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INNOVATION REPORT

Conversion of a Skilled Nursing and Rehabilitation Facility into a Satellite Hospital in Response to a COVID-19 Surge

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Background: New York City was among the earliest and hardest hit areas during the COVID-19 pandemic. Prior to the peak of the surge in April 2020, a makeshift hospital was opened to address the growing need of overflow beds in Brooklyn, New York. A rehabilitation center was converted into a satellite hospital with a capacity of up to 425 patient beds in 10 days.

Design-Build Approach: Our institution worked in coordination with larger hospital systems and state and local governments, which allowed for a rapid lease of an underutilized structure, influx of supplies, and personnel. Hospital staff were voluntarily redeployed from their assigned services based on reduced need.

Outcomes: A total of 204 COVID-19 patients were accepted for transfer to the facility between April 6, 2020, and May 11, 2020. There were no major adverse outcomes and no deaths at the facility.

Lessons Learned: When a surge of patients is projected to outnumber the available beds in a hospital, such as during a pandemic, it may become necessary to establish a satellite facility. Creativity with existing spaces, health care infrastructure, and reallocation of available resources, as well as having all stakeholders on board, is imperative. Providing mandatory emergency planning and response trainings to hospital staff and leadership can improve preparedness. By leaning on revised protocols established at the satellite facility during the initial surge, the hospital was able to lease and convert another nursing facility and make it patient-ready in less than one week during the second surge of COVID-19 patients.

New York City (NYC) was among the earliest and hardest hit areas during the COVID-19 pandemic, caused by the SARS-CoV-2 virus. The entire United States has since been affected, with continued threats to the health care system from new variants and inconsistent regional vaccine coverage. In March 2020 initial projections suggested that New York–area hospitals would far exceed normal operating capacity, creating exigency for action.[1] Cases peaked in NYC the weeks of March 29, 2020 to April 6, 2020, with more than 5,000 new cases, more than 1,600 hospitalizations, and more than 1,000 deaths reported daily.[2,3] Many hospitals, as well as the Federal Emergency Management Agency (FEMA)—the agency in charge of preparing, preventing, and responding to disasters—were coordinating efforts to address this surge.[4] Multiple strategies were employed across NYC to manage the crisis. NYC Health + Hospitals, the largest public health system in the United States, coordinated staffing, volunteers, and logistics. Private hospitals and systems followed suit as New York State adjusted existing rules of credentialing, practice, and liability to enable recruitment of medical professionals to meet the needs of those afflicted with COVID-19.[5]

Ours is a tertiary-care academic medical center and one of the largest hospitals in NYC. At peak, the hospital was admitting more than 50 severely ill patients with COVID-19 daily. Accommodating increased volume and acuity required expeditious redeployment of clinical staff, reconfiguration of inpatient units, and identification of overflow sites. We describe the rapid conversion of a skilled nursing facility into an acute care hospital with surge capabilities five miles away from the main campus.

DESIGN-BUILD APPROACH

Our hospital has an annually updated comprehensive emergency operations plan (EOP) establishing an incident command system, which had been effectively implemented during previous emergencies, such as Hurricane Sandy in 2012. However, due to the uncertain trajectory at the peak of the pandemic, it was difficult to anticipate the resources the surge demanded, and additional capacity was needed. In responding to this surge, we followed the principles of emergency operations outlined in Figure 1.

Approximately 69,000 total beds, 18,000 ICU beds, and 12,000 invasive ventilators were needed to adequately

