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Emergency Department Clinical Operations During a Pandemic: Lessons Learned and Future Directions

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Abstract

The COVID-19 pandemic brought together front-line medical professionals, operational experts, and scientists to share effective strategies and lessons learned during the most tumultuous medical event of our generation. As hospitals and health systems assess the challenges they have faced over the last year, it is essential that they adapt—and even re-imagine—healthcare delivery to address future waves, the next pandemic, or unanticipated new threats that may arise. This white paper, written by emergency physicians who served both clinically and administratively in New York City at the height of the 2020 COVID-19 crisis, is an effort to share lessons learned in pandemic planning and surge response, and to help better prepare our colleagues for the future.

EB MEDICINE

Table of Contents ..... Page

Tables and Figure

Overview

The world's experience with COVID-19 has demonstrated that the current infrastructure and practice of emergency medicine are not designed to respond effectively to an ongoing and sustained pandemic.[1]

As of March 18, 2021, the United States saw over 29 million cases of COVID-19 and experienced over 535,000 deaths.[2] Although there have been some relative successes with limiting the spread of COVID-19, the U.S. continued to see areas with growth in both total cases and hospitalized cases of COVID-19 and a corresponding influx of COVID-19 patients presenting to local emergency departments (EDs). As the epicenter of the early U.S. wave, New York City experienced a surge of COVID-19 patients that magnified the daily strain on regional ED capacity and operations. In addition to existing preparedness plans, from mid-February through April of 2020, clinical leadership at major health systems developed multiple "just-in-time" plans to ensure safety and clinical effectiveness during a period of significant medical uncertainty.[3,4] In addition to learning key treatments, crucial knowledge was gained in reconceptualizing ED operations in response to a pandemic.

During the first wave of the pandemic, EDs experienced dramatic reductions in the numbers of non-COVID-19 patients.[5] While this allowed for focus on treating COVID-19 patients, continued disease prevalence or recurrent waves of COVID-19 may bring a more mixed group of patients to EDs, so the lessons of infection prevention and segregation will be increasingly important in order to control nosocomial spread of all infectious disease. The response to pandemic surge conditions requires ongoing attention to clinical operations to keep patients and staff safe while providing effective and efficient ED care. In this report, we highlight concepts in surge and disaster planning and incorporate them into a generalizable response plan for pandemic conditions. Specific insights related to COVID-19 that were gained during this crisis are highlighted in **COVID-19 Spotlight** boxes.

Building on Modern Pandemic Response Literature

Over the last 25 years, outbreaks from H1N1 and H5N1 influenza, severe acute respiratory distress syndrome (SARS), Ebola, and other infectious diseases have sparked extensive recommendations for responding to emerging infectious disease.[6-12] Within the ED, 3 major strategic areas of focus include: (1) infection prevention efforts; (2) surge planning; and (3) operational response to acute, ongoing, and unpredictable high patient volumes. The U.S. Centers for Disease Control and Prevention (CDC) and the Assistant Secretary for Preparedness and Response (ASPR) within U.S. Department of Health and Human Services (HHS) have developed useful tools to support hospital and health system preparedness, giving specific guidance about strategic planning for these prolonged or short-term surges.[13,14] In 2011, Dugas et al highlighted key interventions and priorities in pandemic response put forth by a panel of 34 experts representing public health, disease surveillance, clinical medicine, ED operations, and hospital operations. Many of the direct ED recommendations were coordinated with hospitals, public health authorities, and regional planning authorities, as a comprehensive framework.[15]

Literature that was focused on clinical and operational interventions, innovations, and administrative process proliferated after the early period of the COVID-19 outbreak.[3,16-20] Although the level of evidence for specific interventions to improve the safety and efficiency of hospitals and EDs during a pandemic is low, this literature—in conjunction with prior experience with infectious disease outbreaks—provides a framework for action. In developing this paper, we have taken our experiences as part of a large urban healthcare system with 8 acute care hospitals and incorporated best practices and promising interventions from around the U.S. and the world. This review will offer ideas and opportunities to optimize overall pandemic planning, as well as noting specific approaches to COVID-19 management.

Preparedness: A Key Part of the Pandemic Response Framework

The U.S. Centers for Medicare & Medicaid Services (CMS) requires that every hospital in the U.S. that receives CMS funding implement an all-hazards disaster plan. As a component of overall hospital and health system planning and response, the ED should operate in coordination with local, regional, state, and federal partners from across the medical response system. Planning and action for pandemic responses flow both vertically (hospital, city, state, and federal groups) and horizontally (across EDs). ED leadership should be well-versed in incident management principles and the incident command structure in order to facilitate interdepartmental operations and to ensure the ED efforts align with the larger effort. National and state policy may strongly influence the public health aspects of response and the resources available to support a response in a pandemic environment.

Regional strategies influence local ED operations directly. For instance, emergency medical services (EMS) transport decisions and policies may affect arrival patterns of patients at the hospital level. In addition to regional policies and procedures around ED diversion, hospital-level policies may also markedly shift the arrival burdens in a community.[21]

Collaborative coordination within the hospital during pandemic conditions will be key to ED success. Some of these responses may be simple, such as a separate EMS reception area for respiratory patients, dedicated isolation floors, or inpatient holding floors for patients pending test results, as well as coordinated transfer arrival processes and rapid interdisciplinary patient disposition plans to limit ED workups. However (and potentially just as important) the usual challenges of throughput and boarding of admitted patients will continue to affect the ability of an ED to respond successfully to volume and acuity surges.

ED leadership can extend beyond their own system by coordinating with other local EDs to share practices, help pressure stakeholders to improve collaborative policies, and speak as a single voice on metropolitan or state policies. For example, during the initial COVID-19 pandemic wave, the inability to seamlessly coordinate transfers between hospital systems to load-balance often led to mismatches in bed availability and need.[22,23] A better and more coordinated approach can serve as a useful model to implement the rapid changes in ED operations that are required during pandemic conditions. In New York City, a state directive in November 2020 mandated that hospital systems have a plan in place to balance patient loads across their hospitals. Other states have done this successfully previously, including across hospital systems.[24]

COVID-19 Spotlight 1: Preparedness for a Hidden Threat and Implications for Emergency Department Planning

In the 2003 SARS outbreak, recommendations to identify disease were developed based on a combination of clinical and epidemiologic criteria. However, SARS (as well as other deadly diseases, such as Ebola) tended to have clearer symptomatology, allowing for a more focused screening. Local health departments and the CDC attempted to create case definitions for COVID-19 screening based on geographic prevalence; however, this approach fell apart quickly, as community spread outpaced screening and testing procedures.

Due to the asymptomatic and atypical presentations of COVID-19, EDs needed an operational approach that embraced this clinical variability and enabled strategies that accounted for a wide case definition and broad safety measures in order to provide a secure environment.

Leadership and Communication

Managing the level of uncertainty during a pandemic requires both clinical and administrative direction. Key principles for ED leaders include a commitment to a safe practice environment; advocacy for the needs of ED operations; a flexible, yet principled approach to business operations; and large amounts of creativity.

