

Situational Awareness Huddles in a Pediatric Cardiac Intensive Care Unit During the COVID-19 Pandemic

Kristen Christensen, BSN, MS, CCRN
Nora Colman, MD
Kay Van Voorhis, BSN, CCRN
Katherine Daniels, MSN, RN, CCRN
Haley Culpepper, BSN, RN
Kiran Hebbar, MD
Michael Wolf, MD

BACKGROUND The COVID-19 pandemic has created challenges for provider teams working in intensive care units, including rapidly changing patient care regulations, staffing considerations, and preservation of personal protective equipment. The need for enhanced respiratory precautions for infected patients and patients under investigation has necessitated a new process for interventions and resuscitation.

LOCAL PROBLEM Along with changing regulations and equipment, significant staff anxiety surrounded caring for infected patients and preparing for emergency situations.

METHODS A huddle process was implemented in the pediatric cardiac intensive care unit for acutely ill patients who required enhanced respiratory precautions and were at risk of imminent decompensation, or who required a bedside procedure. During a huddle, the multidisciplinary team used process maps displayed in patient rooms; the huddle process created a situational awareness of events among these teams.

INTERVENTION After implementation of huddles, a survey was distributed to cardiac intensive care unit staff in order to understand their satisfaction with the huddle process.

RESULTS A total of 36 staff responded to the survey. They thought the huddles helped them to prepare for resuscitation scenarios, helped limit the number of personnel responding to an emergency, and reduced their anxiety surrounding caring for these patients. Staff suggested generalizing this huddle process to all patients at acute risk for decompensation in the cardiac intensive care unit.

CONCLUSIONS A novel huddle process created situational awareness among staff caring for patients requiring enhanced respiratory isolation because of COVID-19. Multidisciplinary huddles allowed staff from various disciplines to apply a process map for interventions and resuscitations among critically ill children with heart disease. (*Critical Care Nurse*. 2021;41[4]:e11-e18)

CE 1.0 hour, CERP C

This article has been designated for CE contact hour(s). The evaluation tests your knowledge of the following objectives:

1. Identify a knowledge gap in situational awareness as regulations changed during the COVID-19 pandemic.
2. Describe a huddle process implemented to create situational awareness for cardiac intensive care unit staff.
3. Analyze staff satisfaction with the huddle process through a survey.

To complete evaluation for CE contact hour(s) for activity C2142, visit www.cconline.org and click the "CE Articles" button. No CE fee for AACN members. This activity expires on August 1, 2023.

The American Association of Critical-Care Nurses is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation, ANCC Provider Number 0012. AACN has been approved as a provider of continuing education in nursing by the California Board of Registered Nursing (CA BRN), CA Provider Number CEP1036, for 1 contact hour.

©2021 American Association of Critical-Care Nurses doi:<https://doi.org/10.4037/ccn2021975>

The World Health Organization has declared COVID-19, the disease caused by the novel coronavirus known as SARS-CoV-2, a pandemic. COVID-19 has spread rapidly, presenting challenges to health systems, hospitals, and individual units alike.¹ Although COVID-19 is thought to be relatively mild in children, numerous publications report cardio-

Discussion during the huddle focused on causes of decompensation and early recognition of symptoms.

genic shock with acute infections, or evidence of past exposure to the virus, among children.²⁻⁶ This patient population has primarily been cared for in pediatric intensive care units (ICUs) or pediatric cardiac intensive care units (CICUs).⁷

In addition to the challenges presented by the COVID-19 pandemic in general, each unit has faced potential challenges with staffing, personal protective equipment (PPE), patient isolation, and grouping of infected patients. The start of the COVID-19 pandemic in the United States coincided with the end of the winter respiratory virus season. This timing required vigilance

by staff, who faced new regulations, limitations, and requirements regarding isolation and PPE. Intensive care units with open pods had to ensure appropriate availability of isolation rooms for infected patients and patients under investigation (PUIs).^{8,9}

In the collaborative atmosphere of ICUs, huddles and debriefs have become a regular part of day-to-day care.^{10,11} In these meetings, individuals from a variety of disciplines (eg, physicians, advanced practice providers, nurses, respiratory therapists) come together to develop a plan for a potential event or to review the impact of a recent event. These collaborative efforts create situational awareness through which team members can develop a shared cognition regarding an event or an intervention.^{12,13} The COVID-19 pandemic has created rapidly changing regulations, staffing considerations, and clinical information, making it essential that all providers prepare for events together, with maximal collaboration.

