimize the number of individuals riding in proximity on the shuttle. Additional shuttle restrictions were enforced in accordance with CDC guidelines, to allow no more than 10 passengers per trip.³

SUSPENSION OF STUDENT ROTATIONS

All student clinical rotations have been suspended for a 2-week period, with possible extension beyond this time depending on developments in the upcoming weeks. This suspension applies to observers and students across all fields, including nursing, pharmacy, phlebotomy, physical and occupational therapy, sonography, and

speech therapy, as well as medical, physician assistant, and nurse practitioner students. Therefore, the need arose to supplement their clinical experience with alternative forms of education. We are currently developing new curricula for these students that attempt to mimic the clinical environment. One such addition includes the development of surgical cases for medical students that contain patient encounters spanning from office visits, to preoperative testing, intraoperative decision making, inpatient postoperative care, and outpatient follow-up. Each case develops over the course of 1 week and is pooled with multiple other cases, to capture the day-to-day experiences of a surgeon these students may have otherwise been following.

INCREASED USE OF TELECOMMUNICATION

With many employees and students working and studying remotely, this led to an increased demand for telecommunication. With guidelines to restrict gatherings and number of attendees in group discussions, a system-wide suspension of nonessential meetings and educational conferences was put into effect. This gave us the impetus to explore current resources that would allow essential meetings to continue in alignment with social distancing recommendations. As a test, we performed a mock educational session using the audio/visual conferencing capabilities of “Microsoft Teams” software. This software is available to all our employees by virtue of our institutional Microsoft subscription and had been, so far, an unexplored avenue. After successful completion of this video lecture, we expanded this practice to other meetings and conferences in hopes of continuing discussions pertaining to administrative practices, patient care, resident education, and emergency preparedness.

IMPLEMENTATION OF NEW TREATMENT GUIDELINES

A system workgroup, led by infectious diseases pharmacists and physicians, with multidisciplinary expertise, is leading decisions about therapeutic management. We are cognizant of the paucity of clinical data informing our management decisions. As new data become available practically every hour, we are using any dedicated experts to monitor and assess for necessary changes. Nontraditional sources have become imperative. The international crisis has amplified open science and medical social media, with their benefits and perils.⁴ Critical assessment of evidence and collaborative multidisciplinary decision-making form the backbone of our strategy. Importantly, nontraditional sources and open collaboration with

colleagues inside and outside our rural system have propelled us to be ahead of the preparedness curve.⁵

“SURGE” PLAN

In the event our providers become overwhelmed with COVID-19 patients or become patients themselves, we have instituted a contingency plan to ensure patients continue receiving appropriate and timely care. This involved creating a pool of physicians and advanced practitioners who have volunteered their services in other departments, should those departments suffer shortages due to an overwhelming surge of new patients. This may involve surgical critical care physicians managing ventilators for COVID-19 patients initially admitted to the medical ICU. This may also include primary care physicians evaluating emergency department patients presenting with noncritical or nonsurgical issues. Certainly, much care has been taken to ensure providers are filling roles appropriate to their level of expertise.

The 26-bed ICU at Robert Packer Hospital, which is divided into 3 interconnected sections—surgical, cardiac, and medical critical care—has been modified to better serve the anticipated influx of COVID-19 patients. The medical critical care unit is now an isolated section containing 8 rooms and accepts only patients with suspected COVID-19. Additionally, our intermediate care unit has been revamped to offer the same level of care as the ICU and will be dedicated to COVID-19 patients alone. It has been transformed into a closed unit with negative air pressure and ventilators stationed to handle 12 additional critically ill patients. If needed to expand our reserve of ventilators, we plan to use operating room anesthesia machines and convert some of our BiPAP machines for mechanical ventilation use. Across our organization, we now have a total of 90 ICU beds and 121 ventilators at the ready.

DAILY SYSTEM-WIDE BRIEFINGS

Given that information related to COVID-19 is changing rapidly, the need for dissemination of timely, accurate information to our workforce became apparent. Due to the sheer amount of information available, significant efforts were made to maintain a balance between under-informing our employees vs overwhelming them with an onslaught of information. Therefore, updates to hospital policy and answers to frequently asked questions are delivered via email to individuals within our organization daily by 10:00 AM. For those individuals desiring more frequent updates, this is provided through an online community powered by Facebook that was already well established within our organization. This allows live updates to

be delivered across our organization through a platform with which our employees are already familiar. We have also established 2 information hotlines staffed by hospital employees dedicated to answering questions related to COVID-19. A voicemail has been set up to allow return of any missed calls. By ensuring our workforce is well informed, we hope to curtail some of the anxiety and confusion surrounding this crisis.

