Best Practices Identified in an Academic Hospital Emergency Department to Reduce Transmission of COVID-19

Lisa R. Ponsford, DNP, RN, FNP-BC, ENP-C

Michelle A. Weaver, MSN, RN, PHN, MICN

Mindy Potter, MSN, RN, CEN, CPEN, MICN

ABSTRACT

Emergency departments (EDs) are the point of entry for infectious diseases, making it necessary to reevaluate current practices and make adjustments to decrease transmission when presented with a novel viral infection. This article discusses strategies implemented in the ED to prevent transmission of coronavirus disease-2019 (COVID-19) while identifying areas of needed change in creating a safe environment for patients, health care workers, and ancillary staff. A team approach is ultimately necessary for success; therefore, development of interprofessional teams was formed to mitigate any obstacles. Dissemination of the most current information regarding proper personal protective equipment use, triaging, patient flow, and treatment areas were implemented with weekly emails, videoconferencing, and daily huddles. Developing an efficient triage screening process, redesigning patient flow, and cohorting of patients and staff to a geographical location are essential to minimize transmission. Constant reevaluation of processes is necessary to meet all the needs of patients and health care staff to prevent the spread of COVID-19. **Key words:** COVID-19, disease outbreak, emergency department, infection control, patient flow, triage screening

DURING A PANDEMIC, emergency departments (EDs) are the point of entry for infectious diseases. In this case coronavirus disease-2019 (COVID-19) has placed health care workers (HCWs),

Author Affiliations: College of Graduate Nursing, Western University of Health Sciences, Pomona, California (Dr Ponsford and Ms Weaver); and Emergency Department, Loma Linda University Medical Center, Loma Linda, California (Dr Ponsford and Ms Weaver and Potter).

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Corresponding Author: Lisa R. Ponsford, DNP, RN, FNP-BC, ENP-C, College of Graduate Nursing, Western University of Health Sciences, Pomona, 91766 (lponsford@westernu.edu).

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ancillary staff, and patients at risk for spread of disease. The novel corona virus first appeared in late December 2019 from Wuhan, China, and has quickly spread globally. World-wide hospitals were not prepared for such a virulent respiratory virus such as COVID-19 and protocols needed to be examined and revised. Reallocation of resources, restructuring workflow, and remodeling safe care practices were necessary to minimize transmission of this contagious infection in the ED. To date there have been more than 23 million confirmed cases of COVID-19 and approximately 380,000 deaths recorded in the United States according to the Centers for Disease Control and Prevention (CDC, 2021). Early

Figure 1. LLUMC graph of the patient census for 2019 versus 2020.

detection of COVID-19 is paramount to decrease spread among all health care staff and patients.

According to the CDC (2020a), COVID-19 spreads primarily when individuals are in close contact of less than 6 feet and by respiratory droplets from a cough, sneeze, or talking. A systematic review and meta-analysis found that physical distancing of 1 m, eye protection, and N-95 respirator or similar were associated with less infection (Chu et al., 2020). Berlanga et al. (2020) suggested that aerosol transmission in crowded or enclosed spaces is a pathway for contracting COVID-19. Therefore, creating an environment to decrease spread of virus to HCWs, ancillary staff, and patients was developed in an academic hospital ED utilizing recommendations from the CDC while being Health Insurance Portability and Accountability Act (HIPAA) compliant and following Emergency Medical Treatment and Labor Act (EMTALA) regulations.

Routinely, the health care team in the ED practices using universal precautions; however, it was necessary to reevaluate our practices regarding the current pandemic. Loma Linda University Medical Center (LLUMC) is a Level 1 Adult and Pediatric Trauma receiving center and a designated Compre-

hensive Stroke and Chest Pain Center for San Bernardino, Riverside and Inyo Counties, totaling 37,635 square miles. A decline in patient census in March through August and most dramatically March, April, and May, due to the stay-at-home orders placed on the state of California, made it possible to develop a revised plan. As seen in Figure 1, census in March 2020 dropped 23% from March 2019, April 2020 declined 38% compared with April 2019, and May 2020 dropped 21% compared with May 2019. During this time, we were able to learn more about the virus, transmission, treatment, and mortality while developing interprofessional teams to construct a robust plan to protect staff and patients. The purpose of this article is to discuss the strategies implemented to prevent transmission of COVID-19 while identifying areas of needed change in creating a safe environment for our patients, HCWs and ancillary staff.

