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HEALTHCARE EMERGENCY PREPAREDNESS
INFORMATION GATEWAY

Designated COVID-19 Hospitals: Case Studies and Lessons Learned



Health systems and communities across the U.S. have implemented innovative approaches to respond to the COVID-19 pandemic. One strategy has been to designate a facility within the system or area to exclusively treat confirmed COVID-19 patients. This designation may “help standardize care, optimize resource utilization, and protect non-COVID-19 patients and healthcare workers.”¹

Between September 9, 2020 and October 20, 2020, the ASPR TRACIE team interviewed decision makers and lead physicians at four designated COVID-19 hospitals. The interviews focused on the facilities’ decision-making processes, operations and logistics (space, staff, stuff), and general lessons learned. These facilities were already operational or existing hospitals; they were not “Alternate Care Sites.” Additionally, the entire facility was designated to solely treat COVID-19 positive patients; all other patients were transferred or directed to nearby hospitals.

This document does not discuss the pros and cons of designating a COVID-19 hospital. There was unanimous agreement among the facilities interviewed that designating one hospital within the health system or community was ideal for their circumstances and helped focus COVID-19 care and expertise, personal protective equipment (PPE), and processes/standardized care in one location. It is important to note, however, that this model was applied when a healthcare system had multiple hospitals in a geographic area and could ensure that others could provide emergency and other services without risk to the community. The volume of COVID-19 cases also needed to be high enough to justify continued dedication of the facility. **The following summary of the lessons learned and key planning considerations are relevant to all hospitals designating units for COVID-19 care.**

I. Site Selection

Typically, a designated hospital within the system or community naturally stood out as ideal due to its:

- **Location:** Interviewees selected sites that were centrally located or easy to transfer COVID-19 positive patients to from other hospitals, were located near numerous post-acute care facilities, or typically served a population at high-risk for COVID-19 complications.
- **Existing services provided, patient census/acuity:** Sites selected by interviewees already had a robust on-site infectious disease services including lab, and/or they were able to transfer patients more easily to other hospitals due to lower census or lower acuity patients admitted.
- **Existing infrastructure:** Interviewees considered sites that were able to easily repurpose/reconfigure the existing layout to treat COVID-19 patients, or had recently updated systems/equipment (e.g., ventilation).

¹ Moullick, A., Kilcoyne, M., Do-Nguyen, C.C., and Stevens, R. (2020). *The Case for Designated COVID-19 Hospitals*. CTS Net.

II. Coordination of Care

These considerations focus on patient transfers and coordination of care within the health system. Note that none of the facilities interviewed accepted patients transferred from outside of their system. Examples of how interviewees coordinated care include:

- Patient transfer evaluations from another site to the hospital were done over multiple phone calls with a COVID hospitalist. Facilities assigned a hospitalist as the consultant for each case and once the patient was diagnosed COVID positive, they would be transferred to the hospital. Cases were kept within the health system except pediatric critical patients or cases requiring extracorporeal membrane oxygenation (ECMO).
- All transfers required communication to the transport team and the receiving facility to notify them of confirmed COVID-19 status, allowing for necessary infection control procedures.
 - Facilities did not transfer COVID unknowns; these patients were kept as persons under investigation (PUIs) until test results were complete.
- The hospital established and required transfer criteria to be followed.
 - Transfer Criteria/ Inclusion Criteria:
 - Laboratory evidence of acute infection with pandemic virus (e.g., COVID-19 positive RT-PCR from respiratory specimen)
 - Expected length of stay >24 hours
 - Expected survival >24 hours
 - Medically stable for transfer
 - Medical Orders for Life-Sustaining Treatment/ Healthcare Proxies (MOLST/HCP) required to be in medical record prior to transfer
 - Exclusion Criteria:
 - Patient requires an urgent/emergent procedure or study unavailable at the designated COVID-19 hospital (e.g., cardiac catheterization, ECMO, hypothermia protocol)
 - Age – some COVID facilities only accepted adult patients

III. Space

All the facilities interviewed had to reconfigure or build out within their current space and install new equipment to safely care for patients. The degree to which this occurred and the related timeframe varied depending on the existing infrastructure.

