TRACIE
HEALTHCARE EMERGENCY PREPAREDNESS INFORMATION GATEWAY

# INNOVATIONS IN COVID-19 PATIENT SURGE MANAGEMENT


***COVID-19 patient surges have prompted healthcare facilities to be innovative in record time, updating and creating new plans as lessons were learned. In this article, we highlight how the following four healthcare executives from different states and settings collaborated and used data to manage patient surge statewide:***

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- Kevin McCulley, Director, Preparedness and Response, Utah Department of Health
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## Minnesota's Statewide Healthcare Coordination Center

Minnesota's (MN) Statewide Healthcare Coordination Center (SHCC) was virtually accessible and physically located at the state emergency operations center (SEOC; Figure 1). This public-private partnership was comprised early on of nearly 40 representatives from the MN Departments of Health (MDH) and Homeland Security and Emergency Management; the MN Hospital Association; and eight regional MN healthcare coalitions.

Initially, the SHCC was responsible for a range of planning and response tasks such as:

- Referrals and transfers
- Alternate care sites (ACS)
- Long-term care (LTC), both reactive (outbreaks) and proactive (testing)
- Personal protective equipment (PPE) policy and acquisition recommendations
- Ventilator/medical supply acquisition

The primary goal of the SHCC was to maximize the use of hospital beds and ACS on hospital premises statewide. Hospitals applied for waivers to use non-traditional areas for patient care; nearly all were approved. This enabled us to identify over 2,000 potential additional medical and surgical beds, many in smaller facilities, which could allow for the decompression of tertiary centers. Another goal was to use statewide resources to "load balance" over-burdened areas before initiating any community alternate care sites (C-ACS).

Each response region in the state identified at least one C-ACS that would be used if hospital and ACS capacity were not sufficient; this added 2,750 potential beds (nearly 20%) to the statewide baseline capacity. We ordered enough supplies to care for approximately 1,000 patients in a C-ACS. Our task force included the MN National Guard and U.S. Army Corps of Engineers, and an interdisciplinary team drove or flew to each region to survey their proposed C-ACS sites. Site surveyors considered location, capacity to provide clinical care, healthcare engineering (e.g., oxygen needs/accessibility), structure age, ventilation, accessibility, and other features and scored and ranked the sites. Fortunately, we never had to use these sites, but we did identify and modify a recently decommissioned skilled nursing facility (SNF)/LTC facility in the Twin Cities/Metro region, which could have served as an overflow site for patients in need of long-term ventilator weaning, chronic respiratory support, and other types of long-term care. We made nearly $1 million in modifications to this site, which could accommodate between 130 and 150 patients. This facility, which was vacant and scheduled to be torn down, has now been returned to its owner's control.

*Figure 1. Joint US Army Corps of Engineers, MN National Guard, MDH, and clinical personnel team at SEOC worked with each region to identify candidate sites, conduct site visits, and then score and evaluate each site.*

## RELATED ASPR TRACIE RESOURCES

Considerations for the Use of Temporary Care Surge Sites for Managing Seasonal Patient Surge

COVID-19 and Surge Capacity Resources (TA response)

COVID-19 Crisis Standards of Care Resources

COVID-19 Patient Surge and Scarce Resource Allocation

Healthcare Coalition Infectious Disease Surge Annex Template

Hospital Intensive Care Unit (ICU) Surge Training Resources (TA response)

Hospital Surge Capacity and Immediate Bed Availability (Topic Collection; not COVID-19-specific)

Patient Surge Management Strategies and CSC during COVID-19 (Technical Assistance [TA] response)

Up-Training Resources for Healthcare Staff during COVID-19 Surge (TA response)

> ***We have placed over 600 patients using C4 – the majority from the outstate into the metro area. During our November peak, we managed 342 calls and placed 268 patients (11.4/ day). We also load-balanced by moving approximately 20 ICU patients during peak periods from one hospital to another (the majority from metro trauma hospitals that were overloaded).***

The Critical Care Coordination Center (C4) was managed by MHealth Fairview – who was contracted to provide this service using state and federal funds. C4 had three goals:

1. Rapid placement of emergency transfers to higher levels of care
2. Load-balancing for overloaded facilities
3. Maximal and consistent utilization of critical care resources including in smaller facilities when necessary

MHealth Fairview integrated C4 into their existing patient management and patient transfer answering point with a designated telephone number. Demand waxed and waned depending on the surge effects on the system. Staffing was dynamic and participants had to have a certain level of clinical and bed placement expertise. C4 used a statewide number for intensive care unit (ICU) referrals. Conference calls were held for information sharing and load-balancing purposes, particularly during peaks in patient volumes.

