Uniformed Services and the Field Hospital Experience During Coronavirus Disease 2019 (SARS-CoV-2) Pandemic: Open to Closure in 30 Days With 1,100 Patients: The Javits New York Medical Station

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ABSTRACT

Introduction: The surge of SARS-CoV-2-virus infected (COVID-19) patients presenting to New York City (NYC) hospitals quickly overwhelmed and outnumbered the available acute care and intensive care resources in NYC in early March 2020. Upon the arrival of military medical assets to the Javits Convention Center in NYC, the planned mission to care for non-SARS-CoV-2 patients was immediately changed to manage patients with (SARS-CoV-2)COVID-19 and their comorbid conditions. Healthcare professionals from every branch of the uniformed services, augmented by state and local resources, staffed the Javits New York Medical Station (JNYMS) from April 2020.

Methods: The data review reported aggregated summary statistics and participant observations collected by N.Y. State and U.S. military officials.

Results: During the 28 days of patient intake at the JNYMS, 1,095 SARS-CoV-2-positive patients were transferred from NYC hospitals to the JNYMS. At its peak, the JNYMS accepted 119 patients in a single day, had a maximum census of 453, and had a peak intensive care unit census of 35. The median length of stay was 4.6 days (interquartile range: 3.1-6.9 days). A total of 103 patients were transferred back to local hospitals, and there were 6 deaths, with an overall mortality rate of 0.6% (95% CI, 0.3-1.2).

Discussion and Conclusions: This is the first report of the care provided at the JNYMS. Within 2 weeks, this multi-agency effort was able to mobilize to care for over 1,000 SARS-CoV-2 patients with varying degrees of illness in a 1-month period. This was the largest field hospital mobilization in the U.S. medical history in response to a non-wartime pandemic. Its success with huge patient throughput including disposition and low mortality relieved critical overcrowding and supply deficiencies throughout NYC hospitals. The downstream impact likely saved additional hundreds of lives and reduced stress on the system during this healthcare crisis.

INTRODUCTION

The surge of SARS-CoV-2 virus-infected (COVID-19) patients presenting to New York City (NYC) hospitals quickly overwhelmed and outnumbered the available acute care and intensive care resources within the city. Upon arrival of military medical assets in late March 2020 to the Javits Convention Center in NYC, more than 100,000 local residents had already been infected and 5,000 residents had died. Intensive care and medical floor capacity in city hospitals were severely overwhelmed with SARS-COV-2 patients, while equally sick admissions overwhelmed the emergency departments and critically ill admissions waited days for hospital beds. The federal goal was to provide relief for local hospitals at serious extremes and being unable to care for the patient volumes and provide relief for exhausted and sickened medical staff.

The initial call-up was for active duty units from the 531st Hospital from Fort Campbell, KY, and the 9th Hospital from Fort Hood, TX, as well as Naval Reserve medical units and
Public Health Service officers. Army Reserve medical units were reconfigured into Urban Augmentation Medical Task Force (UAMTF) with more than 1,200 Army Reserve medical professionals activated as part of the DoD response to COVID-19, led by the U.S. Northern Command. Only 3 units or 240 army reservists were sent to the Javits New York Medical Station (JNYMS). Specifically created to respond to the pandemic, UAMTFs were designed to augment the civilian medical community by delivering a wide range of critical medical capabilities. Each 85-person UAMTF consisted of doctors, nurses, combat medics, respiratory therapists, and ancillary personnel.

The original task force mission was to care for non-SARS-CoV-2 patients. However, within 24 hours of arrival of the first service members, the mission evolved to manage patients with SARS-CoV-2 and their comorbid conditions. This brief report provides an overview of the patient flow involved in the extraordinary request and call to duty performed by U.S. Military, federal agencies, New York state government, and NYC assets in response to the SARS-CoV-2 pandemic at the JNYMS, the largest civilian temporary field hospital ever created for continual patient care.