- One interviewee took these steps to reconfigure a four-floor hospital:
 - Turned existing 21-bed intensive care unit (ICU) into all negative pressure. This unit was on the top floor of the hospital and able to be segregated from the rest of the hospital. This unit is still operational now that the hospital is fully open to both COVID-19 positive and non-COVID patients.
 - Created a secondary ICU in the Emergency Department (ED), which was recently remodeled with the ability to convert to negative pressure.
 - Converted to COVID-only in phases. Initially started with the fourth floor and then to the third floor, etc. At the end, all inpatient rooms were transformed to negative pressure rooms.
 - Designated one room in each unit as a staff break room to increase space available for staff to maintain social distance while eating.
 - Designated one unit solely as on-call or shower rooms for hospital personnel.
 - Created equipment rooms from scratch each time a new unit was developed so supplies were inside the isolation area.
- One system used a long-term acute care facility as the COVID-19 designated hospital, and they:
 - Relocated 35 patients to other hospitals in the system.
 - Removed windows from 40 rooms, added blowers, and created negative pressure rooms.

We closed on a Thursday, terminally cleaned the hospital, then built/created this COVID-only hospital in 10 days. We did not open an emergency room and only allowed direct admits from hospitals within our healthcare system.

Being able to open up all ED rooms to negative pressure rooms was a really great thing. Doctors and other staff felt safer working here with negative flow rooms. Would recommend this as a best practice for other facilities. We also knew that we had the flexibility to be able to make them all ICUs if needed.

We did surge up. We went from about 26 beds to over 40 and we need to really look at our respiratory surge. We are an old building, and we need to have better high flow capabilities. And we need to know where we can expand well, but we need to be able to stretch out and then compress very easily.

We were not ready for the amount of equipment needed for each patient. It was a logistics nightmare on where to put all the equipment (e.g., isolation cart, ECMO). They mostly were in the hallways in front of each patient's room and the facility size we have today was inadequate. Our hallways were no longer hallways, they were pathways from one room to another.

We felt that it was important to show staff that we really care about their safety. We showed the staff all the money and resources we put into ensuring staff and patient safety.

We recommend other facilities conduct simulation trainings to shake down what is a best practice and then potentially make it a standard practice.

I am convinced that one of the reasons we had low mortality is because we used nurse anesthetists for airway teams (they were available 24/7). This was expensive, but it paid off.

- Used regular heating, ventilation, and air-conditioning (HVAC) system and standard care for COVID patients who were not in the ICU and did not require aerosol-generating procedures.
- One facility had a large pediatric unit that was converted to care for adult patients with COVID-19. They were assigned pediatric providers a practice partner, enabling them to care for older patients.
- Other strategies used by multiple health systems include:
 - Using existing or rented monitors for ICU rooms.
 - Installing nursing alarms for other units and adding a secondary alarm system so nurses could hear ventilator alarms from outside of the rooms amid the increased noise.
 - Developing zones within facilities:
 - Upon entry, all staff were screened and temperature checked.
 - **Green zone** – infection free area, no patients allowed, staff screened before entering, no PPE use. Used for administrative work and breaks.
 - **Yellow zone** – patients could be transported for tests, staff wore masks and gloves, patients wore masks, maintained as clean environment.
 - One hospital originally used runners to move equipment, labs, and the like from yellow to red zones but there was a concern that they could be exposed.
 - “Hall monitors” guarded the yellow zone to keep clinicians from red zone out. When a patient moved through the yellow zone transporters / runners “handed off” between providers in Red and personnel in Yellow.
 - **Red zone** – COVID-19 positive patients under treatment.
 - Staffed by those keenly aware of good infection prevention techniques
 - Staff in zone did not need to change their PPE from room to room. They could go about the unit freely. This was more efficient and allowed timely care for very sick patients as well as PPE preservation.
 - Post signage and ample training to instill confidence in staff working in the red zone.
 - As an extra layer of protection, use specific checklists (and “PPE buddies” as available) to for donning and doffing to protect against self-contamination.

IV. Staff

Staffing was one of the key constraints and challenges faced by all facilities treating COVID -19 patients. However, as a COVID-19 designated facility, the interviewees felt that they were able to focus training, PPE, specialization, and standardization of care to one facility rather than spreading these things out across multiple hospitals. Strategies for meeting staffing challenges include:

- Bringing staff from other hospitals within the health system to work in the designated facility. For example, one system closed a surgical center due to the decrease in elective procedures and those staff worked at the designated COVID hospital instead. Another system put out a call for volunteers to work in the hospital and one did a survey of staff to determine who was available, willing, and able to work at the designated COVID hospital to bolster staffing numbers.
- Other facilities assessed nurses to determine skills and where/how they could be deployed to the COVID hospital.
- The practice and education team made up their own PPE for training, so they did not burn through actual supplies during donning and doffing training. They train staff virtually each time there are updates to procedures.
- Recruiting issues:
 - Getting out of state staff licensed was challenging, particularly for respiratory therapists.
 - It was much harder to onboard traveling providers.