We had to quickly analyze available data to make these very important decisions. In addition to the ICU bed availability data provided by MnTrac (MN's system for tracking resources, alerts, and communication), we looked at the number of ventilators in use as a measure of acuity. During periods of high surge, we asked the hospitals to report on the status of non-emergency procedures to ensure consistency in cancellations across the state. We also asked them to share information regarding how sick ICU patients were to help with load-balancing decisions. We used the following color scale:

- Red – patient ventilated or on pressors and cannot move from ICU
- Yellow – patient could move to a lower level of care with some risk
- Green – appropriate to move patient to lower level of care with minimal risk

This allowed us to compare acuity in ICUs should "forced transfers" to rotating hospital systems become necessary.

Because our tertiary medical centers tend to bear the brunt of our ICU referrals, we looked to the greater MN area (i.e., "outstate") for additional resources. There is a fair amount of ICU capacity in the outstate, and they are used to caring for conditions like exacerbations in asthma and congestive heart failure, pneumonia, and sepsis. We polled and surveyed these facilities to determine physician coverage, what conditions they were comfortable treating with or without telemedicine support (e.g., ventilator weaning), and ICU resources. As the tertiary centers became saturated, we anticipated having to use these additional 700 outstate beds. Fortunately, we did not have to do that, but we created a directory and will use it should we reach that level of need in a future wave.

Some additional issues we noted while using C4 during peaks in patient volume include:

- *The importance of using common terminology*. We agreed upon definitions of "crisis staffing" (e.g., staff-to-patient ratios, when non-traditional staff was being used in intensive care environments to

provide patient care). This provided some symmetry of communication and allowed for consistency in communications and response and a better understanding of who was in "crisis."

- *Be prepared for external variables that necessitate patient transfer.* In May 2020, Minneapolis experienced significant civil unrest due to the death of George Floyd. On the first evening, one trauma center—which was already stressed due to COVID—admitted 26 trauma patients in 12 hours. We were grateful to have the ability to load balance with other hospitals. Both major trauma centers were aided by other hospitals in load-balancing at times during the spring.
- *Support local emergency medical services (EMS) agencies.* We were able to use Federal Emergency Management Agency ambulances under contract for several weeks to help with patient transports; this was appreciated because a number of these transports occurred throughout the entire state, covering significant distances and our volunteer ambulance services were stretched thin.
- *Resource allotment is key.* We used C4 to track floor beds and non-ICU beds during our spring peak. One day in April in the metro area, we only had 56 floor beds available out of about 5,000 beds.

In MN, we are working towards identifying the policies and resources needed to incorporate the C4 model into all hazards planning and working together to flesh out a more durable model.

**Final thoughts and lessons learned:** Put a stake in the ground early on from a clinical leadership perspective as to what the goals of the response are, through a medical operations coordination center if possible. It's like trying to drive on the highway while other people are yanking on the steering wheel. You have political, commercial, and healthcare system interests trying to get your attention, and it's a fight to stay on the road, doing what you know needs to be done. There were many well-intended thoughts and requests from various parties that were not consistent with what we needed to do strategically, mainly reflecting a lack of understanding of how the ACS would support the overall COVID-19 response. We also faced some challenges explaining theoretical and actual bed availability to politicians who did not understand the difference. While computer models may show we had 700 beds available, we simply did not have the staff to operationalize those beds. You will be met with peer and political pressure, and you will have to do a delicate dance, but with teamwork from the participating agencies and systems and a clinical leadership perspective, you can ensure as smooth a response as possible.

***When we reviewed the impact of COVID-19 on our hospital capacity from September 2020 to January 2021, we noted that as COVID-19 cases rose, non-COVID-19 cases dropped, allowing us to accommodate these volumes without making significant changes to our standards of care.***

## Utah's Medical Command Response Team Systems Approach for Deep Contingencies

Utah (UT) is the nation's 30th most populous state, with about 3.3 million residents. There are 535 adult ICU beds statewide. Healthcare systems manage 16 referral hospitals with 453 ICU beds for the highest-level ICU care in the state. During the highest COVID-19 surges, these hospitals generated approximately 20% more surge beds by establishing ad-hoc COVID-19 units.