METHODS
The JNYMS was constructed by the Army Corps of Engineers with an intended capacity to house more than 4,000 patients. Despite further plans to house 2,000 patients, the actual number of available beds with available oxygen, monitors, and ability to be staffed was 512 general medical beds (16 pods of 32 beds each) and 48 intensive care unit (ICU) beds (4 pods of 16 beds each) with ventilator capabilities. A joint staff of healthcare professionals from every branch of the uniformed services, augmented by state and local resources, totaled 600 providers, nurses, medical technologists, and administrators, staffed the JNYMS from 1 April through May 1, 2020.

All patient demographic data was collected on a computerized registry (non-proprietary), and clinical documentation was performed using only paper charts. Plans for the use of an electronic medical record were never accomplished. All patients treated at the JNYMS were SARS-CoV-2 positive. The patients had been tested at outside sending hospitals before arrival and had medical documentation sent along with transfer summaries. The Institutional Review Board at the Uniformed Services University for the Health Sciences (USUHS Bethesda, MD) reviewed the de-identified data utilized in this report and waived the need for patient consent and further review.

RESULTS
During the 28 days of patient intake at the JNYMS, 1,095 SARS-CoV-2 patients were transferred from NYC hospitals. Intensive care unit included more than 100 critically ill patients over a 21-day period, initially beginning with 20 intubated patients and 10 who were subsequently intubated while receiving care at the JNYMS. At its peak, the JNYMS accepted 119 patients in a single day (Fig. 1), had a maximum census of 453, and had a peak ICU census of 35. The median length of stay was 4.6 days (interquartile range: 3.1-6.9 days). A total of 103 patients (9.4%, 95% CI, 7.7-11.3) were transferred back to local hospitals (87) or the USNS Comfort (16). There were 6 deaths, with an overall mortality rate of 0.6% (95% CI, 0.3-1.2); however, 27 ICU patients were...
transferred back to NYC hospitals, half were on ventilators and the majority were critically ill (Table I).

It was estimated that 100,000 N95 masks were used in the 35 days of staffing the JNYMS. For every shift, all providers, nurses, technologists, and other support staff received new set of scrubs after removing their outside Operational Camouflage Pattern (OCP) uniforms. All healthcare staff underwent 11-step personal protective equipment (PPE) donning. They were assisted by Army medics and Navy corpsman, who sprayed alcohol on their hands between each step as, they dressed in gown, gloves, head-wear, goggles, N95 masks, and surgical masks prior to each shift. The entire patient care area was treated as COVID-19 positive, so anytime personnel left the inpatient area, they underwent a 13-step PPE doffing (removal). This created need for new gown and other PPE pieces. Approximately 90,000 sets of PPE were used to allow healthcare providers to work in 3 daily shifts of 8 hours because of the 100% time wearing full PPE and extremely limited break opportunities during that 8-hour period of patient care delivery. The actual rate of COVID-19 transmission to the 600 providers and nursing and supporting service members was only 0.5%. Army medics and Navy corpsman accounted for the low rates of provider infection because of a sophisticated 11-step donning and 13-step doffing procedure for the PPE full barriers that were always fully worn when in the patient care hot zone.

**DISCUSSION**

This is the first report of the care provided at the JNYMS. Within 2 weeks, this multi-agency effort was able to mobilize to care for over 1,100 SARS-CoV-2 patients with varying degrees of illness, in a 1-month period. This temporary hospital was constructed in a matter of days, and it was designed to reduce the burden on the local hospital system and help New Yorkers in need during this unprecedented crisis. As the first of its kind, the medical station served as a model for other similar facilities throughout the United States. This large-scale mobilization allowed for hospitals to decompress while offering much needed healthcare provider relief. In addition to the volume of patients cared for over this short period of time, this circumstance is unique in that this field hospital provided ICU level of care. The ability to accept more than 100 COVID-19 pneumonia patients daily, in mid-April at the height of epidemic in NYC truly saved many more lives as high-level medical care was afforded by patients who would have overloaded the NYC hospitals at that time. The presence of the JNYMS allowed these surrounding NYC hospitals to decompress without increasing their inpatient volume by 10-20% during that time period.