Local Problem

Particular challenges in our pediatric CICU included the severity of underlying illnesses in patients with congenital or acquired heart disease, requirements to conserve PPE, a limited number of isolation rooms, and delayed test results early in the pandemic. These challenges were coupled with significant distress among staff as PPE, patient care, and staff protection guidelines changed almost daily. Another consideration was the need to include the operating room staff and cardiothoracic surgery staff in our conversations, because they would be responsible for cannulating any patient who needed extracorporeal membrane oxygenation (ECMO).

Methods

We developed a huddle process in our CICU during the COVID-19 pandemic to create situational awareness among staff regarding both infected patients and PUIs. The purpose of this process was to prepare staff for major patient events such as intubation or ECMO cannulation. During the huddles, team members also discussed infected patients and PUIs who had a high risk of acute decompensation.

The primary driving force for initiating the huddles was distress among staff caused by their concerns about potential exposure when caring for patients who may be infected with COVID-19. It quickly became evident that shared cognition was extremely effective in mitigating

Authors

Kristen Christensen is a staff nurse and a clinical nurse leader in the cardiac intensive care unit, Children's Healthcare of Atlanta, Atlanta, Georgia.

Nora Colman is an attending physician in the pediatric intensive care unit, Children's Healthcare of Atlanta, and an assistant professor of pediatrics, Emory University School of Medicine, Atlanta, Georgia.

Kay Van Voorhis is a staff nurse and an assistant nurse manager in the cardiac intensive care unit, Children's Healthcare of Atlanta.

Katherine Daniels is a staff nurse and an assistant nurse manager in the pediatric intensive care unit, Children's Healthcare of Atlanta.

Haley Culpepper is a staff nurse and nurse educator in the pediatric intensive care unit, Children's Healthcare of Atlanta.

Kiran Hebbar is an attending physician in the pediatric intensive care unit and Director of the Simulation Center, Children's Healthcare of Atlanta, and a professor of pediatrics, Emory University School of Medicine.

Michael Wolf is an attending physician in the cardiac and pediatric intensive care units and the Associate Medical Director of the cardiac intensive care unit, Children's Healthcare of Atlanta, and an associate professor of pediatrics, Emory University School of Medicine.

Corresponding author: Michael Wolf, MD, Sibley Heart Center Cardiology, Children's Healthcare of Atlanta, 1405 Clifton Rd NE, Atlanta, GA 30322 (email: wolfm@kidshheart.com).

To purchase electronic or print reprints, contact the American Association of Critical-Care Nurses, 27071 Aliso Creek Rd, Aliso Viejo, CA 92656. Phone, (800) 899-1712 or (949) 362-2050 (ext 532); fax, (949) 362-2049; email, reprints@aacn.org.

Special Considerations for Resuscitation

Patients on Enhanced Contact Droplet Precautions

The process of resuscitating patients on Enhanced Contact Droplet Precautions presents an increased risk of exposure for health care professionals. This document is intended to serve as a guide and care should be customized to department specific workflows and patient population.



ATTENTION: Do NOT enter room without donning appropriate Personal Protective Equipment!



Inside of the Room

Team Member Roles

Team in closest proximity manages CPR

- **Nurse 1:** Medication administration
- **Nurse 2 and nurse 3:** alternate between compressions and obtaining supplies from team outside of the room
- **RT 1:** Manages the airway

Remaining team members inside room:

- **MD 1:** Team lead
- **Nurse 4:** Documentation

Note: If no advanced airway, bring in MD 2 to intubate and RN 5 as additional resource.

Required PPE

- Gown
- Gloves
- Goggles or face shield
- N95 mask with tight-fitting seal

Outside of the Room

Team Member Roles

Code Team Resources

- **Nurse 5:** Resource/charge
- **RT 2:** Respiratory resource
- **Pharmacist or nurse 6:** Medications - may add additional nurse to check medications.
- **MD 2:** Will enter for procedures as needed (intubation, line access, etc.)