Approaches for ED leadership communication include ED huddles, video/audio townhalls, emails, signage, and more frequent staff meetings. One solution will not work for all, but a continual stream of verifiable information, along with transparency and honesty, are critical for maintaining provider trust.

All staff involved in the ED pandemic response are aware of the risks that they face, so it is key for ED leadership to acknowledge, appreciate, and support efforts to ensure safe practice in the ED. Staff will be obtaining information from not only their department, but also from the published and online literature, professional and social listservs, chat rooms, tweets, newspapers, and colleagues. Invariably, they will compare their department's response to what they see and hear. Departmental leadership needs to be aware of the variety of recommendations that are being promulgated and be able to respond in a thoughtful and fact-based way if asked about them.

COVID-19 Spotlight 2: Providing Insight into Pandemic Practice

- During the COVID-19 pandemic, the American College of Emergency Physicians (ACEP) developed a listserv for their thousands of members. Emergency physicians from around the country regularly contributed updates, opinions, and workflows.
- Dozens of academic journals, free open access medical education (FOAMed) sites, and other online sources proposed creative solutions to clinical and operational challenges during the pandemic; however, when evidence is lacking, separating good and responsible ideas from bad ideas is a true leadership challenge.
- One job of ED leadership was to review all information regularly, both to counter information that was felt to have not been vetted appropriately (and explain why to staff who were reading the same information), as well as to look for best practices or new ideas that might be useful for local integration. The department must review, integrate, and share expectations with physician peers and justify the rationale in order to gain support for departmental policy.

Ensuring a Safe and Secure Environment for Patients and Emergency Department Staff

Modern EDs and hospitals are not designed to care for large numbers of infectious disease patients, and it is unusual for a facility to have more than several negative pressure rooms or large-scale isolation accommodations. In this section, we discuss opportunities for EDs to improve safety through modifying processes and managing existing resources to operate a safe space.

Patient Screening

Patient screening during a pandemic or an outbreak is historically based on a combination of disease characteristics (eg, cough, fever), geographic prevalence (eg, community or country) and potential for exposure (eg, from travel). Community spread of a disease removes the option to use geographic prevalence for screening. Asymptomatic spread reduces the benefits of symptom screening and requires adjustment in hospital strategy. Employees, patients, and visitors may be screened using enhanced checklists of symptoms and temperature; however, limitations will remain due to asymptomatic carriage as well as the potential for delayed test results. Therefore, while screening helps, it will be imperative to assume that everyone is infectious, and implementing precautions for all individuals at all entry points is necessary in order to improve control of the selected diseases.

COVID-19 Spotlight 3: Patient Screening

- COVID-19 was highly prevalent, with widespread infections with rapid community spread due partially to the failure to recognize the variable presentations, combined with inadequate screening tools.[25]
- Generally, screening relied on travel history and symptoms, neither of which were sensitive indicators of infection.
- CMS provided early guidance and regulatory updates, essentially reaffirming EMTALA (Emergency Medical Treatment and Labor Act) obligation as well as the requirement to screen and isolate patients; however, the reality of operationalizing screening under the federal mandates were not feasible and required state- and locally driven solutions.
- Most health systems continued to screen, but assumed that all patients were possible carriers, and required masks to enter the hospitals.

In areas with high prevalence or endemic community spread, all patients and visitors should be presumed to be infected. **(See Table 1.)** Hospitals should require universal masking for outbreaks of respiratory pathogens. Prominent notices, in appropriate languages, should be posted at entrances, listing signs and symptoms of infection to help educate patients to notify the ED staff on arrival that they are experiencing symptoms. Patients arriving unmasked or with a less than optimal mask (eg, exhalation port, bandana), should be provided with an appropriate mask. Symptom-based assessment may be useful when thinking about isolating high-risk patients, especially when single or negative pressure rooms are limited. Although access to high-quality masks (eg, N-95) may be limited, when they are available, hospitals may want to consider providing fit testing to their highest risk populations to help mitigate highly dangerous transmissions.

Table 1. Screening Guidelines

Patient/Visitors	Employees
• Universal masking • Prominent signage • Multicultural/linguistic strategies • Rapid isolation • Use of telehealth or alternative care space • Additional focus on signs/symptoms (temperature checks, questionnaires)	• Universal masking • Use of telehealth or alternative care space • Additional focus on signs/symptoms (temperature checks, questionnaires) and daily attestations

COVID-19 Spotlight 4: Employee Screening

- Employee screening and quarantine policies became nearly universal for healthcare facilities. Daily electronic symptom self-screening and attestation to absence of symptoms and high-risk exposure were common methods. Employees were also required to have temperature checks daily on arrival, before beginning work.
- Positive screens led to an employee health screening and decision tree, based on exposure, for testing, home isolation, and further care. Temperature checks were also common.
- It is not clear how effective or accurate these screening methods were, given the large number of asymptomatic or presymptomatic patients as well as the nonspecific nature of the symptoms; however, screening builds awareness among employees that COVID-19 could be spread by workplace transmission in hospitals and other healthcare settings.
- While not commonly practiced, actual testing of asymptomatic workers is likely to be more effective.[26,27]

Visitor Policies

Eliminating visitors to control infection spread and maintain order in the ED has negative consequences, as it can hinder family integration into the care and support of patients. If visitors are allowed, having a preplanned strategy for communication of expectations, thresholds to remove some or all visitors, minimizing movement in the ED, and mandatory masking (based on threat) are necessary to maintain a reasonable level of safety. Visitation policies should focus on both prevalence and daily surge levels to safely accommodate visitors. **(See Table 2.)**

Table 2. Sample Tiered Visitor Policy

Visitation Category	Patient Isolation Status	Visitor Policy
Usual	Sufficient isolation spaces available for all suspected or confirmed suspected COVID+ patients	• 1 visitor per bedside at a time allowed. Completion of screening tool and afebrile status confirmation occur prior to entrance into the ED. • Visiting allowed 24/7, but for 2-hour limit for each visitor.
Limited	Available isolation spaces not sufficient for some suspected or confirmed COVID+ patients, but 6-foot distance is maintained throughout ED area	• 1 visitor per bedside, pending completion of screening tool and afebrile status confirmation, exclusively during initial evaluation and when discussing results (ie, during key moments of care).
Restricted	Insufficient isolation spaces for suspected COVID+ patients, unable to space 6 feet apart in ED area	• No visitors allowed without prior consent of ED leadership or special considerations, ie, end of life, severely demented patient, or pediatric concerns. • Virtual visitation available for visitors in waiting room or external to the hospital, 24/7.

COVID-19 Spotlight 5: Visitors and Visitor Screening

At the height of the pandemic, New York State released regulations eliminating all nonessential visitors (ie, nonparent or non-necessary caregivers) from the hospital.[28]

- The New York Department of Health reasoning included concerns for an infected visitor transmitting infectious disease as well as for an uninfected visitor acquiring an infection in the facility. As the prevalence of the disease decreased, a revised state and hospital visitor policy allowed 1 visitor per patient into the ED if they were first screened for symptoms of COVID-19, had a normal temperature, and had confirmed face mask placement.
- While visitors are often essential for emotional support and communication of patient medical history and other key information, EDs must balance this against the need to keep patients, families, and staff safe during pandemic surge times.
- Many EDs devised systems to bring visitors to the bedside through various electronic means such as computers, tablets, and telehealth platforms.

