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G. Garra

Zucker School of Medicine at Hofstra/Northwell, ggarra@northwell.edu

S. Gupta

Zucker School of Medicine at Hofstra/Northwell, sgupta2@northwell.edu

S. Ferrante

W. Apterbach

Zucker School of Medicine at Hofstra/Northwell, WApterbach@northwell.edu

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BRIEF RESEARCH REPORT

Infectious Disease

Dedicated area within the emergency department versus an outside dedicated area for evaluation and management of suspected coronavirus disease 2019

Gregory Garra DO | Sanjeey Gupta MD | Steven Ferrante BS | William Apterbach MD

Department of Emergency Medicine,
Southside Hospital at Northwell Health, Bay
Shore, New York, USA

Correspondence

Gregory Garra, DO, Southside Hospital,
Department of Emergency Medicine, 301
East Main Street, Bay Shore, NY 11706, USA.
Email: ggarra@northwell.edu

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Abstract

Background: The circumstances of the coronavirus disease 2019 pandemic necessitated an alternate operations strategy for efficient patient management. Alternate care sites were a viable option for managing emergency department (ED) surge in previous epidemics and disasters.

Objective: This study describes the development of an alternate care site and evaluates efficiency by comparing key performance indicators between an ad hoc nested respiratory evaluation unit (NRU) within the ED and an alternate care site outside the ED.

Methods: This was a cohort study of 2 care models in the same ED during 2 different time periods. As coronavirus disease 2019 surged in March 2020, potential treat-and-release patients with fever or respiratory symptoms were triaged to a dedicated ED area (NRU). As ED volume grew, these low-acuity patients were triaged to an ACS. We compared ED length of stay, elopement, and left without being evaluated rates and ED recidivism between the 2 care models: NRU patients presented to the ED from March 16, 2020, to March 31, 2020, and ACS patients presented from April 1, 2020, to April 15, 2020. Continuous variables were compared using independent *t* test or Mann-Whitney test. Categorical variables were compared using χ^2 test.

Results: There were 414 NRU patients and 146 alternate care site patients with no significant differences in sex or age. The mean ED length of stay was shorter for alternate care site patients: 155 versus 45 minutes ($P < 0.01$). Elopement and left without being evaluated rates were higher in the NRU. There was no significant difference in ED recidivism between groups: 10% versus 6% ($P = 0.15$).

Conclusions: An alternate care site provided an efficient resource for the evaluation of patients with fever or respiratory symptoms during the coronavirus disease 2019 pandemic.

KEYWORDS

alternate care site, COVID-19, ED operations, fever, flu-like illness, public health emergency, revisits

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1 | INTRODUCTION

1.1 | Background

Surge capacity has been defined as a healthcare system's ability to rapidly expand normal services to meet increased demand in the event of large-scale public health emergencies or disasters.¹ Surge census is strongly associated with delays in patient evaluation, increased emergency department (ED) length of stay (LOS), and increased elopement from the ED. There are 3 essential components that contribute to surge capacity: staff, equipment, and structure (both physical and management infrastructure).¹ The American College of Emergency Physicians recommends healthcare facilities and systems plan for contingency capacity by developing alternate care sites during large-scale public health emergencies.² The use of alternate care sites during a surge has been previously reported³⁻⁵ and is recommended by the Centers for Disease Control and Prevention.⁶

The first confirmed case of severe acute respiratory syndrome coronavirus 2 in the United States was identified on January 15, 2020.⁷ Disseminated community spread rapidly followed with amplification of cases in New Orleans, Detroit, Chicago, and New York City.⁸ Similar to other respiratory virus epidemics, the circumstances of coronavirus disease 2019 (COVID-19) necessitated modifications to triage and management of ED patients in an efficient manner.

1.2 | Goals of this investigation

This study evaluates the efficiency of an alternate care site during the COVID-19 surge by comparing key performance indicators between a nested respiratory evaluation unit (NRU) within the ED and an alternate care site located outside but close in proximity to the ED.

2 | METHODS

2.1 | Selection of participants

A surge in patients with respiratory complaints began in March 2020. In an attempt to cohort low-acuity patients presenting to the ED during the COVID-19 pandemic, we initially earmarked 5 single-occupancy rooms for non-toxic-appearing patients with fever or respiratory symptoms. From March 16 to March 31, 2020, patients who did not appear ill or significantly short of breath at triage were placed in 1 of 5 single-occupancy rooms for evaluation and COVID-19 testing. The NRU was a low-acuity, fast track unit located in the ED, operational from 10 AM to 10 PM and staffed with a dedicated advanced care practitioner (physician assistant or nurse practitioner), a registered nurse, and a patient care assistant donning full personal protective equipment including an impermeable gown, gloves, N95 with a covering facemask and goggles or face shield, and a surgical bonnet.