Note: Add additional members based on clinical scenario and patient safety needs.

PPE Guidelines

- **DO NOT** don PPE until entering the room.

Prepare Equipment and Supplies

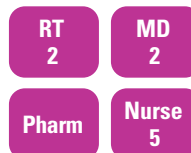
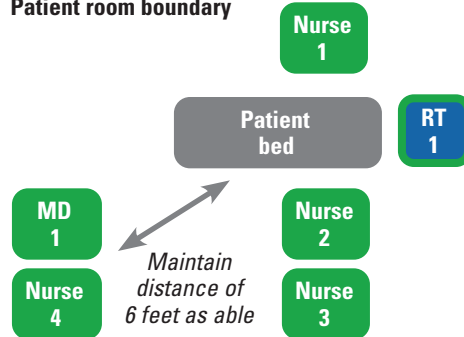
Medications - prepare 3 rounds of medications [epinephrine, bicarbonate, and additional medications as requested per MD].

Code cart - keep outside of room
Defibrillator - with assigned operator

Note: Only bring equipment and supplies into the room as needed for clinical care.

Team Member Positioning

Patient room boundary



Team outside the room should remain available to assist as needed.

Respiratory Management

Without Advanced Airway

1. Connect bag with attached HEPA filter to mask.
2. Provide PPV with bag-mask.
3. Place LMA. Team outside of the room should prepare all intubation equipment and supplies.
4. Intubate.

Advanced Airway Ventilation

Avoid hand bagging when possible and **DO NOT DISCONNECT** patient from ventilator as initial strategy.

- **PEEP:** increased per MD recommendation
- **iTime:** 1 second
- **PIP:** raise alarm limits
- **Rate:** 6 - 10 breaths per minutes

If Hand Bagging Is Required

1. Clamp ETT.
2. Connect bag with attached HEPA filter and provide PPV.
3. When ready to reconnect to ventilator, clamp ETT.
4. Remove HEPA filter and bag.
5. Reconnect to ventilator.
6. Unclamp ETT.

Special Considerations

- Do not use EMMA CO2 detector.
- LMA placed to minimize aerosolization and provide time for team to gather intubation supplies.



Figure 1 Process map: special considerations for resuscitation.

Abbreviations: CPR, cardiopulmonary resuscitation; ETT, endotracheal tube; HEPA, high-efficiency particulate air; LMA, laryngeal mask airway; MD, medical doctor; Med Prep, medication preparation; PEEP, positive end-expiratory pressure; PIP, peak inspiratory pressure; PPE, personal protective equipment; PPV, positive pressure ventilation; RN, registered nurse; RT, respiratory therapist.