Almost all our referral hospitals and high-level ICU beds are located in the Salt Lake City/Wasatch Front area, which establishes a "hub and spoke" delivery model (Figure 2).

We also have a catchment area that includes portions of several states across the Intermountain West. We started working on our crisis standards of care (CSC) guidelines specific to COVID-19 in March 2020 and it took us until December to finalize it.

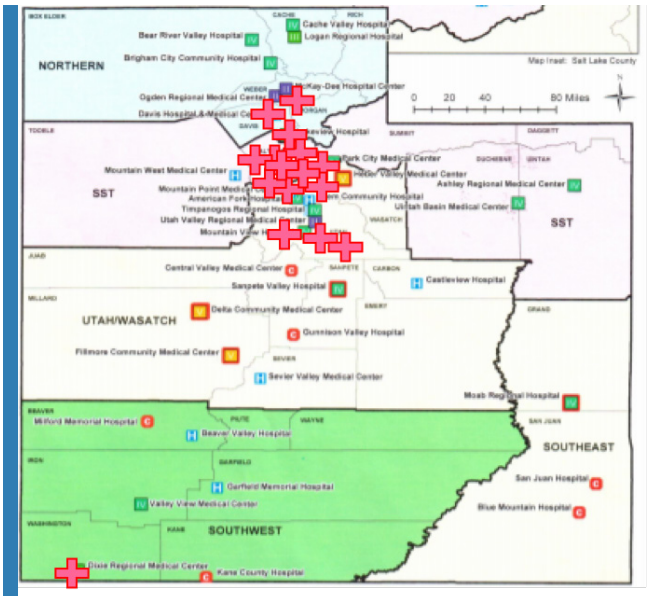


*Figure 2. Map of UT Hospitals*

During a COVID-19 patient surge in the winter of 2020, we activated a Medical Command Response Team (MCRT) to handle ICU diversion and load leveling. Throughout our response to COVID-19, we focused on three questions:

1. How will hospitals utilize contingency care strategies evenly across the state to ensure the highest level of surge capacity possible, prior to entering crisis care?
2. How will hospitals coordinate provision of care during crisis care to ensure fair and equitable distribution of scarce resources?
3. How can we as a system and healthcare community work to avoid the need to place patients in the ACS convention center field hospital?

The MCRT serves as initial activation of the Medical Operations Coordination Cell (MOCC). Although MOCCs are valuable, for the State of Utah, the MOCC would only be activated once MCRT actions of ICU diversion and load-leveling were overwhelmed. MCRT was composed of

partners from the UT Hospital Association, the "Big 4"[1] healthcare system critical care unit (CCU) directors, Chief Medical Officers (CMOs), transfer center directors, representatives from rural hospitals, EMS representatives, a governor's office representative, and liaisons from Unified Command. This group provided the MCRT with tactical facility level data (day-to-day and hour-by-hour surge) and led the ICU diversion and load-balancing activities. Had we reached the point where the team could not manage the surge, we would have activated the MOCC to support interfacility movement and urgent logistics requests, to provide regulatory support as needed, and to support activation of the CSC guidance.

Focusing on these deep-dive contingency strategies allowed us to review our critical supply and staffing issues. We worked with supply chain directors to address PPE, ventilators, and other resource issues. We worked with nursing directors from the Big 4 and rural facilities to consider internal and external options through a Nursing Command Response Team. This allowed us, among other actions, to establish a nursing apprentice program, where 658 fourth-year students applied for and were able to directly support the nursing shortage affecting our state (one of our biggest challenges).