DISCUSSION

More information about COVID-19 is being discovered and released daily, even hourly in some cases. Therefore, the response from our local, state, and national governments is in a constant state of flux. As our local region's largest healthcare organization, it is our duty to not only adapt and respond to these updates, but to anticipate the healthcare needs of our population weeks (and even months) in advance and to develop systems capable of meeting those needs during this crisis.

The need to address the severe shortage of PPE remains a prominent feature in the news and social media. Discussions across the nation are taking place regarding the prolongation of the current PPE supply. Out of necessity, some organizations have even begun reusing what little supply they have left or investigating the feasibility of cleaning or resterilizing previously used materials.⁶⁻⁸ This raises concern, given that this equipment was designed for single use. Its viability and safety over the course of multiple encounters has not been sufficiently studied. Some proactive members of the community are crafting homemade PPE, such as masks, to contribute to the cause.^{9,10} Again, while given with good intentions, the effectiveness of this hand-crafted PPE remains unknown. However, when production of these materials fails to meet increased demand and with government response lacking, what are health care organizations to do?

One response has been to cancel elective procedures. The idea is to instead conserve resources for urgent and emergent needs. However, who decides which cases qualify as urgent or emergent? Some guidelines trying to address this concern have been published by national societies such as the American College of Surgeons and the Society of American Gastrointestinal and Endoscopic Surgeons.^{11,12} However, these guidelines leave significant room for interpretation. Therefore, many hospitals have allowed their operating surgeons a certain amount of clinical discretion in what constitutes an elective procedure. While one would hope clinical judgment and professional responsibility remain intact during this time, when faced with patients requiring surgical intervention, decisions to postpone care are not easily made. Such decisions would

perhaps be more straightforward with specific guidance from informed and well-respected sources.

If our nation experiences an exponential rise in COVID-19 cases, as seen in China and Italy, we will be faced with not only a shortage of PPE, but also a shortage of healthcare providers. Either due to a surge in patients requiring experienced care or a dwindling reserve of healthy providers, we may be affronted with a reality in which there are simply not enough physicians, pharmacists, nurses, respiratory therapists, and other skilled healthcare individuals needed to meet those demands. Although our hospital has developed a contingency plan for such a situation that involves providers from other specialties filling this gap, other approaches have been proposed. One proposition allows early graduation of medical students. Indeed, this has already been implemented in Italy, the United Kingdom, and New York.¹³⁻¹⁵ With the advent of new providers entering the workforce and current providers serving in specialties other than those in which they were trained, we must ensure that the quality of care we provide our patients remains high. It will be vital, now more than ever, to maintain appropriate oversight of these individuals by clinicians experienced in their field—both to maintain high-quality training for new providers and to continue the safe, effective, and reliable care our patients have come to expect.

As concerns and restrictions for travel outside the home increase, the wide distribution of those we serve has become an added impact. Our service area has a population density of 77 individuals per square mile. These individuals are spread across a 10,000 square mile region. Although this aids in decreasing the rapidity of COVID-19 spread, it presents challenges regarding ease of access to our healthcare system. The system-wide adoption of a virtual platform has aided us in reaching our most rural patients and has alleviated some of the burden of limited healthcare access within the more remote regions of our service area.

However, with the expansion of remote work, education, and patient care, we have become increasingly reliant on consistent access to high-speed internet to meet our audio/visual needs. Given the rural service area and patient population of our hospital, the expectation that we will reach the entirety of our workforce and patients is optimistic at best. According to one report by the Federal Communications Commission, 35% of rural Americans lack access to high-speed broadband internet, compared to 3% of urban Americans.¹⁶ Therefore, we should be cautious in transitioning to a healthcare system that is overly reliant on remote communication before basic internet access is established for all Americans. Otherwise we run the risk of dangerously excluding a sizable proportion of citizens.

The obstacles we face in the weeks and months to come are certainly daunting. Successfully managing this pandemic will require tough decisions and uncomfortable changes across our nation's healthcare system. Our organization has instituted a wide array of incremental, but significant, changes already, with undoubtedly more to come as this situation develops. It is our hope that through shared experiences, we will be better prepared to respond swiftly and effectively as a nation in response to this crisis.

Author Contributions

Study conception and design: Cagir

Acquisition of data: Florentino

Analysis and interpretation of data: Brown, Guru, Williams, Florentino, Miner, Cagir

Drafting of manuscript: Brown, Guru, Williams, Florentino, Miner

Critical revision: Brown, Miner, Cagir

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