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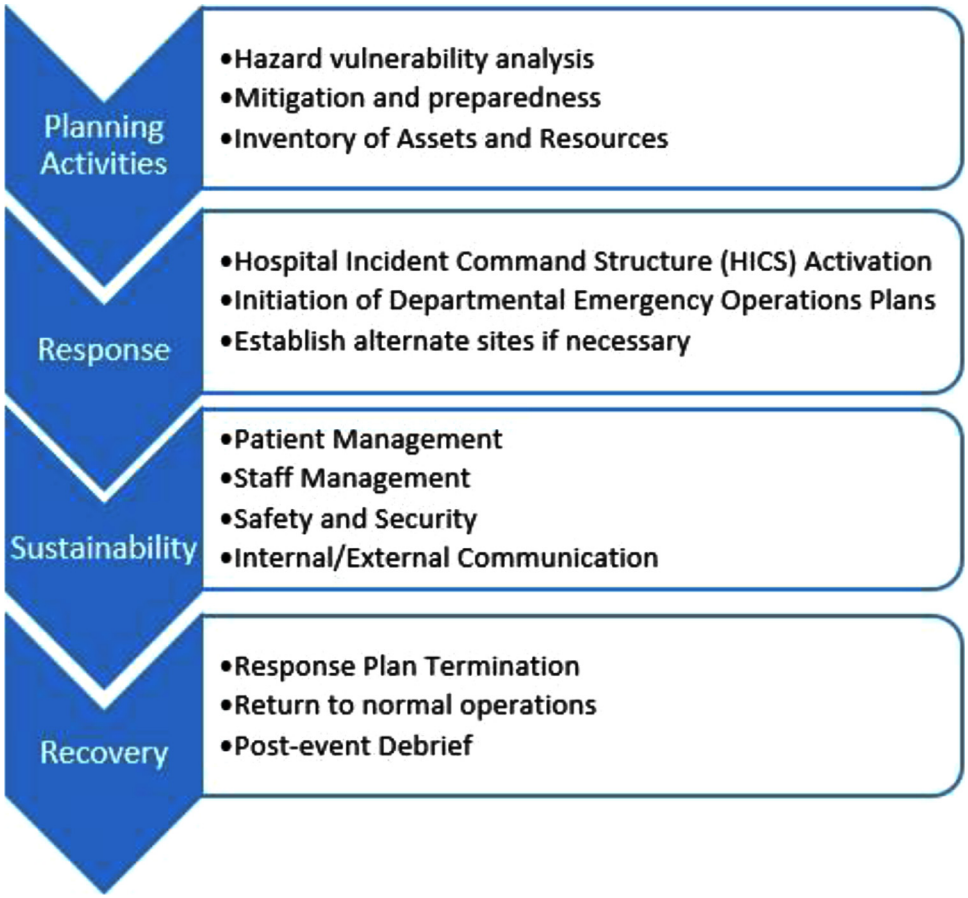

Figure 1: The principles of emergency operations outlined here guided the response to the COVID-19 surge.

prepare hospitals nationwide at the peak of the surge.[1] Hence the existing surge capacity plan had to be modified to increase critical care beds by converting general medical/surgical units to accommodate patients on high-flow nasal cannula (HFNC) oxygen and ventilators. Our cancer center, a stand-alone outpatient building one mile away, became an inpatient unit for non-COVID-19 patients. The State of New York was eager to assist in capacity expansion and aligned with hospital leadership to approve the use of an additional physical plant, a former hospital soon to be reopened as a skilled nursing facility.

The State leased this building, and the hospital agreed to begin accepting COVID-19 patients within 10 days. Although the facility had standing oxygen capabilities and sufficient space for clinical equipment and supplies, none of these materials were in place at inception. A portable computed tomography unit was brought in and parked in the back of the building. Using existing suppliers enabled acquisition of materials needed for patient care, which was augmented by support from the State. The medical information systems group networked the building to allow for seamless integration of clinical documentation on its network. The facility was able to accommodate 281 beds, with additional surge capacity up to 425 beds if additional patient care areas (for example, dialysis unit, physical therapy area) were transformed. To accept patients within 10 days of inception, multiple layers of implementation needed to be carried out simultaneously. However, notable advantages set apart this facility from other surge capacity models, including an accelerated deployment of the facility, expeditious reallocation of personnel from main campus for staffing needs, and strong and coordinated material and logistic support from the government, all of which should be taken into consideration when extrapolating concepts from our model.

Staffing

The main campus was quickly expanding inpatient services and voluntarily redeploying staff members from outside internal medicine and critical care areas such as ambulatory surgery and other specialties that were not operating at full capacity. A leadership team was assembled for this satellite facility, including site director, nursing lead, administrative lead, medical director, and facility director. Administrative support was recruited from the Department of Psychiatry and the Ambulatory Surgery Unit.

Staffing ratios were established in the same manner as in inpatient general medical units at the main hospital. There

was sufficient staff to accommodate the influx of patients, with approximately one nurse for every four patients. Nursing was staffed largely from ambulatory surgery, most with prior inpatient experience. The attending staff consisted of internal medicine, primary care, and subspecialty providers whose practices were operating at significantly lower volumes due to the regional lockdown orders, including neurology, rheumatology, and emergency medicine. House staff consisted of psychiatry residents (PGY [postgraduate year]-1 to PGY-3 years) who were reassigned from their current services of both ambulatory and acute care settings based on the reduced need. Additional per diem advance practice providers were onboarded to provide additional support and enable increased capacity if needed. The facility maintained the care team structure of the main campus with nurse case managers and social workers who were able to quickly and efficiently coordinate the necessary aftercare and discharge plan for each patient ready to return home, be sent to a skilled nursing or rehab facility, or be accommodated at COVID hotels.