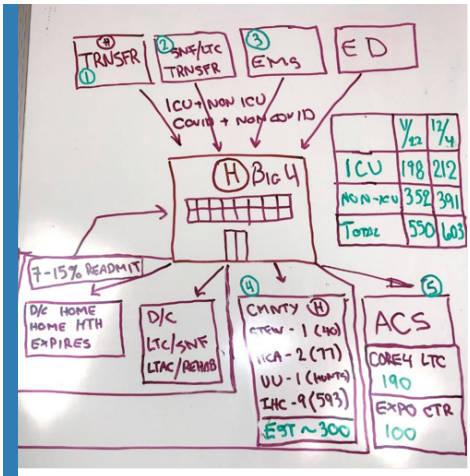


*Figure 3. Photo of white board used to track inputs and variables.*

At one point, we used a white board (Figure 3) to track inputs in the Big 4 and referral center hospitals, outputs, and variables we could control (e.g., support from referring hospitals, training hospitals to hold on to patients they would normally transfer, and the establishment of mobile and temporary spaces). In Figure 3, the number 4 shows how the Big 4 were using their community hospitals to offload cases and provide additional ICU capacity. The number 5 represents the four COVID-19-positive LTC facilities we contracted with. Those facilities generated close to 200 additional beds for hospital decompression. While we did set up our Expo Center as an ACS (adding 100 beds), we made every effort not to use it.

Just prior to the patient surge, we did a significant amount of planning, training, and engaging partners. We conducted three tabletop exercises where we reviewed lists of potential transfers with directors from our transfer center and CCUs. This helped us establish a "battle rhythm" and understand how we would accommodate transfer requests. This was very valuable in planning for how the system would work in real time.

There was no shortage of data coming in every day, from the number of confirmed cases in individual hospitals, statewide numbers, and daily tactical texts that described status from each of the Big 4 facilities. One challenge with hospital data, however, is that it is manually entered and a day behind. While it was helpful to visualize over time, it was not tactically

[1] *The Big 4 refers to Intermountain Healthcare, University of Utah, Steward Health Care, and HCA MountainStar.*

useful. We relied more on the daily MCRT tactical texts from the Big 4 that included percentages (e.g., “ICU capacity at 102%”) and qualitative information (e.g., facility under “severe stress” or “insanely busy”). When a CMO says “it is insanely busy today,” that means a lot to us relative to their ability to take additional transfers.

We also used data to track indicators and develop activation points for the MCRT. Other systems might choose to also create “trigger points” based on hard data, but we did not feel like that was a practical solution. Just because the data indicated that a receiving hospital was statistically able to take a referred patient did not necessarily mean that they could. The indicators and activation points we developed include:

- Indicators – available staffed beds, staffing rations, supply/equipment shortages, CCU/CMO stress level (qualitative data)
- Activation points– the original referral/receiving hospital unable to accept requested inbound transfer
  - » Transfer center directors activated by text for a conference call
  - » CCU directors/CMOs communicate with sending hospital
  - » Round-robin agreement determines which hospital is next to take referral
  - » Agreement reached and patient transferred.

We completed 34 diversions using this model, and no facilities were overwhelmed.

**Final thoughts and lessons learned:** ACS planning has been underway for over a decade in UT, mainly focused on hospital evacuation and relocation strategies in a fast-moving event. As COVID-19 did not compromise hospital infrastructure, the team had time to develop intermediate care locations by contracting with SNFs. These SNFs were able to support medical surge mitigation efforts throughout the response. Support included the ability to mitigate skilled nursing outbreaks by providing lateral transfers and supporting hospital decompression of post-acute COVID positive patients. The SNFs received additional supplies, staff training, and deployment of UT Health Emergency Response Strike Teams to ensure enhanced capabilities were maintained. Looking back, we recognize that these centers could have been utilized earlier in the response.

Regarding CSC, there were missed opportunities with community engagement through the years. Even though the end result of engagement with, and approval by, the U.S. Department of Health and Human Services (HHS) Office of Civil Rights resulted in a much-improved plan and process for implementing CSC, we strongly recommend that CSC planners reach out to a variety of partners as they develop plans. These could include the state disability law centers, independent living organizations, associations representing persons with disabilities, and gerontology providers.

## Southeast Texas Regional Advisory Council: Making Data-Driven Decisions

The Southeast Texas Regional Advisory Council (SETRAC) is comprised of 25 counties in southeast TX that serve more than 277 cities, 9.3 million people, 187 hospitals, three trauma service areas, and close to 1,100 nursing homes. As news coverage of COVID-19 grew, we decided to collect early, consistent, and objective baseline information to allow us to track hospital census data and project into the near future (Figure 4). The Catastrophic Medical Operations Center was activated virtually under state mission assignment to coordinate the medical needs of our region. From the beginning, we knew that this data would be public facing, possibly helping residents make decisions for themselves and their communities. We also needed to be able to break down the data by counties to determine where more resources were needed.