In late March 2020, the volume of ED patients with respiratory symptoms plateaued; the proportion of high-acuity respiratory complaints increased; and the number of hospital admits, and subsequent

The Bottom Line

The arrival of patients suspected of having coronavirus disease 2019 often necessitate alternate care sites. By using an outside alternate care site for stable patients with fever or respiratory symptoms, one emergency department successfully reduced length of stay from 155 to 45 minutes.

ED holds, increased. An alternate care site was created to manage low-acuity patients presenting to the ED for concerns of COVID-19. A 52 square meters conference room space adjacent to the ED with an external entrance was repurposed as an alternate care site. The unit was modeled using Centers for Disease Control and Prevention guidelines for an open floor plan alternate care site.⁴ A total of 4 cubicles were fashioned from portable screens and furnished with 1-piece molded plastic chairs (for ease of decontamination) oriented parallel to each other and parallel to airflow direction exiting the unit. Ventilation in the alternate care site was positive pressure.

The staffing model from the NRU was redeployed to the alternate care site without any additional personnel. The alternate care site was operational from 10 AM to 6 PM daily, reflecting our peak registration time for patients presenting with respiratory illness. The area was equipped with workstations on wheels for documentation in the electronic medical record (EMR). The external entrance permitted patient movement between the ED triage and the alternate care site without traversing ED clinical areas (Figure 1) and allowed a 250 ft exertional pulse oximetry recording.⁹

Both the NRU and alternate care site functioned as treat-and-release screening units. Workup was limited to nasal swabbing. Patients identified as having more serious disease or suspicion of an alternate diagnosis were retriaged to another area of the ED for care. The ED triage process was not altered during the COVID-19 surge. After a quick registration to generate an EMR, the ED triage nurse completed a rapid assessment that included vital signs, pulse oximetry, travel screening, and assignment of an Emergency Severity Index (ESI) score. Patients with fever or respiratory symptoms and appropriate vital signs were escorted to the NRU or alternate care site by a senior nurse assistant. Vital signs were rechecked on arrival to the alternate care site. Patients were immediately upgraded to the main ED if exertional pulse oximetry dropped below 88% on room air or if heart rate exceeded 120 beats per minute. All charting was performed using the hospital's EMR. Pre-printed discharge instructions and educational material were provided.

We used data from the EMR system, which integrates patient tracking and charted data (Sunrise EHR, Allscripts Healthcare LLC, Chicago, IL). Database queries with Tableau (Tableau Software, Seattle, WA) collected patient demographic information, clinical data, patient flow time stamps, and disposition for all patients registered in the ED from March 15, 2020, to April 15, 2020. We compared key ED performance metrics between the different care models including ED LOS, elopement, and left without being evaluated rates, and ED recidivism with 72 hours and

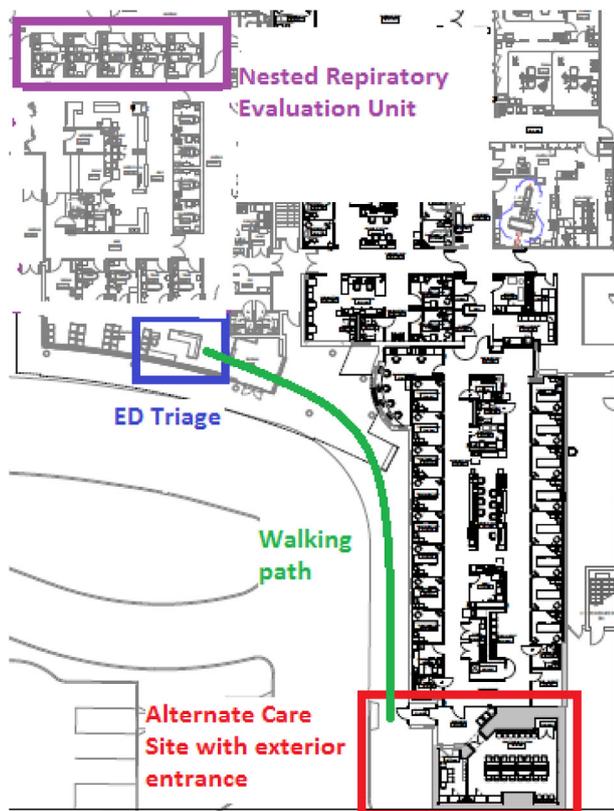


FIGURE 1 Blueprint of emergency department (ED) clinical space and conference room

within 1 week. Continuous variables were compared using independent *t* test or Mann-Whitney tests, when applicable. Categorical variables were compared using χ^2 test or *z* ratio.