Distancing

Healthcare workers are particularly vulnerable to transmission of respiratory infections, due to close proximity and department crowding.[29] Standard guidelines around hand-washing, masking policies and procedures, personal protective equipment (PPE), and screening are difficult, but achievable in most EDs. Maintaining distancing has often proven to be an impossible task, especially in crowded urban departments. Patients can benefit from specific strategies such as placing waiting room chairs 6 feet apart; taping off or labeling chairs that cannot be moved; developing protocols to avoid, when possible, placing patients in double rooms or adjacent bed spaces; adding alternative care sites; and creating single rooms, as able, with curtains or fixed barriers.

Maintaining distancing between workers, on the other hand, is more difficult to achieve. Erecting barriers at staff workstations is a challenge in most EDs. Transparent barriers at ED registration and triage are another barrier solution for infection control, though the efficacy of this is unclear. If there is unused workspace, it should be brought online and workers spread across the department. Unfortunately, because these options are generally limited, focusing on proper and effective use of PPE, hand-washing, and station cleaning are the best options.

Personal Protective Equipment

PPE is a cornerstone of infectious disease preparedness. Understanding the guidance and operationalizing the appropriate equipment and processes for staff protection is crucial to staff safety. During a new pandemic disease, when disease transmission is incompletely understood, PPE may challenge the public health and medical experts. In developing policy and protocols for PPE, it is best to err on the side of caution until there is clarity on routes of transmission.

There must also be a plan to make sure that PPE processes are carried out effectively.[30,31] Designating a person dedicated to monitoring distribution and oversight in the department may be useful. Clearly written and posted instructions, as well as in-person training and reminders, help support safety messaging. It is difficult to guarantee proper wear as well as donning and doffing, especially in the initial phase of a pandemic, because it requires a change in process, personal comfort, and culture. One solution is to deputize a clinical staff member (eg, an EMT, PA, MD, or RN) to "police" the department, provide ongoing reminders, stop procedures with ineffective PPE, and summarize daily issues. In addition, to help conserve PPE, a system may be established where an individual, such as a clerk or administrative assistant, has set roles in distributing PPE daily to staff according to strict guidelines.

One ongoing area of controversy is the use of PPE that is purchased by staff. While the U.S. Occupational Safety and Health Administration (OSHA) has given more leeway for hospitals to allow personal PPE in times of severe shortage, in general, it is not recommended due to inability to standardize and vet equipment for actual safety. Especially when there are shortages and increased prices, unvetted PPE purchased outside the usual channels may not be safe.[32]

COVID-19 Spotlight 6: Personal Protective Equipment

- Initially, shortages of PPE, leading to procurement difficulties and controversy over safe reutilization practices of PPE materials, was a highly publicized and controversial issue.
- While much of this this was due to the unclear understanding of transmission, particularly controversy over aerosolization, it was also driven by the reality of limited PPE supplies.
- Although there are currently clear guidelines set forth by the CDC about appropriate PPE usage and supplies required for COVID-19, it is important to maintain supply chains and ongoing availability.
- The CDC and OHSA provided some graduated guidance, including reuse over multiple patients (generally widely practiced at this time) and other options such as wearing PPE past expiration date and use of internationally approved respirators that were not NIOSH (National Institute of Occupational Safety and Health)-approved. In addition, options for decontamination during crisis care were given.
- One option to help with PPE resource requirements is the CDC "burn rate" calculator to assist with understanding supply needs. The calculator can be accessed at: https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/burn-calculator.html

Improving Air Flow and Negative Pressure Space

Air exchange is another element of preventing nosocomial spread of infection with airborne or aerosolized pathogens. The construction of permanent negative pressure space is time-consuming and costly; however, lower-cost alternatives help support safer operations. "Air scrubbers" with HEPA filtration offer improved air exchange and decrease viral particles in the environment.[33] These can be placed in high traffic and infectious disease areas of the department. Temporary negative-pressure rooms may be created from rooms adjacent to external walls/windows (essentially, pulling air from the select room), although it can be a challenge in venting air on ground floors. Engineering solutions that reverse filtration or redirect airflow may be possible; however, safety regulations must be met prior to implementation.

Emergency Department Endemic Unit Designation

The ED requires a distinct and flexible approach to designation of infection prevention standards. If the number of likely infectious patients overwhelms the ability to place symptomatic or potentially infectious patients in a closed-door or isolation room or if there is an inability to perform all potentially infectious procedures in isolation, there may be a need to transition to "endemic unit" status. This surge designation requires the donning of PPE at all times for the providers and all staff working in this environment, as infectious particles may be endemic in the area.

COVID-19 Spotlight 7: The Emergency Department as a COVID-Endemic Unit

Compared to formal COVID-19 units in the hospital and intensive care unit (ICU), where all patients had confirmed diagnosis of COVID-19, ED patients had multiple non-COVID-19 diagnoses. Therefore, certain practices had to be modified, eg, gowns had to be doffed after each patient and new ones donned for the next patient. If a closed-door area could be designated to cohort patients all diagnosed with the specific pathogen, then staff dedicated to the area would not require PPE changes between each patient, conserving limited resources.

Radiology

Suspected lower respiratory tract infections such as SARS, MERS, or COVID-19 often warrant imaging for diagnosis, either by chest radiograph or chest computed tomography (CT). Explicit protocols for the operation of radiology services to reduce contamination of equipment and staff should be part of departmental plans. Point-of-care ultrasound poses a particular challenge. As a key device, there must be attention from clinical and environmental services (EVS) to ensure an ultrasound machine is cleaned completely, based on potential exposures. If resources allow, it may be beneficial to designate a machine as "respiratory" to indicate that it is to be used only for patients with suspected infection.[34]

Environmental Services

Stringent guidelines for cleaning clinical spaces require a clear, accountable process to maintain a safe environment. New protocols and processes revolving around consistent and enhanced cleaning are necessary to maintain infection control. Using clear, visible "clean/dirty" designations on each room signals to EVS and patient-facing staff what is required and signals to patients that infection control is being prioritized. This type of closed-loop communication can create efficiencies to expedite care and more quickly room patients who require isolation. Enhancing EVS procedures may require additional supplies and staff, so this should be a recognized planning need, including contractual options for additional staff during peak periods.

Safety can be enhanced by highlighting a universal approach to infection prevention and offering non-EVS staff options to assist. Actions such as providing cleaning wipes at all workstations and reinforcing basic sanitation can contribute to a standardized approach to a safe work environment.