- Onboarding training included:
 - In-services and observation of PPE donning and doffing. Safety was key and staff were watched carefully until leadership was confident that they could don and doff properly.
 - Powered Air Purifying Respirator in-service training sessions
 - Cleaning techniques (PPE, equipment, surfaces)
 - Retraining staff to make sure they donned proper PPE before running into rooms in response to alarms
 - Conducting simulation training for CPR and intubation best practices and collaborating with other facilities around the state to be consistent on practices.
 - Refresher training as needed for electronic health records and other hospital procedures.
- Surge staffing plan considerations:
 - Repurpose/redeploy staff such as certified nurses and anesthesiologists to be ICU personnel.
 - Add Certified Registered Nurse Anesthetists (CRNAs) and pharmacists to the team.
 - Conduct daily check out rounds to include nursing, pharmacy, and physician teams.
 - Use ancillary staff and do not over burden nurses. One facility noted that they initially asked nurses to do work typically done by ancillary staff (e.g., housekeeping and food delivery), but discovered they were getting burned out quickly. The organization ended up needing more nurses and had to reassess procedures and staffing.
 - Adjust staffing to patient acuity.
 - A typical ICU plan will not work. One facility noted that COVID patients are very sick and that nurse to patient ratios had to be adjusted to 1:1 or 2:1 at times.
 - Consider traveling staff if able; they are often available for a competitive fee.
 - Have an efficient bed management lead.
 - Designate at least one proning team.
 - Consider creating a procedures team that focuses on insertion of invasive lines and airway interventions.
- Human resources considerations:
 - Track staff redeployment.
 - Streamline identification badging and credentialing for redeployed staff.
 - Expedite the onboarding of volunteers.
 - Assist with recruitment of staff shortages in key areas like respiratory therapy.
 - Cross-train staff.
- One of the facilities shared their staffing plan:
 - On the clinical side of things, we set up our provider staffing to mimic the Society of Critical Care Medicine (SCCM) pandemic response guidelines.
 - At our ICU's peak census (45 patients), one medical intensivist oversaw the care of roughly 15-20 patients per day, in concert with 1-2 of our advanced practice providers (APPs) or non-ICU doctors per ventilator unit (ICU, ED, ASU).
 - Night coverage was provided by 1-2 APPs or non-ICU doctors per each of these units with the availability of tele-intensivist backup.
 - We used tele-medicine technology for some specialist consultations, and we continue to use tele-medicine now when our system staffing does not allow for a medical intensivist to be physically on campus.
 - We contracted with a nephrology team, who in addition to providing/directing care related to intermittent hemodialysis and continuous renal replacement therapy issues, essentially performed as a quality control team from a pure internal medicine standpoint.
 - The nephrologists stayed primarily in the green zone and used our physical exam findings and input via phone as their care guide.
 - The team maintained a COVID standards of care document that was updated periodically as new literature warranted.
 - Several intensivists participated in a weekly city-wide ICU directors call with directors from other healthcare facilities.

One major strength of our staff was their willingness to redeploy and take on alternate care roles. We posted our medical students in non-clinical areas that helped immensely. Another strength was the restructuring of our residents. Our surgical teams should be highlighted. They were routinely brought to the floors to prone patients, as IV teams, and were sent to the ED and other medical care floors to help with critical care patients.

One of the areas that worked well was that we made sure our residents were still able to maintain their residency and doing things that were appropriate for the residency (even though their electives were canceled).

We had a difficult time recruiting respiratory therapists. Average ratio is 10:1, at one point we had them at 30:1. Recruited first year anesthesia residents were reassigned to respiratory therapy and they were able to supplement the therapists.

We spent a lot of money/ spared no expense and felt that we did it the right way. We spent over \$24 million on hazard pay and PPE, furloughed 1,100, and will take a nearly \$100 million loss this year but wouldn't do a thing differently.

- We had a proning team and nurse assist with just-in-time training.
- We had specifically trained staff on a donning/doffing team.

V. Stuff (Equipment and Supplies)

All interviewees reported PPE shortages, but none had ventilator shortages. Many received more donations than they needed and partnered with local durable medical equipment (DME) companies/ businesses. Some facilities also relocated all necessary equipment to treat COVID patients from other hospitals in their healthcare system.

- One facility partnered with a local university to design a gown that could be printed on a 3D printer. The staff did not like that they were heavy and warm, but they were a good substitute until the facility was able to acquire more gowns. These gowns were only reused on the same patient/room.
- One facility created a central supply, under badge swipe and cameras, that was only accessible by a designated supply chain person under incident command.
- Through donations, one facility gave house and respiratory therapy staff PAPRs. Staff found PAPRs more comfortable and easier to communicate in.