In early 2020, our numbers were relatively low. At this point, we held numerous trainings and exercises with our LTC facilities teaching them the proper use of PPE, including donning and doffing, and ensuring proper use of protective barriers. We also highlighted cleaning protocols for these facilities.

Our largest county chose to set up an ACS in a convention center. We maintained, however, that COVID-19-positive patients were at high risk, and needed to be cared for in brick-and-mortar healthcare facilities. We examined the cost of retrofitting several facilities that had been closed, and found it was not financially feasible. We then reached out to “The Medical Resort,” a company that has five long-term acute care (LTAC) facilities within our region and asked them if they would be able to decompress their negative patients into two of their facilities, making the other three facilities COVID-19-specific hospitals. They agreed, and we received a contract from the state to support the initiative. Between May 2020 and May 2021, the three facilities added an additional 90, 112, and 70 beds, and treated 683, 633, and 162 COVID-19-positive patients, respectively.

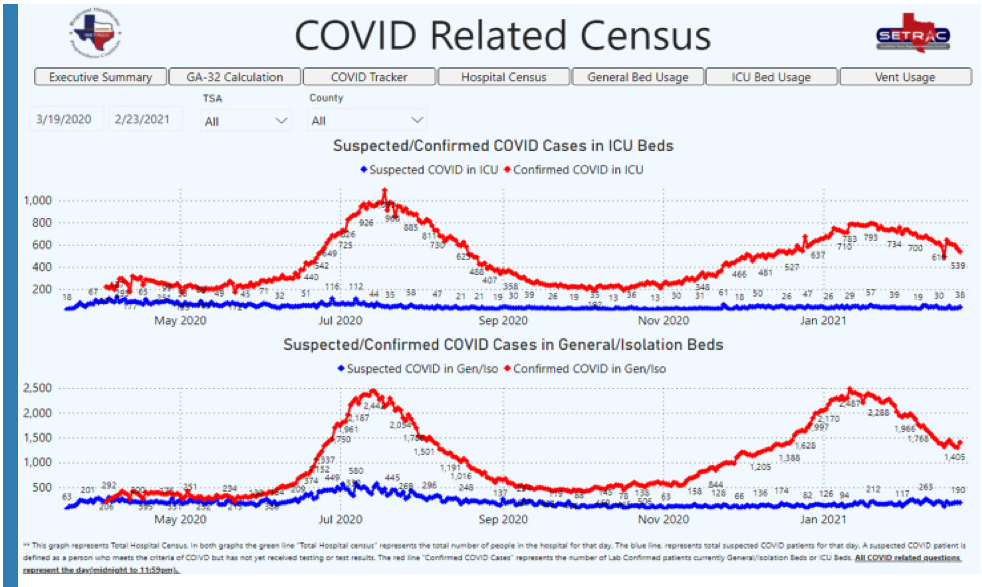


*Figure 4. COVID-Related Census from May 2020-January 2021*

We needed more capacity during our surges. The state offered a military unit to help us manage patients, allowing us to place them where they would be of most assistance. We reached out to United Memorial Medical Center because we knew they had a unit that was not open. It required a small amount of retrofitting, and it needed staff. Together, the military unit and medical center were able to open a unit comprised of 50 ICU and general beds for COVID-19-positive patients.

Next, we reached out to Atrium Medical Center, another LTAC facility, which has a 30-bed ICU. With some retrofitting, we were able to convert it to a 30-bed COVID-19 ICU, which was at capacity most of the time. We also worked with Mid-Jefferson Beaumont/Port Arthur, an extended care hospital, and they provided 48 general COVID-19 beds, which allowed East Texas hospitals to offload patients who did not need general hospital care, but needed to be monitored before being discharged. In the Lufkin area, the military worked with St. Luke's Lufkin Memorial to open an additional 15 medical/surgical COVID-19-positive and 20 ICU COVID-19-positive beds. While some of these numbers may seem small, any number of beds—particularly with ICU capability—was helpful. Figure 5 illustrates COVID-19-related census and the opening of the alternate care locations.