Electronic Medical Record

Part of disaster planning includes ongoing collaboration with information technology (IT) services around the electronic medical record to enhance the response to the pandemic environment in the ED. Innovative ways to enhance safety can be preplanned and deployed during an infectious disease outbreak. General recommendations include:

- Establishing appropriate markers related to disease or symptoms of interest. Quick visual markers can be created on patient lists to identify persons under investigation (PUI), positive-tested patients, and negative-tested patients.
- Attaching specific contact and droplet precautions to orders for specific disease tests.
- Creating specific laboratory order sets and clinical protocols for easy access to all necessary tests.
- Making key vital signs visible on tracking boards. For example, respiratory diseases could have an "oxygen saturation" tab on the tracking board to help clinicians monitor the latest key vital sign at a glance.

Respiratory Intervention Practices

In respiratory disease pandemics, it is necessary to develop and maintain safe practices with respiratory interventions. This includes the application of safety tools such as HEPA filters for all airway devices, including BiPAP, bag-valve masks, and endotracheal intubation. The literature on the benefit of airway boxes and other devices is mixed; maintaining sufficient supplies of oxygen delivery equipment is critical. Also essential is having a clear practice of isolating patients. If isolation is impractical due to space limitations, patients can be cohorted to endemic areas in order to protect staff, and written protocols on the maximum number of clinicians allowed in a room during the highest-level respiratory procedures (eg, intubations) should be created.[35,36]

Integration of telemedicine enables safer and more streamlined processes that engage patients before and during their visit to the ED. Emergency medicine leaders have discussed a multitude of applications for this technology both to enhance standard ED operations and to transform the way we care for patients.

COVID-19 Spotlight 8: Telemedicine Innovation

Telemedicine was an essential part of the management of patients during COVID-19 surge periods. Patients who entered the ED might still receive care via a video visit in order to mitigate risk and exposure to providers and to minimize the use of PPE on specific designated procedures that are thought to be of low acuity.

- **Remote screening:** A public-facing teletriage system can help to prevent patients with mild disease from overwhelming the hospital and ED. Workflows must be designed to ensure that sick patients have access to required in-person care if screening shows worse disease than expected.
- **Onsite teletriage:** Evaluating low-risk patients with COVID-19 symptoms by telemedicine can improve flow in the ED, similar to a provider-in-triage (PIT) operation. This minimizes exposure of staff and enables more vulnerable physicians or physician-extenders to participate in the care of patients. Patients appropriate for telemedicine can be selected based on guidelines for telemedicine evaluation, which usually includes mildly ill patients.
- **Telesupervision:** Remote supervision of advanced practice providers or resident physicians by an attending physician allows for conservation of PPE and decreased clinician exposure to potentially infected patients.
- **Existing technologies:** Not all remote work requires sophisticated devices to accomplish a safer workflow. Clerical and administrative tasks may be performed from afar, including the use of telephones or digital devices to gather patient information and avoid direct contact.

Emergency Department Surge Concept and Definitions

The goal of pandemic surge planning and operation is to enable effective care of patients while keeping staff, clinicians, and patients safe in spite of increasing demand on healthcare resources.[37] This ability to provide surge capabilities when pandemic conditions arise is the difference between a system's failure or success.[38,39] Although all critical departments (such as the ICU and ED) will have an independent plan, ideally, this plan is integrated with other hospital and regional resources. ED leadership should advocate for ED-based considerations in hospital surge planning, including inpatient-related triggers that are developed based on ED arrivals and census of pandemic patients.

Hospital surge plans for volume-based or crowding concerns may use evidence-based scoring systems such as the National Emergency Department Overcrowding Scale (NEDOCS) www.nedocs.org[40] However, in the context of infectious disease outbreak or pandemic, a more complex response requires flexible and dynamic mechanisms in order to accommodate shifts in standard and infectious patient volume. A dynamic pandemic surge model should account for escalating and expanding operations that begin internally in the ED but allows for quick escalation to involve hospital and regional support. This will require structural, staffing, systems, and equipment resources to manage anticipated patient care needs. An online calculator for the NEDOCS score is available from MDCalc at: **www.mdcalc.com/nedocs-score-emergency-department-overcrowding**

The surge levels will be determined by the physical layout and available space of the individual ED, in addition to its staffing capabilities. A model to consider is one triggered by the number of infectious/isolation patients compared to the ability to isolate those patients in appropriate space.

Triggers and Initiation of Surge Plan

Infectious surges generally occur over days to weeks. Depending on the local transmission rate, however, certain diseases may multiply rapidly in a population, and patient arrivals can build up relatively quickly. Determining pre-established triggers to escalate ED response prior to a surge will enable ED leadership to communicate level of impact, expected actions, and resources required so that hospital administration has a common framework of response. Balancing community disease prevalence and internal operational measures can provide a starting point.

Utilizing the Crisis Standard of Care Framework

The National Academy of Sciences/Institute of Medicine developed the widely adopted Crisis Standards of Care (CSC) framework in 2012.[41] The standards of care surge levels consist of (1) conventional, (2) contingency, and (3) crisis designations. The standards of care spectrum has been accepted widely and is used as the basis for national disaster planning efforts. These standards can be adapted to define stages of ED surge and offer mitigation strategies. **(See Table 3, page 18.)**

Table 3. Surge Framework for the Emergency Department

Surge Level	Trigger/Rationale for Escalation	ED Operations	Anticipated Request From Hospital/Health System
Normal Operations (Conventional Operations): Number of patients with suspected illness is less than or equal to the number of NPRs or isolation rooms in the ED	Number of patients is less than or equal to the available number of NPRs	Standard operations	• Early warning for hospital and health system as needed
Surge Level 1 (Contingency Level 1): Number of patients with suspected illness is less than or equal to the number of CDRs in the ED	Number of patients exceeds the number of NPRs (using existing "safe spaces" ie, CDRs or single, curtained rooms)	Make internal operational adjustments to ensure safe isolation	• Request support for expediting bed assignment on the floor and ICU • Follow standard surge guidance • Request preparation for medicine team assignments in the ED • Request preparation for PPE teams in the ED • Request expedited testing for specified patients
Surge Level 2 (Contingency Level 2): • Number of patients with suspected illness exceeds number of appropriate closed/ isolation rooms • Requires geographic surge within the confines of the ED (with minimal external support) • Requires a change in patient flow, augmentation of clinical staff, and will require minimal change to level of hospital resources required	• Number of patients exceeds NPRs + "safe spaces" • Move to geographic partition of ED with >6-ft separation • Single bed assignments continue	• Implement prescreening or other pandemic triage option • Increase ED staffing to meet demand • Geographic assignment of nursing • Endemic ED protocols (PPE) • Medicine team assigned to ED • Consider palliative care team • Implement isolation in curtained rooms • No-visitor policy	• All contingency 1 actions • Trigger upgrade in hospital operations (if not already done) • Deploy additional staff to ED • Deploy medicine team to ED • Deploy specialty teams to ED, including palliative care and proning teams • Activate planning for deployment of tent • Turn on transfer operations to load-balance
Surge Level 3 (Crisis Operations): • Number of patients with suspected illness exceeds the capacity of entire ED • Requires significant use of alternative care space, additional staff and resources.	• Exceeds NPR + CDRs + curtained rooms in expansion area level 2; • Double-bed assignment	• All level 2 actions • Implement cohorting of infectious patients • Request for additional staff • Tent operations and/ or alternative care sites	• All contingency 2 actions • Deploy medical tent operations and staffing support • Deploy additional ED staffing and equipment

Abbreviations: CDR, closed-door rooms; ED, emergency department; ICU, intensive care unit; NPR, negative pressure room; PPE, personal protective equipment.