INTERPROFESSIONAL COLLABORATION

Challenges

In any major disaster situation, a team approach is ultimately necessary to have successful outcomes. It is virtually impossible that all tasks can be completed if working

in silos; therefore, the support of hospital leadership and the community is an integral part of success in any situation such as this one. It is vital that every department involved work together to instill a seamless plan.

A COVID response team (CRT) was formed that included individuals in senior leadership positions from each department who then distributed information to their teams. Placing senior leadership on the CRT allowed for decreased delays in decision-making. As each of the departments slowly came up with processes, they were then vetted through a command center. Each new process was explained and evaluated with each stakeholder and department. Obviously, this vetting process did not work perfectly each time due to constant changes and recommendations presented by the CDC and each county involved. However, newly updated information was quickly dispersed to the appropriate teams at the beginning of each day by the command center via videoconferencing. The ED experienced challenges with HCW education, patient care, and staff exposures, which involved the participation of all interdisciplinary teams to remedy. Each of these was evaluated daily and then teams distributed information either by email, during shift change, or by videoconferencing.

Education

Communication can be one of the most significant challenges faced when educating interdisciplinary teams about a crisis. As guidelines and processes change, it was imperative that distribution of information was executed in a clear and concise manner as the understanding, treatment, and spread of COVID-19 changed daily. Disseminating the most up-to-date information to the staff that were working in the department was vital to protect patients, HCWs and ancillary staff. According to Park et al. (2021), it is imperative to share information in real time when amidst a novel infectious disease outbreak. Therefore, distribution of daily email releases from the command center and ED to staff was

implemented to keep all stakeholders well-informed. To ensure all staff was educated on the daily changes, ED leadership was present at each daily huddle to answer questions that needed clarification regarding patient flow, treatment protocols, or personal protective equipment (PPE).

Patient Care

It is pivotal for a tertiary care center to be a leader in the frontline effort to identify and treat all patients while ensuring that potential cases of COVID-19 are identified early and isolated from the general public upon arrival (Wee et al., 2020). With the anticipated increase in census and changes to the standard triage process, patient care challenges were expected. By including a multidisciplinary team of epidemiology, physicians, advanced practices nurses, nursing, leadership, facilities, information services, communications network services, security, environmental health and safety, and housekeeping, the challenges became easily mitigated. Constant reevaluation of processes was necessary to meet all the needs of patients, staff, and visitors to prevent transmission of COVID-19 in new locations.

Early and efficient screening was necessary in a well-ventilated large space that could accommodate both COVID-19 patients and other ED patients who were arriving. Using multiple outdoor spaces created new unforeseen challenges such as weather and equipment issues. Development of a multidisciplinary team at the start helped to overcome the challenges encountered with informatics, environmental health, facilities, epidemiology, and security.

Necessary to social distance, the hospital chose to construct medical tents that could be used for the patients who were stable but screened positive for COVID-19. The medical tents were useful to distance from the screened COVID-19-negative population and also limited the exposure to the ED staff. The medical tents created new workspace issues that were promptly corrected with

our facilities management team. Being in Southern California, the weather was not a tremendous issue until we experienced extreme heat, wind, and the occasional rain. As each weather inclement arose, the appropriate teams were engaged in implementing cooling measures such as air conditioners, E-Z UP shelters, and umbrellas. Ice vests were provided by the disaster team to protect our staff from the dangers of heat exhaustion when ambient outdoor temperature rose above 100°F.

Computers and electrical equipment are essential for patient care, and without the help of facilities and information services the delivery of care would not be efficient. According to Whiteside, Kane, Alijohani, Alsamman, and Pourmand (2020), the use of video-chat for subsequent interactions with a patient is valuable to decrease potential exposure to infectious disease. The ED was equipped with the use of telehealth, which was found beneficial to lessen interaction of team members that did not need to be physically present with screened COVID-19-positive, low-acuity patients. This included providers, registration, social workers, case managers, pharmacy, and other ancillary staff. In addition, it preserved the highly valuable PPE that was necessary for other team members where it was essential as recommended by Russi Heaton and Demaerschalk (2020). However, the use of telehealth did present some obstacles.

Utilizing telehealth was introduced by the senior leadership to communicate with patients without having to be physically present in one of the tents. However, there were several complications met with this form of communication. Inside the tents it was noisy due to the generators and other equipment, therefore making it difficult to hear over the device. Additionally, one had to rely on a nurse or emergency medical technician to be available to answer the call and locate the patient. Another challenge faced was the small screen size making it difficult to evaluate the patient; therefore, you had to rely on the nursing assessment. While this did save

on the use of PPE and exposing staff to positively screened patients, it was not found immensely useful for patient interaction.