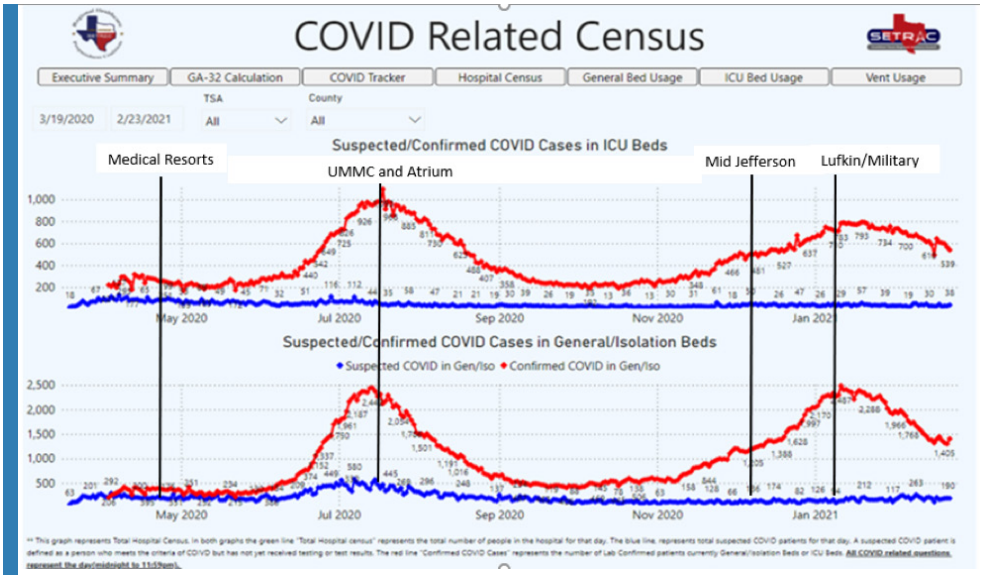


*Figure 5. COVID-Related Census and the Opening of Alternate Care Locations (May 2020-January 2021)*

In addition to load-balancing, we also distributed PPE through our central warehouse. Just before the pandemic, we ran a medical countermeasures exercise to distribute supplies to our hospitals (this is part of our point of distribution plan). Figure 6 illustrates the numbers of PPE that have been distributed since June 2020 to a wide variety of locations, including LTACs, hospitals, EMS agencies, physicians'/dentist offices, pharmacies, and mortuaries.

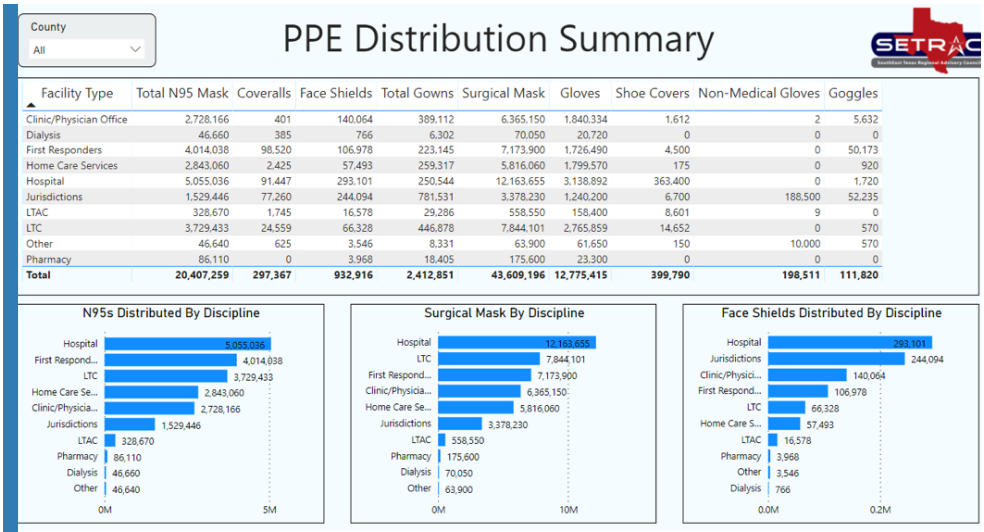


*Figure 6. PPE Distributed by Facility Type*

Staffing was another significant issue. A lot of well-trained nurses left our medical centers to pursue higher-paying contracts. Through a contract with the department of state health services and Angel Staffing, we were able to field 2,000 nurses during each peak; they were demobilized after 15 months.