VI. Communications

Interviewees agreed that regular communication is key to ensuring staff are informed, stressing safe practices, sharing new procedures and policies, and setting priorities for the day. All facilities conducted at least daily meetings or made announcements during peak patient census times. Also, communication with loved ones (from both the patient and staff) was key.

- One facility noted they created a WhatsApp group text for the ED group; this is still active today. They found group text to be a better way to communicate rapid changes.
- One facility noted they required daily communication to the patient's loved ones to be done by a team member (ideally the attending physician, but this was not always possible). They provided a standard template for what was communicated to loved ones.
- One facility shared their categorized communication structure:
 - System level- daily call with all service lines to make sure everyone was on the same page.
 - Critical care- daily call with intensivists and others on that team (e.g., environmental services, nutrition).
 - Clinical therapeutics team- discuss reviews of new treatments and related findings
- Interviewees found telemedicine/ virtual communications useful for consults (e.g., cardiology, nephrology, infectious disease). Surgeons would see patients in-person. iPads were used extensively by all staff:
 - At the bedside to help communication with loved ones and nursing staff.
 - For translation services.

VII. Case Management

All interviewees noted difficulty in placing patients to post-acute care facilities after discharge. Many nursing facilities and long-term care facilities (LTCs) were reluctant to take back patients and placing patients took a long time. Patients who came from group home settings were also difficult to place. This section highlights some unique solutions and lessons learned.

- Because many COVID-19 patients require extensive physical therapy, one facility designated a transitional unit to help with mobility issues and other transitional needs.
- Another facility used a Congregate Living Committee to review all discharges to make sure they were done safely and to prevent spread to nursing homes.

We found that we problem-solved new ways to manage our case load every Monday morning. The census and balance of ICU and med/surg patients changed each week which changed our focus for discharges. For example: If the number of ICU patients was very high, we concentrated on the med/surge patients.

Establishing a pandemic communications program, pre-approved messaging, and scripts for various stakeholders ensured that not only did we get critical information to staff and patients, but to supply chain staff and vendors.

- One facility opened a COVID positive transitional facility due to difficulty finding transitional placement. It had 24 beds, and the most patients at one time was 14 or 15. They closed this facility in September.
- Interviewees suggesting developing processes for obtaining DME for patients, arranging transportation for COVID patients, and determining how to obtain home services without in-house assessments. Community providers can help facilities determine what services are available.
- One facility noted the following lessons learned:
 - Our department had to completely change the way we conducted our daily work. Once the safety zones were in place, we were part of the green zone. Prior to COVID, we were on the units, met with patients and families regarding their discharge plan. Once COVID hit, we no longer had that ability. Maintaining flexibility when faced with these obstacles was the key to our success.
 - The care managers successfully transitioned 500 patients either to home or another facility after their acute episode.
 - We established criteria for discharges to LTCs and assisted living:
 - If a patient is discharged to an LTC or assisted living facility AND transmission-based precautions are still required, they should go to a facility with an ability to adhere to infection prevention and control recommendations for the care of COVID-19 patients. Preferably, the patient would be placed in a location designated to care for COVID-19 residents.
 - If transmission-based precautions have been discontinued, but the patient has persistent symptoms from COVID-19 (e.g., persistent cough), they should be placed in a single room, be restricted to their room, and wear a facemask during care activities until all symptoms are completely resolved or until 14 days after illness onset, whichever is longer.
 - If transmission-based precautions have been discontinued and the patient's symptoms have resolved, they do not require further restrictions, based upon their history of COVID-19.
 - The decision to discontinue transmission-based precautions should be made using a test-based strategy or a non-test-based strategy (i.e., time since illness onset and time since recovery strategy). Meeting criteria for discontinuation of transmission-based precautions is not a prerequisite for discharge.
 - The test-based strategy was reserved for patients who remained hospitalized, were severely immune compromised, or were being discharged to a LTC facility. Patients had to demonstrate resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath).

VIII. Other Considerations

This section includes other lessons learned or considerations specific to testing, fatality management, and operations the interviewees shared.

- One facility noted that they had the first in-house fully validated COVID test with results within 24 hours starting March 12. They have conducted more than 200,000 tests and extended this service to neighboring nursing homes, hospitals, and other community partners.
- Another interviewee noted the morgue capacity in the hospital quickly filled up. They had three refrigerated morgue trailers at one point, but many families were unable to claim their loved ones' bodies or could not afford the \$750 cremation fee. One hospital reconfigured the trailers to hold more decedents and kept them on-site (instead of transferring to a state facility or funeral home) while giving loved ones more time to get organized. This helped show the community the hospital's good will and trustworthiness.
- Other general recommendations:
 - Conduct intra-facility crisis planning and develop a plan based on volume triggers.