3 | RESULTS

There was a total of 5401 ED visits during the time intervals captured in this report; 3227 during the NRU period and 2174 in the alternate care

site period. There were significant differences in the proportions of ESI levels between periods, with a higher acuity of illness and a smaller proportion of treat-and-release patients in the alternate care site interval compared with the NRU interval (Table 1).

There were 414 patients triaged to the NRU and 146 patients triaged to the alternate care site. There was no significant difference in sex or age between groups. There were significant differences in the ESI distributions between intervals. Comparison of key ED performance metrics between the NRU and ACS patients is listed in Table 2. Overall, the mean ED LOS decreased from 155 minutes in the NRU to 45 minutes in the alternate care site ($P < 0.01$). The ED LOS for each acuity level was significantly different between groups. The rates of elopement and left without being evaluated were higher in the NRU. There was no significant difference in the overall ED revisit rate between groups; 10% versus 6% ($P = 0.15$). There was no significant difference in the number of patients admitted to the hospital on return visit from the NRU and alternate care site.

4 | LIMITATIONS

There are several limitations to the current report. The operational strategies described were different and functioned in different time periods of the COVID-19 surge. The overall ED volume dropped from March to April; however, the acuity of patients and the proportion of admits significantly increased from March to April. The NRU treated a wider spectrum of patients in a time of higher patient volume, whereas the alternate care site functioned during a time of lower ED volume with higher acuity and a narrow spectrum of patients. In addition, as our clinicians became more familiar with COVID-19, evaluations relied increasingly on vital signs and exertional pulse oximetry, presumably leading to shorter ED LOS.

There was no standardization of triage assignment to the NRU or alternate care site. Other than fever or respiratory complaints, we did not specifically define clinical characteristics (ie, work of breathing,

TABLE 1 Overall emergency department metrics March 15, 2020, to April 15, 2020

	NRU interval (March 15, 2020, to March 31, 2020)	ACS interval (April 1, 2020, to April 15, 2020)	<i>P</i>
Emergency department census, n	3227	2174	
Acuity level, n (%)			
ESI-1	45 (1)	64 (3)	<0.01
ESI-2	724 (22)	612 (28)	<0.01
ESI-3	1575 (49)	931 (43)	<0.01
ESI-4	815 (25)	462 (21)	<0.01
ESI-5	59 (2)	40 (2)	0.97
Admits, n (%)	617 (19)	733 (34)	<0.01
Total T&R, n (%)	2343 (73)	1208 (56)	<0.01
Average T&R LOS, minutes	218	212	
Total elopement and LWOBE, n (%)	48 (1.5)	18 (0.8)	0.03

ACS, alternate care site; ESI, Emergency Severity Index; LOS, length of stay; LWOBE, left without being evaluated; NRU, nested respiratory evaluation unit; T&R, treat and release.

TABLE 2 Key performance metrics for nested respiratory evaluation unit (NRU) and alternate care site (ACS)

	NRU	ACS	P
Total patients triaged to unit, n (%)	414 (13)	146 (7)	<0.01
Average age, years	42	44	0.17
Female, n (%)	255 (62)	72 (49)	0.96
Acuity level, n (%)			
ESI 3	212 (51)	17 (12)	<0.01
ESI 4	198 (48)	114 (78)	<0.01
ESI 5	4 (1)	15 (10)	<0.01
Mean T&R LOS, minutes	155	45	<0.001
Mean LOS by acuity, minutes			
ESI 3	178	50	<0.01
ESI 4	132	45	<0.01
ESI 5	88	39	<0.01
Elopement and LWOBE (n)	6	0	
Total return visits, n (%)	42 (10)	9 (6)	0.15
Mean time to return, hours	85	141	0.04
Return visits by acuity, n			
ESI 3	27	3	
ESI 4	15	6	
ESI 5	0	0	
Return within 72 hours, n			
ESI 3	12	1	
ESI 4	9	2	
ESI 5	0	0	
Admits after return visit, n	11	1	

ESI, Emergency Severity Index; LOS, length of stay; LWOBE, left without being evaluated; T&R, treat and release.