As bed space became more limited in the winter of 2020, we set up an emergency transfer rotation with the top nine hospitals systems within our region. We had an agreement that specified that if the SETRAC officer called and said, “This is a SETRAC emergency transfer,” the hospital on rotation would accept and make room for that patient. This agreement was geared towards our rural community hospitals and the numerous freestanding emergency departments (ED) we have within our 25-county region. We carried out nearly 500 transfers in the three-month period between December 24, 2020 and March 1, 2021:

**SETRAC Duty Officer Emergency Transfer, 12/24/2020-3/1/2021**

| Bed Type | Number of Transfers |
|---|---|
| ICU | 227 |
| Medical/Surgical | 150 |
| Telemetry | 96 |
| Other | 18 |
| Total | 491 |

**Final thoughts and lessons learned:** Politics and being able to defend the decisions you are making are both huge challenges. Not backing down when you know what is being done is in the patient’s best interest is key. We will continue to ingrain that into our process. Data transparency was also important to us; we shared county-level data with our elected jurisdictional officials so they could make the best determinations for their communities. We have also maintained weekly phone calls with our LTAC facilities, since we know they are more vulnerable, and we want to foster that relationship and ensure they have the tools they need to care for patients.

## Imperial County, California: A Rural Perspective on COVID-19 Surge Management

Imperial County is located in the most southeastern corner of the state. From May through July 2020, they experienced the most significant COVID-19 surge yet in California. More than 600 patients were transferred out of the county (indicated by the arrow on Figure 7); some moved as far north as Sacramento (indicated by the star). The majority of transfers were carried out by air ambulance (helicopter and fixed wing).

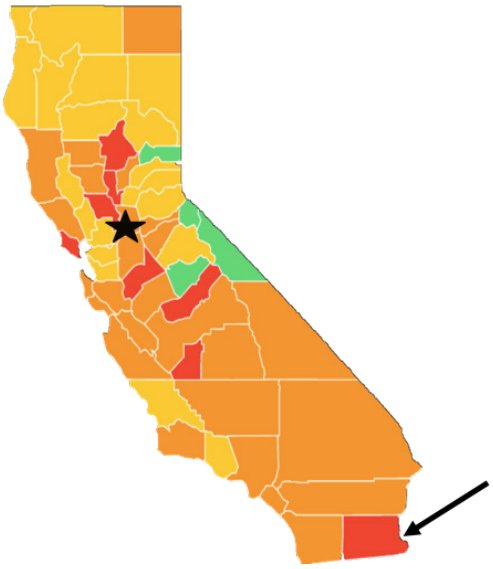

*Figure 7. Map of California with Sacramento Marked by a Star; Imperial County is Marked by the Arrow*

Imperial County is bordered by two other counties, Riverside to the north and San Diego to the west; we transfer patients on a daily basis. To our east, we are bordered by Yuma County (Arizona). The area that challenged us the most during the surge is to our south, where the Baja and Mexicali areas of Mexico are located.

Figure 8 illustrates that Brawley and El Centro are close to the middle of the county and relatively far from the population centers that receive our transfer patients; sending a patient to Riverside or San Diego County takes two hours at the minimum.


*Figure 8. Map of Imperial, Riverside, San Diego, and Orange Counties*

The 2010 Census listed our population at approximately 180,000. It is important to note that we are also a binational county; between 80 and 90% of our residents identify as Latinx. Many people live in Mexico and commute to California daily to work or shop. To the south, Mexicali's

population is nearly 1.2 million, and approximately a quarter are U.S. citizens or legal residents that can cross daily. We are the third busiest land crossing in the U.S.; before the pandemic, 50,000 crossed daily and the numbers dropped by half during the COVID-19 pandemic. Unlike the rest of CA and many other areas around the country, our county is not a closed system; when there was a surge on one side of the border, it was quickly followed by a surge on the other side. While we have the resources to care for approximately 180,000 residents, the true number of people eligible to seek care in Imperial County is closer to 400,000.

Many residents in our county have pre-existing conditions that put them at risk for more severe COVID-19 infection:

- Our rate of tuberculosis is 25 per 100,000 (national average is 3 per 100,000)
- Asthma rates in our population are up to three times the national average
- Deaths attributed to diabetes are higher than statewide and national rates

Prior to COVID-19, the two hospitals in Imperial County had 22 ICU beds, 160 general beds, and one intensivist that served the entire county. There are no tertiary care centers in the county; those patients are typically transferred.