Protocols

Prior to the satellite facility opening, a set of transfer criteria and protocols were established to ensure standard expectations and patient safety. Transfer criteria were developed to account for some limitations, such as lower capacity for in-person consultation and need for transportation back to the main campus if patients required critical care services. Stable patients were transferred to the facility to continue treatment prior to being discharged. The transfer protocol and criteria included communication between the main campus and satellite facility staff, written transfer documentation, and a reconciliation of orders (Figures 2 and 3). Further protocols were developed for transferring patients back to the main campus as needed, criteria for discharge, and rapid response for patient decompensation. Procedures for phlebotomy, transfer of medications, and obtaining imaging were established. These protocols were designed to be modifiable as conditions on the main campus evolved. If needed, HFNC and ventilators could be supported.

Treatment Capabilities

The satellite facility had limited but adequate treating capabilities, including diagnostic imaging capabilities, on-site. Transport to the main campus usually took approximately 20 minutes. Most laboratory tests were sent by courier to the main campus; however, a point-of-care blood analyzer was available for emergent tests. Imaging was also available on-site, including computed tomography scan, ultrasound, and portable x-ray. Results were interpreted by a radiologist at the main campus and entered into the electronic medical record. Consultations were established virtually when possible and were largely decided at the discretion of the service when deciding if the patient encounter could be virtual or would require transport back to the main facility. An ambulance was stationed outside the facility at all hours and available to assist in rapid responses or codes. Any transfers out of the facility triggered the arrival of a new ambulance. A financial cost center was created to track operational personnel, infrastructure, supplies and materials, and services. Partnerships with the state and local government allowed adequate funds and resources to operate the site safely.

Occupational Safety

The main hospital had established necessary policies and procedures to achieve preparedness and respond to the surge in volume of patients during the COVID-19 pandemic. To ensure that appropriate occupational and safety protocols were followed, managers and leadership throughout the hospital adhered to the policies outlined in the EOP. In April 2020 the EOP was revised to include updated policies regarding the hazard vulnerability analysis (HVA), a risk assessment designed to gain a realistic understanding of vulnerabilities and help focus the resources and planning efforts. The HVA was developed in collaboration with NYC Office of Emergency Management. In addition, the EOP is drilled twice a year as required by accreditation in response to an actual emergency, or in a planned exercise such as a full-scale, community-based exercise; a mock disaster drill; or a tabletop exercise or workshop that is led by a facilitator and includes a group discussion using clinically relevant emergency scenarios and a set of problem statements or prepared questions designed to challenge an emergency plan.

Furthermore, hospital staff are provided with emergency planning and response information through the employee hospital orientation program and annual mandatory trainings, which were established prior to the COVID-19 pandemic. The emergency management training module addresses employees' roles during an event, levels of activation, the incident command structure, and communication. All medical center leadership (managers and above) completed FEMA emergency management training in the summer of 2020 to better prepare for future disaster scenarios.

OUTCOMES

All patients admitted to the satellite facility tested positive for COVID-19 (by polymerase chain reaction [PCR] test) at the main hospital. Treatment mainly consisted of supplemental oxygen and supportive care, although certain patients required antibiotics, intravenous fluids, or higher level of care due to complications from COVID-19, which may have required transfer back to the main hospital. The satellite facility was equipped to handle a catastrophic surge that could have included additional surge capacity of up to 425 beds. Although there was capacity for ICU–level care, only patients of lower acuity were transferred to the satellite facility to conserve resources at the main hospital. All existing infection control and pressure injury monitoring was

Non-vented patients:

a. Admitted as inpatient at least 48 hours
b. Supplemental oxygen requirements: Less than 6 L/min via low flow nasal cannula with oxygen saturation > 92% for at least 24 hours
c. Does not presently meet SIRS criteria
    i. Patients with intermittent fever and decreasing leukocytosis but otherwise demonstrating clinical improvement may be considered for transfer
d. Blood pressure > 90 systolic for 24–48 hours
e. Mental status at baseline
f. Creatinine at baseline or resolving acute kidney injury
    i. Patients on chronic hemodialysis can be transferred only if arrangements are made with nephrology for the patient to receive dialysis back at the main campus
g. Electrolytes not at level posing threat of arrhythmia or altered mental status
h. No comorbid condition placing patient at increased risk of STEMI/NSTEMI
    i. Not requiring continuous cardiac monitoring
    ii. Decompensated cardiopulmonary disease
    iii. Immunocompromised with clinically significant neutropenia (due to chemotherapy, high risk medications (biologics, immunomodulators)
i. Patients requiring supportive care with advance directives (DNR/DNI) may be considered for transfer outside the above parameters

Figure 2: Stable patients who met these criteria were transferred to the facility to continue treatment prior to being discharged. SIRS, systemic inflammatory response syndrome; STEMI, ST segment elevation myocardial infarction; NSTEMI, non-ST segment elevation myocardial infarction; DNR/DNI, do not resuscitate/do not intubate.

consistent with protocols at the main hospital, and standards of care were maintained. The infection control department continued to oversee catheter-associated urinary tract infection nursing documentation and pressure injuries at the satellite facility. The average length of stay was approximately five days, and the eldest patient was 90 years old. At discharge, all patients were prescribed apixaban to prevent clotting complications secondary to COVID-19, and certain patients were provided home oxygen supply.