Infection Control

Heightened vigilance was placed on infection control in the ED, as was employee safety. Nosocomial infections can be a major threat during a pandemic; therefore, strict surveillance and management protocols should be implemented to prevent spread of disease (Nicastro Mazza, Gervasoni, Di Giorgio, & D'Antiga, 2020). Every employee within the ED that had the potential of coming in contact with a positively screened patient was fit tested for an N-95 respirator. The ED educators and managers became qualified as fit testers as to ensure greater ease of fit testing for employees while on campus for regularly scheduled shifts versus having the need to go through employee health on off days. ED educators reinforced education on proper PPE donning and doffing in accordance to CDC guidelines (CDC, 2020b). The information included donning PPE beginning with a gown, followed by a mask/respirator, then goggles/face shield and finally gloves and doffing PPE beginning with gloves, followed by goggles/face shield, removal of gown, the mask/respirator and ending with hand hygiene. Guideline procedures on donning and doffing PPE were placed within the department as visual reference tools, in addition to a video created by the ED educators and sent out electronically via email to all ED nurses, providers, and staff to reinforce learning.

Staff Exposures

Since the establishment of efficient processes and collaborative teamwork among the ED team, there has been minimal transmission of COVID-19 to staff. The assumption has been made that utilizing CDC recommendations of proper PPE usage and good hand hygiene has kept staff healthy. According to Canova et al. (2020), preliminary evidence revealed low transmission of COVID-19 when exposed briefly to a patient with mild respiratory

symptoms without PPE, although cautioned against this practice. Recognizing the danger to relaxing of PPE could result in more exposures, the hospital quickly enforced all staff to wear masks and shields in all treatment areas of the hospital per CDC guidelines.

Notification of potential exposure to each individual was limited to prolonged exposure of 15 minutes or greater of a positive COVID-19 patient. When this occurred, it was immediately reported to employee health as well as the individual employee. Notification ensured that the employee was aware of their exposure and could follow proper procedures to not accelerate the community transmission of the virus. If the employee was exhibiting COVID-19 signs and symptoms that were established by the CDC, they were to self-isolate for 10 days prior to returning to work.

Advanced Practice Nurses

Advanced Practice Nurses (APNs) in the ED have been instrumental in the present pandemic performing multiple roles, including educators, directors, and nurse practitioners. Educators have provided daily updates to the ED team to ensure that knowledge is distributed to the appropriate individuals. COVID-19 weekly huddle emails are sent to all ED staff with updates on testing, flow changes, and any new procedures. Nurse practitioners offer support in multiple areas of the ED performing medical screening examination (MSE) and managing patients in several treatment areas. Treatment areas include treatment area A where unstable negatively screened COVID-19 patients are bedded. The Surge area is the only indoor ED treatment area where unstable positively screened adult patients receive medical care with individual private rooms and closing glass doors so that any spread of infection can be minimized. Ambulatory Care is a treatment area for patients who will likely be discharged and screened negative for COVID-19; the medical tents include all stable positively screened COVID-19 patients. Management of

patients by APNs involves collaboration with an attending physician, performing history and physical, ordering diagnostics, developing treatment plans that can include specialty consultation, and educating patients and family.

SCREENING PROCESS TO REDUCE TRANSMISSION

Operations and Flow Redesign

At the onset of the current global pandemic, the ED operations and flow were redesigned at LLUMC to meet the needs of unprecedented times due to COVID-19. Efforts focused on early identification of patients with exposure or risk of exposure, as well as were aimed at the reduction of transmission from patient to staff and patient to patient. While operational modifications occurred, maintaining patient safety and ensuring that the LLUMC standard of high-quality patient-centered care remained at the forefront.

Highest priority was placed on interventions to minimize exposure to HCWs, ancillary staff, and patients seeking medical attention for non-COVID-19-related presentations, from those with COVID-19-like symptoms. According to Ge et al. (2020), enforcing strict triaging practices reduced occupational exposure risk of COVID-19 to staff. Additionally, by cohorting patients and staff to a geographical location would minimize exposure to potential contagious infection (Whiteside et al., 2020). Therefore, upon arrival to the ED, all patients were screened for COVID-19 symptoms or their risk of exposure by being asked the following questions by a registered nurse based on the CDC (2020a) guidelines, and then moved to the appropriate treatment area (see Figure 2):

1. Have you tested positive for COVID-19?
  - a. If yes, how long ago was the positive test?
    - i. 0–20 days
    - ii. 21–90 days
    - iii. >90 days

Figure 2. LLUMC emergency department COVID-19 patient flow.