In early May, Baja, Mexico began to experience a surge in COVID-19 cases. For those of us who work in public health in Imperial County, May 19, 2020 will live in infamy (Figure 9); it is the day that neither hospital was able to take any more patients and we were faced with quickly adapting to this surge.  From May to July 2020, we had the largest surge in the state relative to population. At our worst, the county had four times the next closest infection rate per 100,000 in the state.

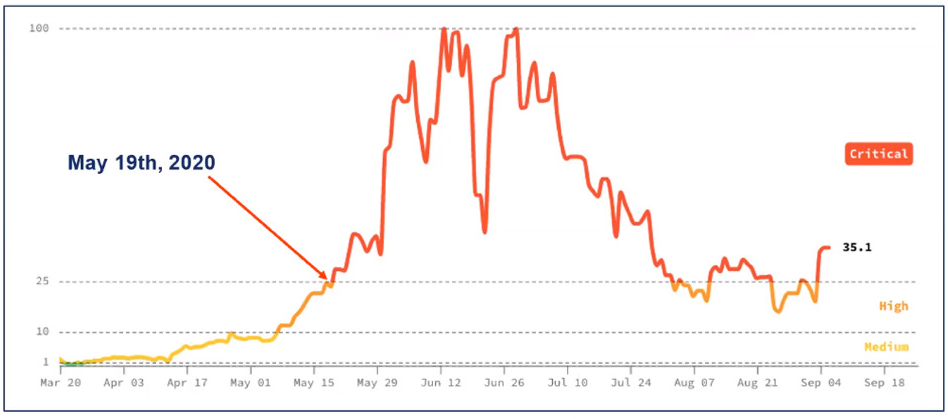


*Figure 9. Daily New Cases per 100k*

> ***While we have the resources to care for approximately 180,000, the true number of people eligible to seek care in Imperial County is closer to 400,000. We are the third busiest land crossing in the U.S., with 50,000 people crossing a day pre-COVID-19 and 25,000 continuing to cross daily during the pandemic.***

We used a four-pronged approach to managing surge:

1. Used all available non-pharmaceutical interventions to flatten the curve
2. Increased local capacity for care
    - Increased local ICU and hospital beds at both county hospitals
    - Placed tents outside both EDs for suspected COVID-19-positive patients
    - Obtained tele-ICU for patients, allowing us to provide better clinical care when we were not able to transfer patients
    - Created a field medical station (later renamed an alternate care site [ACS]) using personnel from local, regional, and federal resources
3. Used incident command as response framework
4. Transferred patients when local capacity exceeded

At the time, our ACS was the busiest in the state and was staffed by a California Medical Assistance Team (CALMAT). This was a huge asset, as it was able to provide care for 106 lower-acuity patients whose average length of stay was 3.6 days, saving the two county hospitals over 300 hospital days. The ACS was located in a local gymnasium, and partly due to its impressive logistics, we were able to increase its capacity from SNF to medical/surgical capacity. The main challenges the ACS encountered were related to electricity and oxygen management.

When local capacity was overwhelmed, we started the patient transfer process, but this was not without challenges. When state bed availability waned, there were often prolonged hold times in the ED, especially for patients who were too unstable to transfer. Some patients were too large for air transport, so they had to wait to be transported by ground. We also faced funding challenges. Our state transfer center was key to coordination, and they held daily and sometimes hourly communication with the state's regional coordinators. California is separated into six regions, making the transfer planning and coordination process involved in offloading Imperial County extra challenging, but using the Incident Command System and innovative methods helped significantly.

**Final thoughts and lessons learned:** Politics definitely challenged us operationally. Data transparency was another challenge, especially when there was such a push to reopen at the same time we were getting resources to the right healthcare facilities. Healthcare data is often one or two days old, so we began having daily phone calls to ensure we were getting real-time information. Being a resource-limited area, we were not able to access one electronic medical records (EMR) system across the board. Hospitals used several types of EMR, so we had to coordinate locally, statewide, and regionally. Sometimes this required making individual calls, explaining how the data we were trying to collect would help the entire state manage COVID-19 in the long run.