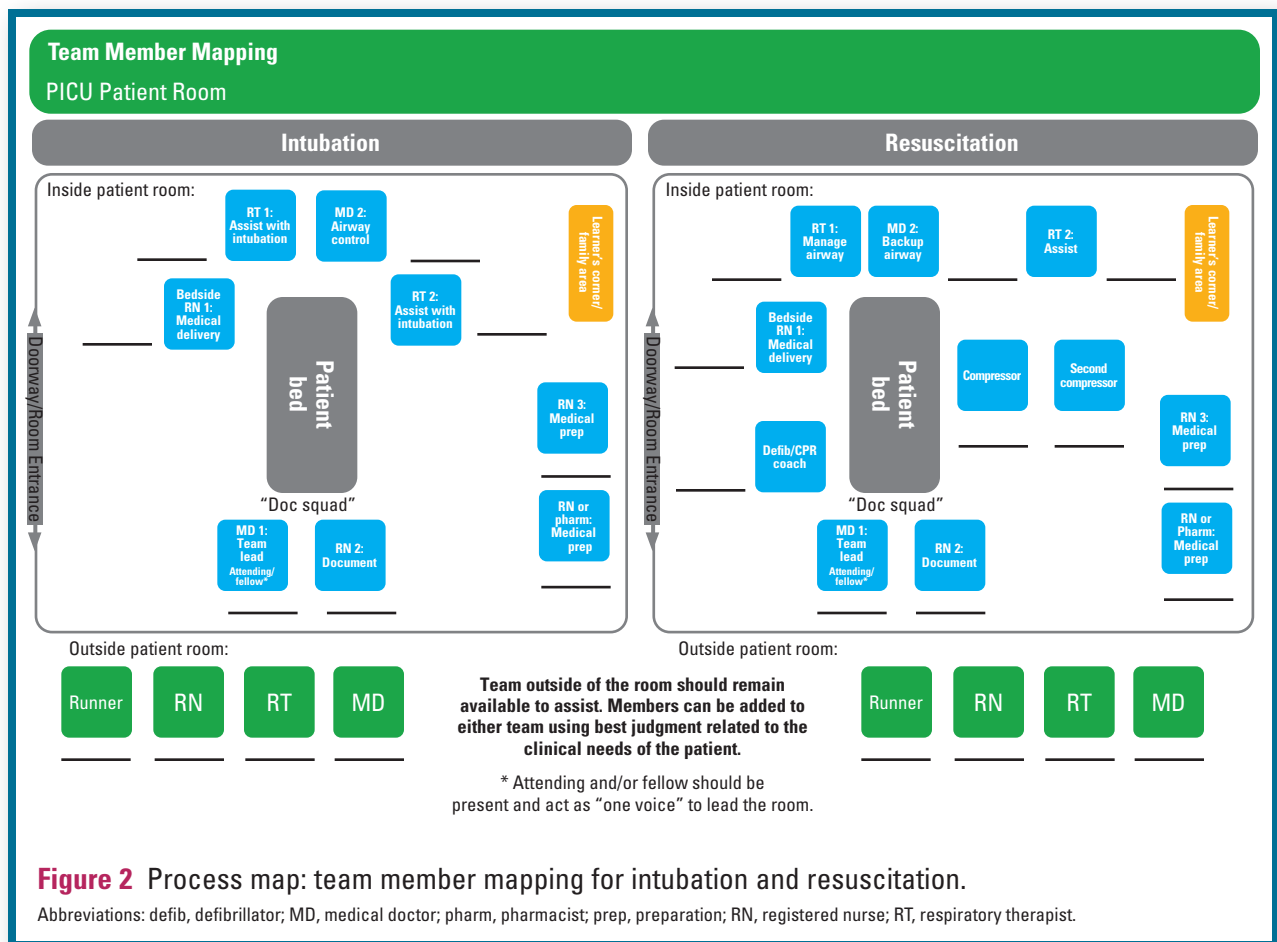


Figure 2 Process map: team member mapping for intubation and resuscitation.

Abbreviations: defib, defibrillator; MD, medical doctor; pharm, pharmacist; prep, preparation; RN, registered nurse; RT, respiratory therapist.

some of this anxiety and allowing staff to feel better prepared for potential and actual events.

As the first step in preparation for potential events, we disseminated process maps developed by pediatric ICU nursing staff at our institution (Figures 1 and 2). Drawing on their experience with simulation, they developed a process map for both airway management and cardiopulmonary resuscitation for PUIs. These documents served as guidelines for CICU staff to prepare for potential events. The process maps clearly defined personnel needed in the room, including physicians, nurses, and respiratory therapists, and the location of each provider; additional providers stationed outside the room provided equipment or medications as necessary and did not enter the room unless required. The maps were posted on the door of each room housing PUIs or COVID-19–positive patients. Bedside providers could then reference these maps and know who their team members would be if an emergency occurred.

The second step in preparation was a staff huddle that occurred at the beginning of each shift in the CICU.

The attending physician responsible for the care of the patient under discussion led the huddle. Providers performed a huddle only for patients who met certain criteria: a high risk for acute decompensation during the upcoming shift or a planned intervention (eg, intubation) during that shift. Attendees at the huddle were the attending physician and fellow physician; an advanced practice provider (as appropriate); the bedside nurse, resource nurse, and charge nurse; and the bedside respiratory therapist and resource respiratory therapist. If the team was considering ECMO or mechanical circulatory support for the patient, the ECMO primer and the operating room team lead were invited to participate in the huddle (Figure 3). Logistics did not allow all operating room staff or cardiothoracic surgery staff to be present consistently. The process maps posted on room doors were updated during these huddles to reflect the appropriate staff names.