Elements of an Emergency Department Surge Plan

- Organized stages
- Triggers and initiation
- Indicators of safety
- Surge processes: triage, telemedicine, geographic separation, segregation of patients, resuscitation
- Surge space: Expanding space availability with new beds, double beds, quick disposition, alternative care spaces, and pandemic-specific iterations
- Surge resources: Equipment needed to support space use
- Surge personnel: People needed to implement a clinical response

Pandemic Surge Processes

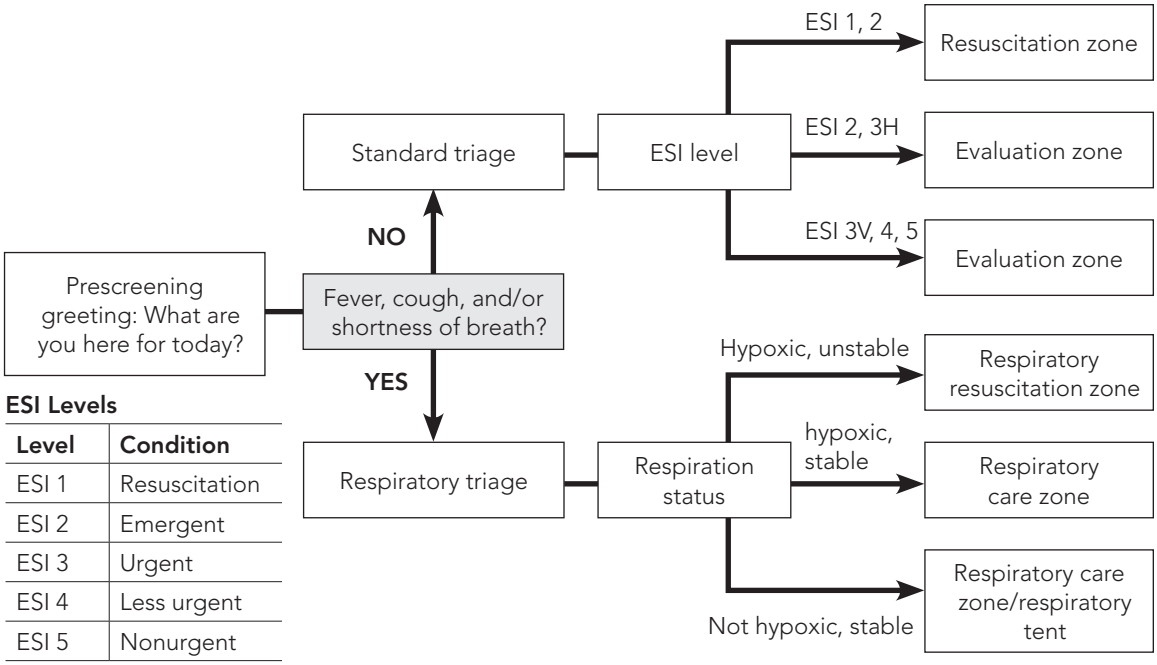
As ED patient volumes escalate, there are key processes that should be linked to each of the surge levels. Consider including these elements in the planning process:

1. **Establish regular leadership meetings and frequent updates:** Reporting on the conditions and impacts of pandemic conditions by the ED leadership can (1) raise hospital concerns and issues quickly, and (2) gain situational awareness about hospital and system operations that will impact the ED. In addition to ensuring every person has the required information, it will build ongoing trust in the operational plans.
2. **Triage process:** As increasing numbers of pandemic patients arrive, pre-screening triage processes or alternative spaces/tents dedicated to forward triage may enhance the ability of the ED to maintain separation of patients. For example, patients may be pre-triaged using an algorithm based on complaint and initial vital signs to receive care either in an adjacent tent, a low acuity area, or in the main ED. **(See Figure 1, page 20.)**
3. **Implementing endemic unit and geographic designation:** Although highly variable, depending on the layout of an individual department, adaptation of physical spaces is key for ED operations and ensuring staff engagement in the geographic distribution of patients. Cohorting by disease state or infectivity as well as changing the use of certain areas based on current needs (eg, pediatric to adult), can expand the ED footprint for targeted space.
4. **Boarding team engagement:** As the hospital adjusts to increasing numbers of pandemic patients, ED boarding times will likely increase. Depending on patient volume, it may be important to designate a specific coverage team for admitted patients to enhance patient care in the ED for all patients. Ideally, this team is based in the ED during high census times and composed of both inpatient nursing and physician/advance practice provider staff. Ongoing patient care is enhanced by close proximity to the inpatient team. It also allows patients and family members greater ability to participate in their care.

5. **Resuscitation protocols:** As prevalence of the disease increases in the ED, spaces and protocols for sick patients must be designated. For highly transmissible diseases, intubation and CPR protocols must be simple to understand, explicit, and posted. Issues such as where patients on high-flow nasal cannula or BiPAP may be treated must be clear. As part of surge plans, the de-escalation must be considered when it is safe to return to normal resuscitation protocols.
6. **Transfer policies:** Load-balancing must be an ongoing assessment by leaders. Daily system or regional huddles to understand area capabilities may be critical to offload a hospital whose daily capacity has been overwhelmed. While community load-balancing is optimal and has been discussed increasingly in many communities since the initial COVID-19 phase, it still remains a need for many areas.

7. **Adjunct clinical teams:** Engaging the palliative care team, the ethics team, as well as patient experience and social services teams takes enormous burdens off the ED staff and contributes to patient care. In smaller EDs not supported by large systems, this is more difficult, and identifying options for these resources early on is critical for long-term effective responses. Dedicated services to assist with family contacts are essential if they do not often have access to face-to-face discussions with the patient or care team. The hospital may be unable to provide some of these services, and reaching out to other volunteer or community resources may be necessary.

Figure 1. Sample Pandemic Triage Operations Algorithm



ESI Levels

Level	Condition
ESI 1	Resuscitation
ESI 2	Emergent
ESI 3	Urgent
ESI 4	Less urgent
ESI 5	Nonurgent

Abbreviations: ESI, emergency severity index; H, horizontal (requires stretcher); V, vertical (can be in a chair).

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Surge Space

There are many challenges to ED space utilization during a pandemic since, in general, modern EDs are designed for individual patients needing isolation.

Temporary Barriers

Temporary barriers can improve the separation between patients, groups of patients, and/or patients and the medical team. Theoretically, these physical barriers may decrease the transmission of infectious particles transmitted by contact or droplet.[42] The material between spaces may vary from physical screens or curtains to temporary walls. Because curtains and other barriers can easily be a source of cross contamination, any barriers should be regularly cleaned and disinfected or disposable.[43] Development of a temporary construction plan that fits with the departmental and hospital response plan should be done with the engineering department with the support of hospital leadership.

