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Simulation perspective on new latent safety threats in high-risk patient care scenarios during the COVID-19 pandemic

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ABSTRACT

The Code Simulation team at University of California, San Francisco (UCSF) Benioff Children's Hospital-San Francisco is presenting a perspective on COVID-19 related simulation in a paediatric emergency department (PED) setting. The primary focus was personal protective equipment (PPE) usage in the setting of new latent safety threats in high-risk scenarios in relation to the COVID-19 pandemic. We addressed communication challenges and trialled new workflows in relation to the COVID-19 pandemic. The perspective details the objectives, themes and lessons learnt during this process. The simulation practice occurred multiple times over multiple days with an interpersonal, interdisciplinary and inclusive approach. The results of this work were implemented into practice in the PED at UCSF Benioff Children's Hospital-San Francisco setting and influenced hospital-wide education on PPE usage during the acute phase of the COVID-19 pandemic.

INTRODUCTION

The COVID-19 pandemic has created many challenges for emergency departments (EDs) around the world. In particular, stand-alone paediatric emergency departments (PEDs) have faced unique opportunities to prepare for a potential surge with COVID-19, including the need to care for both paediatric and adult patients. At University of California, San Francisco (UCSF) Benioff Children's Hospital San Francisco (BCH-SF), an urban quaternary free-standing hospital, the PED cares for critically ill patients, 12% of which are adults. Our initial responses to the pandemic included the construction of an alternative care unit (ACU), a negative pressure isolation shelter, an additional resource to treat low-acuity, low-risk, persons under investigation (PUI) and COVID-19 positive paediatric patients. Additionally, personal protective equipment (PPE) recommendations for patient and staff safety were implemented, new surge plans and adult COVID-19 treatment protocols were developed, communication pathways evolved and staffing models were adjusted.

We identified a need to quickly and efficiently educate PED staff in the new, rapidly changing patient care workflows and policies that were developed. Interprofessional simulation training allows multidisciplinary teams to work together to identify latent threats, such as poor communication, inappropriate use of equipment and gaps in knowledge.[1 2] It also allows sharing of varied skills and experiences for situational practice in a context relevant to learners.[3 4] This article presents the UCSF BCH-SF and this PED experience of using interdisciplinary simulation to practice workflows, communication and skills training in responding to critically ill patients during the COVID-19 pandemic.

DESCRIPTION OF SIMULATION PROCESS

Learning objectives

1. Demonstrate donning and doffing of PPE according to newly established policy.
2. Demonstrate knowledge of new Advanced Cardiovascular Life Support (ACLS) and Pediatric Advanced Life Support (PALS) guidelines for presumed or known COVID-19 positive patients.
3. Verbalise who the essential personnel are for provision of care to critically ill patients.
4. Demonstrate knowledge of new workflow for transfer of a decompensating patient from the ACU.
5. Demonstrate crisis resource management for transfer/admission of critically ill adult patients to the general ED or adult inpatient unit.

Simulation cases

We created two cases to address our learning objectives.

1. A paediatric respiratory patient initially triaged to the ACU acutely decompensated, needing urgent transfer to the resuscitation room in the ED.
2. An adult patient, with several underlying medical conditions, presenting with chest pain and shortness of breath. Patient acutely decompensates, requiring stabilisation, intubation and transfer to adult care.

Personnel

Simulation participants included paediatric emergency medicine (PEM) physicians and nurses, patient care technicians, PEM fellows, emergency medicine residents, ED clerks and child life specialists. Fourth-year medical students, whose clinical rotations were moved to an online format during this pandemic, were simulation confederates, acting as patient, parent or pharmacist.

LESSONS LEARNT

The COVID-19 interdisciplinary simulation scenarios revealed challenges to existing workflows