A total of 204 patients were accepted for transfer to this satellite facility between April 6, 2020, and May 11, 2020. A total of 170 patients were transferred to, treated, and discharged within this period. Thirty-four patients were canceled for transfer because they were discharged from the main hospital or did not meet transfer criteria. Seventeen patients required transfer back due to medical decompensation. Of note, there were no major adverse outcomes and no deaths at the satellite facility (Table 1). Two patients died after transfer back, but this was found to be due to progression of disease, and there was no delay in their care. Ultimately, this satellite facility freed more beds in the main hospital facility to treat the highest-acuity patients and provided additional care for more convalescent patients who continued to have acute needs.

Table 1. Transfer Outcomes at Satellite Facility between April 6 and May 11, 2020

Transfer Outcomes	Total Number of Patients
Patients accepted for transfer to satellite facility	**204**
Patients transferred to satellite facility, treated, and discharged	**170**
Patients canceled for transfer due to being discharged from main hospital or not meeting transfer criteria	**34**
Patients transferred back to main hospital due to medical decompensation	**17**
Deaths at satellite facility	**0**

Principles of Emergency Operations Used During COVID-19 Surge Response

LESSONS LEARNED

The establishment of a robust satellite hospital in 10 days at the height of a pandemic emergency was a momentous task that was achieved through a multidisciplinary, coordinated approach to ensure adequate capacity for the surge of severely ill COVID-19 patients. To the best of our knowl-

1. Sending provider inputs transfer request into SharePoint via the COVID-19 resources site: https://mmcsharepoint.maimonidesmed.org/DoM/Pages/COVID-Clinical-Resources-and-Policy.aspx --> Transfers to Satellite Facility
2. If bed available and criteria met, satellite facility staff will contact the transfer center to initiate the transfer.
3. Satellite facility RN and resident/APP providers will receive signout by calling transfer center to connect with sending providers.
4. Sending provider after giving signout:
    a. Completes Transfer Order Reconciliation
    b. Documents Transfer Note
    c. I-PASS handoff documented in SCM
    d. Hospital course (on Signout tab) updated to be used for eventual discharge summary
    e. Places order in SCM for "Transfer to Satellite Facility"
        i. Completes transfer criteria checklist
        ii. Transfer Order will **not** be permitted unless Reconciliation and Note are complete and signed
5. Receiving provider
    a. Interim note for transfer acknowledgement note
6. Nursing
    a. Satellite facility receiving RN contacts transfer center to request handoff
7. Case Management
    a. Discharge plan in place and discussed with family

Figure 3: The transfer protocol and criteria included communication between the main campus and satellite facility staff, written transfer documentation, and a reconciliation of orders. APP, advanced practice provider; SCM, Sunrise Clinical Manager.

edge, this is the only facility of its kind by which the shell of a health care structure was erected as a satellite campus in such a short period of time. The physical structure with its expansion capabilities offered some advantages over more temporary structures. In densely populated regions such as NYC, leveraging existing health care infrastructure buildings or even units in operating structures such as skilled nursing facilities should be strongly considered. They can be emergently staffed and equipped, alleviating future surges due to infectious diseases or mass casualty events whose numbers may exceed current available hospital beds.

Partnerships with local and state governments are essential to ensuring adequate resources for a prompt undertaking, and consistent standards of care should be maintained across all satellite facilities with the flexibility to quickly access higher levels of care when needed. Maintaining a register of any potential satellite facility capable of supporting safe and effective care of patients should be undertaken. We believe that our efforts to establish a surge facility will serve as a model for other hospitals that need to develop satellite surge facilities in response to a demand for hospital care and admissions during a pandemic, natural disaster, or global health crisis to improve patient outcomes. This held true during this past winter, when our medical center experienced its second surge of COVID-19 patients. The satellite facility was no longer an option, having been opened as a rehabilitation center. NYC worked with the hospital to lease an empty unit in a skilled nursing facility across the street from the main campus that connected via a pedestrian bridge. However, this unit did not have wall oxygen and was repurposed for an appropriate cohort of patients other than those with COVID-19. The unit was made patient-ready in less than one week, and by leaning on the revised protocols and procedures established at the satellite facility, it served as an important extension of the main hospital for patient care by managing the surge in patients through early spring of 2021.

Not only were the efforts reported here to establish a satellite facility a lesson for us at the time of the second surge, they may serve as a model for other hospitals that need to develop satellite surge facilities to improve patient outcomes. To be successful in such endeavors, it is essential to have the various stakeholders and government agen-

cies working cohesively in collaboration with other hospitals and health care systems.

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