Local, state, and federal rules should be followed; however, consideration for emergency declarations may allow construction not generally accepted during a standard operating phase. Additionally, attention to airflow must be paid so that enclosed space without ventilation is minimized.

Medical Tents

The renovation, repurpose, or construction of an alternative care space can augment the operational space in an ED, serving as forward triage, holding spaces for admitted patients, or an extension of the standard ED operations. Whether a tent or another internal area, alternative spaces can provide an opportunity to build in concepts of safe design, decreased crowding, and improved airflow. Optimizing the utility of a space can present logistical challenges. One challenge in the rapid development of these spaces is the demand for infrastructure support, eg, IT, electrical, supplies, and staffing. Additionally, the ED needs to maintain compliance with EMTALA.

Existing Surge Spaces and Alternative Care Sites

Depending on the physical plant and use of the hospital and affiliated medical facilities, there may be an opportunity to transform existing space into usable clinical space for the ED. There will be variability based on multiple considerations, including clinical space or nonclinical space, outpatient or hospital grounds, as well the proximity to the ED. These spaces may be ideal locations for triaging mildly ill patients or for creating additional holding space.

It is unlikely that the core tenets of EMTALA (such as the need for medical screening stabilization) will change during a pandemic, although there may be some latitude given in the specifics of how they are carried out.

COVID-19 Spotlight 9: EMTALA and Pandemic Response

During the initial COVID-19 surge, hospitals were able to set up alternative screening sites on campus where the medical screening examination could take place. Individuals arriving at the ED were able to be redirected to these sites after being logged in at the ED (or outside the ED entrance); however, the person doing the directing still had to be qualified to recognize individuals who clearly required immediate treatment in the ED (eg, an RN). In addition, if the individual who is moved to an alternative care site is found to have an emergent condition, they must be stabilized and transferred back to the ED. Hospitals were also allowed to set up screening at off-campus, hospital-controlled sites and encourage the public to go to those sites; however, if they came to the ED, they could not be redirected from the ED directly to an off-campus site.[44]

Permanent Infrastructure Upgrades

There may be opportunity to rethink the standard ED space without having to start from scratch. Coordination with engineering, construction, and hospital leadership is necessary when looking at the redesign of HVAC systems, isolation space, built-in isolation unit solutions, and more, as there is significant associated cost to this work.

Surge Resources

This conceptual description of surge resources following is not a comprehensive list of needs; however, equipment and supplies must be matched to the operational requirements of the surge. For instance, if the hospital is equipping a medical tent, there are considerations for computers, medical supplies (both disposable and nondisposable), furniture, durable medical equipment, and biomedical devices that will support the operation.

Respiratory Equipment

For respiratory pandemic conditions, there will be an increased demand for respiratory equipment such as ventilators, noninvasive positive pressure (BiPAP or CPAP) equipment, and high-flow nasal cannula (HFNC) devices. Tracking the availability and use of this equipment will enable operational planning for the care of patients. Additionally, a sufficient supply of smaller parts, including oxygen tubing, adaptors, HEPA filters, $ETCO_2$ equipment, etc, must be maintained.

Surge Staffing

The surge staffing model is slightly different from staffing models required for surge events such as a "no-notice mass casualty incident (MCI)." The ED is staffed based on average daily and hourly volumes. In addition to volume-based analysis for the pandemic surge, other considerations include the additional operational areas or functions that need to be created.

If the need for attending physician staffing increases, sharing between sites in a system, locum tenens, and additional per diem work may suffice. Most hospital have options to rapidly credential in the face of an emergency. However, if the impact is widespread or the hospital is rural, additional physicians or advanced practice provider may not be available. Doctors from other specialties, residents, and advanced practice providers may enhance the response, but lessons learned during COVID-19 underscore the need for an established plan that outlines just-in-time training or oversight and assistance during shifts to ensure consistency in care.

Key factors in successful integration of surge staffing include clear role identification, skills-based role matching, and efficient training to accomplish the required job. If surge staff come from outside of the ED, it is essential to match different allied health positions to the appropriate ED tasks and to develop the appropriate guidance and training by the appropriate supervisor to support the transition to a new role. Quick and easy guides to the EMR and ED policies should be made accessible for easy access and review.

Ancillary Staff Needs

Nursing, ED tech, and support staffing should be increased as needed based on patient volume during the pandemic surge and the number of critical care patients in the department. In addition to a likely increase in ED patients, projections should also include increased boarding times for admitted patients. It is expected that there will be increased effort from EVS to ensure appropriate cleaning of rooms and the ED in its entirety. Staffing for EVS should be calculated based on space, locations, and numbers of rooms utilized.

When opening new treatment spaces, whether alternative care sites or a medical tent, additional staff will be required according to volume-based requirements, which require different distribution from existing staff or additional staff.

New roles in the ED will also arise. Consider the need for a family communication team, a PPE coach, and a safety officer in the ED. These roles may be essential due to the nonstandard care that occurs in the ED during a pandemic. Although patient experience may be felt to be expendable due to the exigent medical needs, given the prohibition of visitors along with the distress patients may feel from being ill, a focus on patient experience remains paramount. Providing staff with clear expectations and giving regular updates are essential for both adherence to clinical care as well as minimizing disruptions in the ED due to dissatisfied patients.

Clinical Policy Guidance

Clinical Treatment and Algorithm Protocols

Clear, consistent, and current clinical protocols and guidance for front-line clinicians are essential. Protocols maximize safety for both patients and clinicians, particularly during times when evidence and expert guidance are shifting rapidly. Standardized and updated clinical guidelines allow experienced clinicians familiar with the specific practices of medical specialties to review changes regularly and incorporate necessary recommendations to be applied to the local context.

A consistent guideline around use of ancillary treatments and resources will allow planning on a greater scale. For example, understanding how an extensive evaluation is performed helps in developing alternative care sites, such as in clinics and medical tents. Staffing and use of PPE can also be better regulated and conserved if the predefined evaluation is applied consistently. Just as importantly, in order to use attending emergency physicians to care for the sickest patients, clinical algorithms regarding testing, treatment, and follow-up for low-acuity patients can be taught to both physician assistants and nurse practitioners from multiple different departments, allowing them to care for these patients. Telemedicine protocols can be added to decrease face-to-face involvement by multiple providers.

COVID-19 Spotlight 10: Development of Clinical Guidelines

Most of the protocols used at our institutions were developed by an interdisciplinary team of emergency physicians, infectious disease specialists, and intensivists.[45] Incorporated into the tables was a combination of information coming out of countries that had outbreaks prior to those in the U.S., including China and Italy. Additionally, local information obtained within an 8-hospital system in New York City with both community and academic sites, extensive discussion with emergency medicine experts around the country, and literature searches focused primarily on acute respiratory distress syndrome (ARDS) and analyses from prior viral outbreaks, including SARS, MERS, and H1N1, were used. As the pandemic continued and national organizations such as the National Institutes of Health and the CDC also provide updated clinical recommendations, and these sites were used for benchmarking and comparison.[46,47] To review the COVID-19 protocols developed by interdisciplinary teams in the Mount Sinai Health System, go to: www.ebmedicine.net/topics/COVID-19/Protocols

Consult Policies

With heightened infectious risk to medical practitioners, there needs to be a principled approach to the development of expectations and policies. As required by EMTALA, patients have the right to appropriate stabilization and care in the ED, including the right to access specialists for emergency conditions.[44] Emergency medicine clinicians are generally well-versed in identifying clinical conditions requiring a specialist or consultant. While telemedicine adaptations and other creative solutions may improve remote assessment, there will be times that bedside evaluation and treatment are necessary.