Table 1 Themes of problems identified and lessons learnt

Themes	Problem identified	Solutions implemented
Care escalation in ACU	Tent too small for gurney transport.	Care escalation to the code room via 'scoop and go'/wheelchair./
	Security needs in ACU.	Emergency button on walkie talkies used to call security.
	Need for first line respiratory care.	Oxygen and nasal cannula at every bedside.
	Exposure safety.	Staff education on maintaining negative pressure with signage on doors as reminders.
Personal protective equipment	Confusion about appropriate PPE usage (N95 vs PAPR).	Universal education on appropriate PPE for an AGP in a COVID-19 PUI is N95 mask and face shield or PAPR.
	Inconsistent proper PPE donning techniques.	Donning PPE (PAPR, gown and gloves) *prior* to caring for patient. PPE timeout to ensure proper donning.
	Concern for parent safety in code room.	Parents given face mask only (no N95 due to lack of fit test).
Staffing	Crowd control/reduce exposure.	Door monitor (charge nurse) to ensure only necessary staff inside of code room. Designated area for pharmacy.
	Inappropriate level of staff.	Increased code team to three nurses.
	Safety concern for additional staff during code.	PAPR for anaesthesia given by door monitor.
Communication	Verbal communication difficult in PAPR.	Awareness, speak loud and clear. Signs on code room door indicating need for proper PPE when entering.

ACU, alternative care unit; AGP, aerosol-generating procedure; PAPR, powered air-purifying respirator; PPE, personal protective equipment; PUI, persons under investigation.

in the PED. The problems and lessons learnt can be categorised into four themes: (1) care escalation in the ACU, (2) PPE, (3) staffing and (4) communication (see table 1).

Care escalation in ACU

Problem: while the ACU is an extension of the ED, we determined that decompensating patients would need to be expeditiously brought into the ED resuscitation room. Gurneys proved too bulky and difficult to manoeuvre in the ACU.

Solution: patient movement was most effective via a 'scoop and go' process or using a wheelchair for older paediatric patients. A core group of staff carried walkie talkies for real-time communications between the ACU and ED. The walkie talkies have an emergency button available in case of security needs in the ACU.

We educated all staff on maintaining negative pressure in the ACU and the location of medical equipment including emergency resuscitation supplies in the ACU.

Personal protective equipment

Problem: during the scenarios, the initial reaction of the staff was to move to the bedside prior to properly donning PPE in an attempt to stabilise the patient.

Solution: we educated staff on the new PALS/ACLS recommendations to don PPE prior to providing care to critically ill patients. All ED staff were educated on appropriate PPE for a PUI requiring aerosol-generating procedures, including steps required for appropriate donning and doffing an N95 mask with face shield or a powered air-purifying respirator (PAPR). With practice and by addressing accessibility of equipment in the resuscitation room, the time to donning PPE improved. Alternatively, we discussed having one member initially don N95 mask and face shield, while the remainder of the team donned PAPR, allowing for faster transition and initial stabilisation procedures. A 'PPE Timeout' was implemented to ensure proper donning.

Parents wear face masks at all times. PPE caddies were conveniently placed outside of the resuscitation room for any consultants who may need to enter the room to assist.

Staffing

Problem: social distancing and limiting exposure of all ED staff challenged our existing staffing structures in the PED.

Solution: a core interdisciplinary resuscitation team was developed, consisting of an attending physician, a medical fellow/resident, a patient care technician, registered nurses and a respiratory therapist. The charge nurse was designated as the resuscitation room monitor to ensure that only necessary staff enter the resuscitation room. Specific zones of the resuscitation room were created by placing tape on the floor to delineate work areas for pharmacy and consult physicians for their safety.

Communication

Problem: the scenarios revealed that verbal communication is difficult in PAPR.

Solution: we emphasised the importance of limiting side conversations, using name tags to identify resuscitation team member roles and speaking loud and clear. Signages throughout the ED and the ACU were developed to guide staff on PPE donning and doffing and utilisation of the ACU.

REFLECTIONS

The development and implementation of interdisciplinary simulation sessions for COVID-19 workflows in our PED resulted in the discovery of new latent safety threats when caring for critically ill patients, presumed or known to have COVID-19. Through our debriefs, we found creative solutions to many of these threats. Iterative sessions led to improved staff comfort in all areas where gaps were identified. We were able to conduct these simulations safely while maintaining social distancing guidelines.

Collaborators Julian Van Wyk, RN.

Contributors MLB: helped with concept development, led all simulation sessions conducted in the emergency department, summated the findings from the simulation and assisted in editing the manuscript. SK: helped to develop concept, assisted in leading simulation sessions, summarised the objectives and process of conducting this project and assisted in editing the manuscript. HW: assisted with concept development, assisted in leading simulation sessions, summarised reflection for this project, assisted in editing the manuscript and recruited and coordinated volunteer medical students as LIVE SIM modes. NG: developed concept, assisted in leading simulation sessions, summarised the background for this project and oversaw the editing of the manuscript.

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