cough characteristics) or “appropriate” vital signs for triage to the NSU or alternate care site. Triage nurses were advised to use clinical judgment in addition to ESI criteria for ED unit assignment and became more conservative with triage to the low-acuity unit during the course of the COVID-19 surge. Patients triaged to the NRU had a higher acuity of illness based on the triage nurse ESI assignment. In addition to the aforementioned, differences in ED LOS and ED recidivism between the NRU and alternate care site might reflect a higher acuity of illness. Of the 42 return visits after an initial evaluation in the NRU, 11 resulted in hospital admission, including 5 ICU admissions and 3 subsequent deaths. Of the return visits after initial evaluation in the alternate care site, one resulted in a hospital admission.

We do not have the rate of up-triage that might have occurred after initial evaluation in the NRU or alternate care site. Although there may have been a significant rate of up-triage after evaluation, the numbers do not undermine the effectiveness of the alternate care site and in fact may bolster it. Lastly, patients may have sought care at a different hospital after the index visit to the NRU or alternate care site. It is possible that there may be a higher proportion of ED recidivism after the index visit for either group of patients.

5 | DISCUSSION

We created an alternate care site outside of the ED for the evaluation of patients during a surge in critically ill ED patient volume during the COVID-19 pandemic. The plan of creating an alternate care site outside of the ED permitted the evaluation of patients who were low acuity with suspected COVID-19 while preserving ED beds and isolation rooms for patients with high acuity. The alternate care site also prevented comingling of patients with severe respiratory illness and patients with low acuity or potentially no COVID-19 illness. Patients triaged to our alternate care site were low acuity and had a short LOS and a low rate of ED recidivism. Our data suggest that patients who were low acuity with fever or flu-like symptoms could be managed promptly without sacrificing quality of care using the ED revisit rate as a surrogate.

The concept of an alternate care site is not novel and has been implemented during other ED census surge events. Fagbuyi et al⁴ reported improved door-to-clinician time, improved treat-and-release LOS, no increase in daily elopement rates, and no change in return rates using a rapid screening process and alternate care site despite a 50% mean

increase in daily patient volume during the 2009 H1N1 pandemic. Pershad et al³ also reported a significant reduction in ED turnaround time and ED elopement rate with no significant change in ED revisit rate using an alternate care site staffed exclusively by registered nurses and ED technicians for pediatric patients presenting with influenza-like illness during the 2009 H1N1 pandemic. The evolving acuity and changing volume of ED patients during COVID-19 was different from the surges reported with the 2009 H1N1 epidemic. Our ED volume surged with respiratory complaints and quickly contracted, presumably because of shelter-in-place mandates, but was teeming with high-acuity patients and an increased number of hospital admits.

The external alternate care site also provided a unique process change providing activity-provoked vital signs, which in retrospect turns out to be an important component in ED disposition assignment. Patients triaged to the alternate care site by its design provided an opportunity to investigate an activity-provoked vital sign measurement. After walking patients to the alternate care site, a repeat pulse oximetry and heart rate was obtained. Exertional pulse oximetry conferred additional risk stratification that was not easily obtainable within the ED in the context of the situation. Literature on patients with chronic obstructive pulmonary disease suggests that a 6-minute walk test can accurately identify patients at risk for decompensation.⁹ Lama et al¹⁰ found a significantly higher mortality rate among patients with non-specific interstitial pneumonia who experienced a fall in oxygen saturation $\leq 88\%$ during a 6-minute walk test. Our exertional pulse oximetry test was performed on a different population of patients for a shorter length of time; however, it simulated the conditions a patient would experience upon discharge and provided an opportunity to educate patient about the disease process and his or her current symptoms.

6 | CONCLUSIONS

An alternate care site staffed by emergency personnel provided an efficient resource for the evaluation of patients with fever or flu-like symptoms during the COVID-19 pandemic as demonstrated by shorter ED LOS and fewer ED return visits.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Gregory Garra contributed to the conceptualization, methodology, writing, original draft preparation, and formal analysis. Sanjey Gupta contributed to the conceptualization, writing, reviewing, and editing. Steven Ferrante contributed to writing, reviewing, and editing. William Apterbach contributed to writing, reviewing, and editing.

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AUTHOR BIOGRAPHY



Gregory Garra, MD, is a board-certified attending physician in emergency medicine and pediatric emergency medicine at Southside Hospital, Bay Shore, NY, where he is an Associate Chair of Emergency Medicine.

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