In developing consult policies, it may be useful to look past historical or usual practice, focusing on both the acute need and assessment of how much an in-person consult actually benefits the patient. This, however, has to be done with the understanding that providing remote advice may require improved telehealth capabilities and additional time to implement and use them at the bedside.

COVID-19 Spotlight 11: Consultation Experience

- Nonprocedural specialties fare well with consultation performed remotely and fit in to already existing workflows.
- Some specialties, such as hematology, can generally provide advice by telephone, while others intermittently require a higher level of interaction. For example, neurology consultation, while reasonable to perform by telephone for nonacute or obvious cases, can be done very credibly by telehealth for acute cases, with benefit from observation of the physical examination.[48]
- Other services may require bedside consultation at some times, but will be appropriate for telephone or telehealth at other times. Critically ill cardiac patients requiring bedside echo/pacer, etc, may require inpatient cardiology consult, while discussions regarding electrocardiograms can be conducted by telephone. Ophthalmology may be appropriate for telehealth in some cases, especially with traumatic injuries; however, retinal or post chamber pathology may require in-person evaluation or transfer.
- During the initial surge, certain telehealth privacy requirements were relaxed by CMS in order to allow for rapid upscaling. The U.S. Department of Health and Human Services Office for Civil Rights issued guidance around HIPAA that allowed providers, "in good faith, provide telehealth services to patients using remote communication technologies, such as commonly used apps – including FaceTime, Facebook Messenger, Google Hangouts, Zoom, or Skype – for telehealth services, even if the application does not fully comply with HIPAA rules." Platforms that were public-facing, eg, Facebook live and TikTok were not to be used.[49,50]

Admission Policies

Admission policies determine who is admitted and, if admitted, to what service and physical location in the hospital. In the setting of high disease prevalence, hospital needs will likely continue to preclude admission except for the highest risk patients.

COVID-19 Spotlight 12: Admission Policies

- Early returns to the ED by discharged patients were expected to exceed usual levels, as there was a much lower threshold to discharge patients. The need to admit only those who required oxygen or inpatient care became the general rule as the volumes rose exponentially the first several weeks of the COVID-19 pandemic.
- Part of the planning process included using the best guidelines and evidence available, mostly from China and Italy, to help define the high-risk groups; however, this was focused mostly on outcomes rather than the likelihood of progression. For higher-risk patients not being admitted, we used options such as next-day telehealth, home pulse oximeters, and telephone calls to make sure there was very close follow-up. Other systems have used similar approaches.[51]
- The high-risk groups data came from patients who were admitted and fared poorly, and not necessarily from stable patients who went on to worsen. In a recent prepublication prospective cohort from a single center with over 10,000 COVID-19 visits, almost 35% of patients had adverse outcomes of hospitalization, ICU stay, or death within a week of the visit. Most patients, however, had some symptoms on presentation (about 40% received chest imaging), so they were already in a higher risk group. They developed and locally validated a scoring system to help predict illness that is more significant. As expected, the elderly and those with multiple comorbidities were at highest risk.
- To review the COVID-19 protocols on admission policies developed by interdisciplinary teams in the Mount Sinai Health System, go to: **www.ebmedicine.net/topics/COVID-19/Protocols**

COVID-19 Spotlight 13: Disposition Criteria

Disposition	Criteria
Discharge with follow-up as needed	• No shortness of breath • No hypoxia, tachypnea, or tachycardia • Age <65 years • 0-2 significant medical comorbidities • No history of moderate to severe cardiovascular disease, severe chronic lung diseases, or severe immunocompromise • Ability to ambulate without severe symptoms • Ability to return for worsening symptoms • Ability to isolate at home
Discharge with 24-hour follow-up	• Mild persistent or exertional shortness of breath without supplemental oxygen requirement • Mild hypoxia, tachypnea, or tachycardia • Age >65 years with stable vital signs • History of moderate to severe cardiovascular disease, severe chronic lung disease, or severe immunocompromise with stable vital signs
Floor admission	Absolute: • Supplemental oxygen requirement • Moderate to severe shortness of breath or tachypnea • Rapidly worsening symptoms or clinical course Case-by-Case: • Age >65 with mild hypoxia or tachycardia • History of moderate to severe cardiovascular disease, severe chronic lung disease, or severe immunocompromise • 3 or more significant comorbidities • Fragility, resources, and other risk factors should remain under consideration • Group living arrangement may necessitate admission
Intensive care unit admission	Absolute: • Rapidly progressive supplemental oxygen requirement • Hypercapnic respiratory failure • Septic shock Case-by-Case: • Respiratory rate >30 breaths/min • 100% FiO_2 on NRB, HFNC, or BiPAP requirement • Age >70 years with any supplemental oxygen requirement • 3 or more significant comorbidities with any supplemental oxygen requirement

Abbreviations: BiPAP, bilevel positive airway prssure; FiO_2, fraction of inspired oxygen; HFNC, high-flow nasal cannula; NRB, nonrebreather.

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Palliative Care

Palliative care offers thoughtful and reasonable options for patients with critical illness. In general, palliative care is not always an end-of-life intervention, but a way to provide a comfort-based approach to symptoms in patients who have a low likelihood of improvement or cure. In the setting of a pandemic, however, palliative care often focuses on decision-making and comfort with critical, immediately life-threatening illness. In an academic center in New York City, after initial palliative care intervention was initiated in the ED, the number of full codes decreased by more than 60% (71 patients total), including a 55% decline in the request for mechanical ventilation.[52] It should be clear, however, that palliative care is a patient-centered approach, rather than a resource-centered intervention.

Embedding palliative care fellows or attending physicians in the ED is a highly useful option, although it is generally limited to academic medical centers. Having emergency physicians gain knowledge and facility with palliative care principles and interventions is extremely important if hands-on consultation is unavailable. There are multiple options to choose from, including ACEP's Maintenance of Certification activity monograph, "Improvement in Medical Practice: Palliative Care in the Emergency Department" (available at: **https://ecme.acep.org/diweb/catalog/item/id/2479129**) as well as the Center to Advance Palliative Care online guides, available at **www.capc.org**[53]

COVID-19 Spotlight 14: Using Palliative Care

- While palliative care is generally focused on enhancing the quality of life for patients with incurable disease, during COVID-19 it has concentrated on treating critically ill patients with severe disease who did not wish to be intubated and on a respirator.
- In a sense, providing palliation to patients ill with COVID-19 generally implied a low chance of early survivability. In these cases, palliation emphasized providing appropriate, proportional pharmacological management of pain, dyspnea, agitation, and other common symptoms to maximize patient comfort at the end of life.
- Given the high mortality with COVID-19 in the critically ill, an early discussion with patients and their families is highly recommended.