2. Are you currently experiencing a fever/do you have a recent history of fever (within the last 14 days) (temperature $>100.4^{\circ}\text{F}$) *with* a new-onset cough *or* shortness of breath (SOB)?
3. Are you experiencing any flu-like symptoms (chills, body aches or new-onset sore throat, or new-onset SOB within the last 14 days)?
4. Are you experiencing a new onset of loss of taste or smell within the last 14 days?
5. Have you been in close contact or do you live with someone who has been confirmed as COVID-19 positive?
6. Do you live or work in a skilled nursing facility, shelter, homeless encampment, jail, board, and care or group home?

Based on the response, patients are directed to a designated treatment area.

Patients who screen negative to the questionnaire proceed into the ED lobby where they are registered, and an initial assessment is completed by a registered nurse. The assessment includes a quick look process where patients are asked the reason for their ED visit along with pertinent medical history. Medically stable patients are then triaged and an MSE is completed. Orders are then written by the MSE provider as medically indicated and execution begins while the patient awaits bed availability within the ED.

Medically unstable, negatively screened patients are taken directly to a bed in the main ED for immediate evaluation and intervention. Furthermore, patients who screened positive for the questionnaire remain outside of the main ED lobby in order to minimize exposure to others. Next, the patient will go through the quick look process outside and then moved to designated cohorted

areas. Medically stable patients are either taken to one of two medical tents that are set up outside of the ED in the main parking lot, adjacent to the hospital, or to an outside waiting area based on bed availability within the tents. Patients are then rotated in and out of the tents for medical examination and treatment(s) as medically necessary. Additionally, patients who screen positive who are deemed medically unstable are escorted to the Surge area of the ED.

Prevention of viral infectious disease spread is mitigated by early recognition and prompt initiation of infection control measures established during the triage screening process (Whiteside et al., 2020). Data collected at LLUMC on the triage screening process for July and August revealed capture of 93% screened positive patients who tested positive for COVID-19 and 98% for the month of September. We found that many patients who screened negative and tested positive for COVID-19 were asymptomatic. It was thought that placing more seasoned nurses in the screening position achieved higher captures of COVID-19-positive patients.

Environmental Changes

The set-up of two new outdoor patient care areas presented the immediate need for multiple resources. In addition to having two physical medical tents erected, electrical, heating, and cooling had to be established. Additionally, delineated treatment areas with patient privacy, computer on wheels workstations, a crash cart, nurse servers stocked with basic medical supplies, and intravenous and phlebotomy supplies were set up in the outdoor medical tent treatment areas, as was an AccuDose medication management system with nonnarcotic medications. Health care staff in the medical tents are equipped with an iPhone to be used for communicating to the main ED and scanning medications.

The establishment of two fully functional outdoor treatment areas for positively

screened patients required the assistance of multiple entities, as well the leadership and management of both the ED and the hospital as a whole. LLUMC facilities management worked closely with Occupational Safety and Health Administration regulatory bodies to ensure safety of the medical tents as well as safety of the physical ground that the tents were set up on including imaging studies on the concrete to ensure stability of the ground and to assess for sink holes. The local fire department was involved in the safety checks of the outdoor treatment care areas as well. Additionally, California Department of Public Health conducted a survey to ensure that the newly established patient care areas were safe, functional, and met standards, and then granted permission to utilize the medical tent areas for patient care.

CONCLUSION

When challenged with a novel infectious disease such as COVID-19, it is important for EDs to evaluate and revise current procedures to prevent spread of disease. It is imperative to be vigilant in the triage screening process, cohorting patients, educating staff, having effective communication, and proper use of PPE to decrease the possibility of intrahospital transmission among HCWs, ancillary staff, and patients. During the current outbreak we have continued to minimize spread of disease by refining the triage screening criteria, making adjustments in HCWs assignments, and optimizing space and patient flow within the department. As we approach the winter months, we will be faced with new challenges of other respiratory viruses and will continue to alter our protocols to meet the needs of the department and our patients. The entire interprofessional team has been instrumental in the development of robust plans while making the ED run smoothly and safely during these perplexing times. Knowledge sharing during a pandemic is helpful and although each ED varies in resources the basic concepts shared can be relevant and beneficial.

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