We had three patients that needed long-term care and did not have insurance. The state was able to extend Medicare coverage to them.

We need a dashboard. We need to get this information out in real time. We're giving reports still to this day to as many as seven different governmental institutions, and each report is formatted differently. They have to be done, they're taking a tremendous amount of time and energy, and we really need a COVID dashboard. Things like admissions, length of stay, discharges, mortality outcomes. Some thing that can be pushed out immediately to our stakeholders, our community, and to our governmental organizations.

- Keep adapting based on changing circumstances; rapid planning was a real hallmark to this response.
- Do not get too bogged down in the bureaucracy; make decisions and keep adapting the best that you can.
- Consider making regular announcements (e.g., over the loudspeaker) that emphasize employee safety and quality of care are the hospital's top priorities.
- Make sure to take employee behavioral health needs and self-care seriously.
 - Set up an employee assistance program onsite.
 - Set up times automatically for staff to talk with a behavioral health professional (they can reschedule or opt-out).
 - Consider setting aside spaces where staff can receive services like acupuncture sessions, aromatherapy sessions, and religious/spiritual support.
- One facility shared their list of facility upgrades, equipment, and technology they made to their COVID-designated facility (which cost nearly \$3.4 million):
 - Renovations
 - Repurposing/modifying existing spaces
 - Architectural fees related to modifying interior spaces related to National Fire Protection Association (NFPA) and other codes
 - Purchasing and installing prefabricated walls and structures
 - Interior and exterior construction
 - Expanding capacity within the facility
 - Making modifications to increase the morgue capacity
 - Temporary generator rentals
 - Computerized tomography (CT) scanner rental
 - Modifications to the building's electrical systems
 - Modifications to the HVAC systems
 - Using free standing and portable HVAC units to supplement the main HVAC systems
 - Engineering consulting to assist with modifications to the existing HVAC, structural, and plumbing systems
 - Building equipment/systems repairs necessary to support interior safety zoning due to COVID patient intake
- The costs did not include the following or rented equipment other than the portable generator and mobile CT:
 - Post-acute care center
 - Infusion clinic modifications (e.g., architectural and engineering fees, equipment, and construction)
 - Increased utility expenses due to the increased amount of medical equipment beyond average daily usage pre-COVID
 - Hotel for temporary staff housing

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IX. Resources

[ASPR TRACIE COVID-19 Resources](#)

Dhake, S. et al. (2020). [COVID-19 Hospital Designation: Effect on Emergency Department Patient Self-Selection and Volume](#). Journal of Hospital Administration. Vol 9, No. 5.

This article provides the results of a retrospective analysis of ED volumes and COVID-19 ED visits between March 12, 2020 to April 30, 2020 at Glenbrook Hospital. The authors concluded that the declaration of Glenbrook as a COVID hospital had significant affects to their ED visits.

Edwards, J. et al. (2020). [Lessons Learned at a COVID-19 Designated Hospital](#). The American Journal of Surgery.

This editorial article highlights the surgical department's lessons learned from the State University of New York Downstate Health Sciences University, the only COVID-19 designated hospital in Brooklyn.

Liebman, D., Patel, N. (2020). [To Save Staff and Supplies, Designate Specialized COVID-19 Referral Centers](#). Health Affairs.

This blog describes benefits of, and options for, operationalizing a COVID-19 referral center, or dedicated care center for positive COVID-19 patients.

Moulick, A., Kilcoyne, M., Do-Nguyen, C.C., and Stevens, R. (2020). [The Case for Designated COVID-19 Hospitals](#). CTS Net.

The authors of this article identify the benefits of a dedicated COVID-19 hospital and categorize them by supply allocation; infrastructure, personnel, and patient management; and COVID-19 sequestration and public health. They also provide a list of steps to achieve a COVID-19 hospital.

Robbins, A. et al. (2020). [Transforming a Long-Term Acute Care Hospital into a COVID-19 Designated Hospital](#). *Surgical Infections*. (Abstract Only).

This article describes lessons learned from M Health Fairview Bethesda Hospital's conversion of the LTACH facility into a hospital dedicated to treating COVID-19 positive patients.

Wu, X., Zheng, S., et al. (2020). [Contingency Nursing Management in Designated Hospitals during COVID-19 Outbreak](#). *Annals of Global Health*. 86(1):70.

This article describes the nursing management program at Shantou Central Hospital, a COVID-19 designated treatment hospital in Guangdong Province. It includes strategies for initial set up, establishing a technical support team, staffing, detailed nursing duties for each shift, and behavioral health services.