Crisis Standards of Care and Ethical Triage

An ED should never undertake the implementation of CSC ethical decision-making in a vacuum. No emergency physician should be placed in a position to make life-and-death decisions based on resource constraints until every resource of the department, hospital, health system, and government has been explored to provide necessary care for pandemic patients. The framework for CSC has been laid out clearly by the National Academy of Medicine, and many states have developed ethical principles and provided clear guidance for ventilator triage when resources are overwhelmed. However, the actual implementation of these policies is extremely challenging in the ED, where rapid decisions must often be made when a patient is in extremis and the full medical history or patient desires many not be known. Many of the existing ethics documents are geared more toward treatment in the ICU and are not designed to guide ED physicians. It is highly preferable to have a developed, institutionally and governmentally supported plan when addressing the treating team's need to make quick decisions.

Finances and Fiscal Planning

A Flexible Approach to Pandemic Finances

Finances during a pandemic are highly variable and depend on multiple factors. ED finances are driven largely by volume, although significantly higher acuity can provide some buffer if ED volume drops off during a pandemic. The largest driver of cost is staffing. Maintaining financial viability on the professional side of the department requires building staffing models that can withstand wide swings in patient volume and dynamic changes in an uncertain environment. ED leaders and administrators should consider creative methods of cost-saving during downturns in volume, including scaling hours rather than providers, using providers creatively across sites (as applicable), allowing leaves of absence or less-than-full-time work, or mandating vacation time until volumes return, to list just a few options. While many are not necessarily popular, clear and consistent communication to ED staff that acknowledges change, strain to providers, and a commitment to the least harmful changes can make an otherwise uncertain time more tolerable and enhance trust in the workplace. Encouraging a sense of shared sacrifice is important, to focus on maintaining jobs until volume returns and full staffing is required.

Cost Increases

In addition to the lost revenue from decreased volume, there are increased costs incurred due to pandemics. This is likely true regardless of the type of pandemic. Most, however, tend to be on the facility side rather than the professional, from increased needs for PPE, nursing staffing, infrastructure improvements, and costs due to maintaining distancing, wellness, and cleanliness. The most significant expenses on the professional side, especially early on, tend to come through covering shifts of providers who are out due to quarantine or actual illness. The prevalence of this for any disease is likely directly related to asymptomatic spread as well as transmissibility. Before recognized widespread community outbreaks of COVID-19 in the U.S., there were highly aggressive CDC recommendations around restricting healthcare workers who had higher-risk exposures. As community spread of COVID-19 became apparent, this approach rapidly became impractical. In addition, in the very early days of COVID-19 in New York City, many patients were diagnosed after a day or two into their hospitalization, potentially exposing large numbers of healthcare workers. In response, CDC advised facilities to consider forgoing formal contact tracing and work restrictions for healthcare workers with exposures in favor of universally applied symptom screening and source-control strategies.

Mental Health Considerations

As with all crises, it is often difficult to reflect on immediate events while working clinically and focusing on patient care. Recognizing and addressing the mental health problems that can be associated with a disaster such as mood, sleep, and depressive disorders, are important for the continued effectiveness as well as the well-being of staff.[56,57] Creating a wellness champion in the group who can provide resources and remote support group gatherings can be very helpful to staff.[57]

Frequent communication from leadership to staff in the pandemic is imperative for staff adherence to new protocols and guidelines, but also to improve staff morale. Providing recurring opportunities for staff to ask questions and clarify new guidelines can be immensely beneficial. While it is helpful to provide recognition as well as benefits such as wellness spaces, rest areas, food, etc, frequent communication may be the most important activity to implement.

COVID-19 Spotlight 15: Fiscal Issues

During the onset of COVID-19 in the U.S., decreases in ED volume and revenue happened regardless of whether the disease was prevalent in the community. CDC data from the national syndromic surveillance program found that ED visits decreased by 42% during the early COVID-19 pandemic, from a mean of 2.1 million per week (March 31-April 27, 2019) to 1.2 million (March 29-April 25, 2020), with the steepest decreases among persons aged ≤14 years, females, and in the Northeastern U.S. The decrease remained low through data collected in May, with May 24-30, 2020 at 26% below the corresponding week in 2019.[5] Similar data from the Emergency Department Benchmarking Alliance found a 48% decrease in April, although pediatric EDs noted a 71 percent decrease in volume between January and April. Urban and Northeast U.S. EDs seemed to be the most affected overall. One medical data company published research showing ED visits down about 25% overall at the end of June from pre-COVID-19 volumes, recovering approximately 51% since the nadir in April. Broken down further, visits from children remained markedly down at 59% in mid-June compared to pre-COVID-19 volume, while adults were down about 16%.[54] While this obviously has significant public health implications, there are also large financial consequences.[55]

Protecting Vulnerable Staff and Sick Call Policies

For high-risk staff, EDs should develop consistent and fair policies to redeploy to telemedicine, administrative tasks, or other methods to support their time and responsibility. Employee health should be utilized as a fair and objective resource, if possible, to adjudicate personal concerns and request for redeployment that may not map to known health risks.

Human resources policy and staff sick calls are extremely challenging during a pandemic. Integrating the information from trusted national sources about the period of infectivity and transmission risk profile may evolve over the course of a pandemic. Plans on sick call activations and backup providers should be created and released to staff in the event of sick call. Enforcing appropriate PPE wear should decrease nosocomial infection.

Putting it All Together

ED operations during a pandemic requires a broad reconsideration of patient-centered care to keep patients and staff safe, optimally and efficiently treat patients, and provide leadership during uncertain times. The requirements to address the response are complex, multidisciplinary, and often rapidly evolving. Key principles of transparency, creativity, collaboration, and fairness are essential to provide a safe and effective work environment. Focusing on consistency of clinical recommendations, optimally developed across the spectrum of care from the ED to the inpatient setting and integrated into the EMR are critical for the best clinical care. The discussion and recommendations outlined in this paper provide a framework to address these challenges and build a more resilient operation during times of pandemic surge as well as normal operations.

Key Takeaway Points for Emergency Department Leadership During a Pandemic

- Strong local leadership and communication are key to successful implementation of pandemic response plans.
- Keeping patients and staff safe is the key to ED response. Start with this.
- Implement key infection prevention strategies and work to ensure rigorous detail is followed, including screening, universal masking, patient/staff social distancing, and other precautions.
- Develop a clear, structured surge plan with established triggers to move from one operational surge level to the next.
- Pre-plan surge resources, including space, staff, systems, and equipment.
- Clear and up-to-date clinical and practice guidance can improve consistency of care in an ED setting, particularly when providers have access to a wide-range of guidance.
- ED leadership should work to ensure crisis standards of care, palliative care policy, and other key clinical decisions are made in conjunction with hospital, health system, and regional leaders.
- Mental health care is an essential resource needed during pandemic operations.
- Building a flexible financial and staffing model to scale will support long-term fiscal planning

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