Reducing Emergency Department and inpatient volumes by even 10% allowed sufficient downstream resource reduction, saving in healthcare provider staffing and reducing stress on providers that were there. Not to be lost was the extraordinary effort put forth from our discharge planning team. Case management kept outstanding pace with our admissions by discharging as many patients as we admitted, even during our peak periods (see Fig. 1). The ability to discharge home, these uniquely ill COVID-19 patients in under 5 days with all of their medication, also freed up both beds and many hospital case management resources for other patients.

Often, as was initially the case for the JNYMS, field hospitals are designed to relieve strained resources by caring for non-pandemic patients or pandemic patients in varying degrees of convalescence, it became apparent that a choice had to be made. We could try to replicate every capability within a hospital, a seemingly impossible task, or we could organize, staff, and equip around one core capability: treating COVID-19 patients. Most patients received at the JNYMS were in the convalescent phase of their disease, which likely contributed to the shorter length of stay and lower mortality rate. What became clear shortly after the transition was that most of the patients recovering from COVID-19 needed more than low-acuity support because the disease was unpredictable and their condition could rapidly deteriorate.

The higher levels of care meant rethinking the facilities’ capabilities, especially for oxygen support. Oxygen generation became a critical limiting factor in the number of beds that could be used. Although medical units’ kits provided some capability it was not nearly enough to meet the demand. Figuring out how to supply more oxygen became the focus of the sustainment community; Army Anesthesiology faculty (K.B.) designed an innovative and safe intervention, to provide adequate oxygen for all the ventilators in the ICU.

Intensive care unit level care alongside convalescing patients in a civilian field hospital is unique in modern times. The low mortality rate, including ICU patients, exemplified the extraordinary care coordination to and from the JNYMS. Taken alone, admission rates of over 100 patients per day

| TABLE I. Supplemental Data |
|-----------------------------|
| Total patients intake       | 1,095 |
| Mean length of stay         | 4.6 days |
| Cumulative discharge        | 1,090 |
| Discharge home              | 967 |
| Discharge to USNS Comfort    | 16 |
| Transfer to NYC hospital    | 87 |
| Deaths at the JNYMS         | 6 |
| Left AMA, Transfer to SNF   | 17 |
| Total patients in floor non-ICU beds | 1,047 |
| Total patients in ICU       | 48 |
| Transfers to ICU from Javits| 21 |
| Transfers to ICU from NYC hospitals (10 were ventilator transfers) | 27 |
| Ventilator patients total   | 20 |
| Intubated at the JNYMS      | 10 |

**Abbreviations:** AMA, Against Medical Advice; SNF, Skilled Nursing Facility; ICU, intensive care unit; JNYMS, Javits New York Medical Station; NYC, New York City.
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is on par with some of the busiest hospitals in the country, typically associated with annual emergency department censuses of over 100,000. The JNYMS experience represents the largest field hospital mobilization for the specific care of SARS-CoV-2 or any acute response, ever, in the United States. In addition, the remarkable success of PPE protection protocol used at the JNYMS should be noted, with a provider transmission rate of less than 0.5%. This was much lower than that reported by surrounding NYC hospitals for caregivers, found to be 3.3% transmitted infection rate.3

The operational aspects of running a military hospital for civilian disease, such as this pandemic, are beyond the scope and purpose of the manuscript. There are a number of limitations that an army hospital was not prepared for during this unique mission. Assembling field hospitals and triaging casualties to operative and non-operative management are usual. However, receiving all quarantined medical patients that required all providers to don PPE and deliver continued care during a pandemic, has never been attempted on the U.S. soil. Northwell Health also saved this mission by providing significant case management support, which allowed providers to begin to rapidly discharge patients following a mean 4.5 days of stay. All patients were able to be sent home with 30 days of medications to assure both compliance and greatest opportunity for a full recovery.

This report has provided an important overview of the successful care of 1,100 patients performed by the U.S. Military, along with federal agencies, New York state government, and NYC assets in response to the SARS-CoV-2 pandemic at the JNYMS, the largest civilian temporary field hospital ever created for continual patient care.

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CONFLICT OF INTEREST

None declared.

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