Discussion during the huddle focused on causes of decompensation and early recognition of symptoms. The attending physician assigned a role to each team

ECPR/Bedside Procedure in CICU Known/Suspected COVID-19 on Enhanced Contact-Droplet Precautions

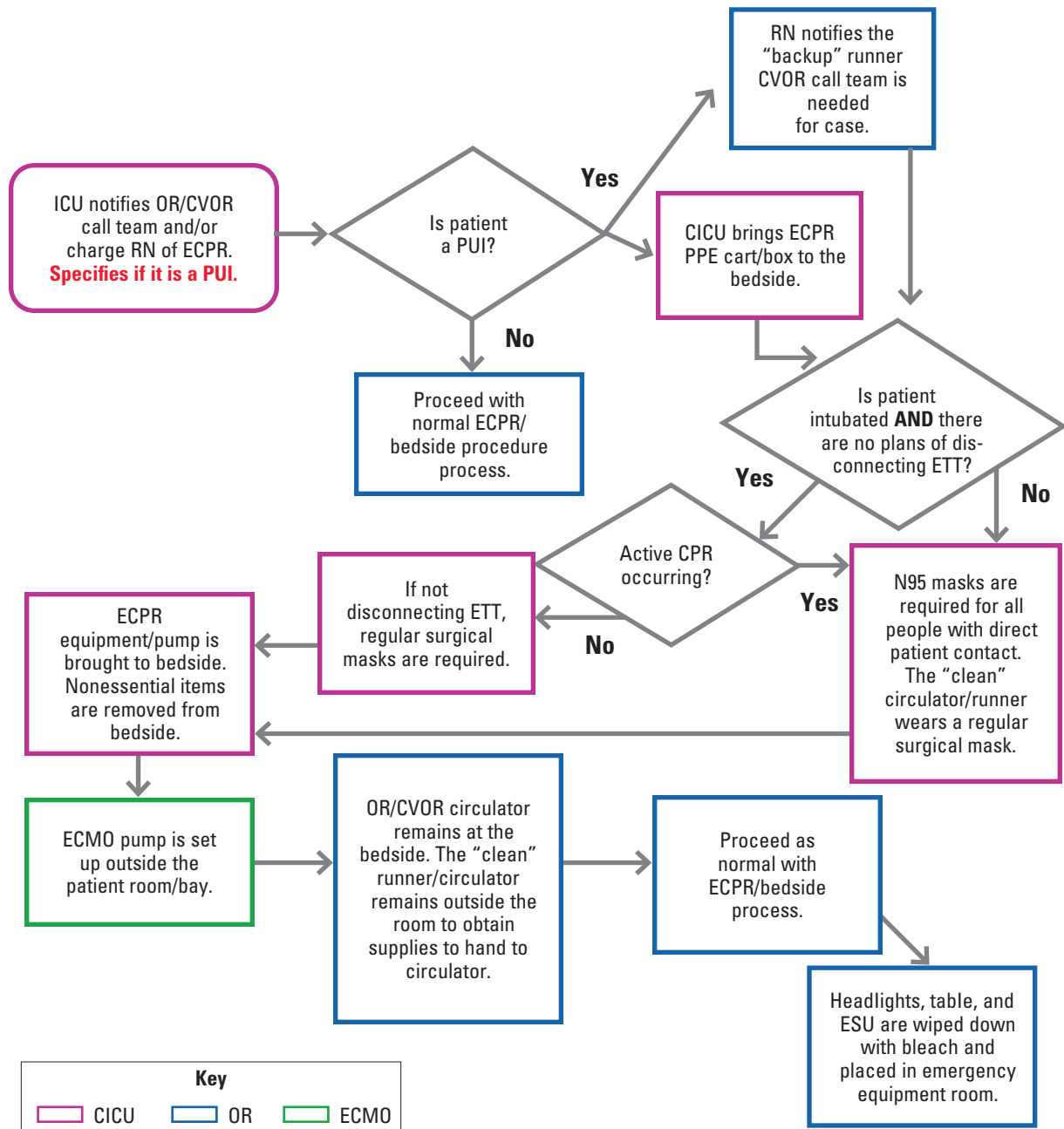
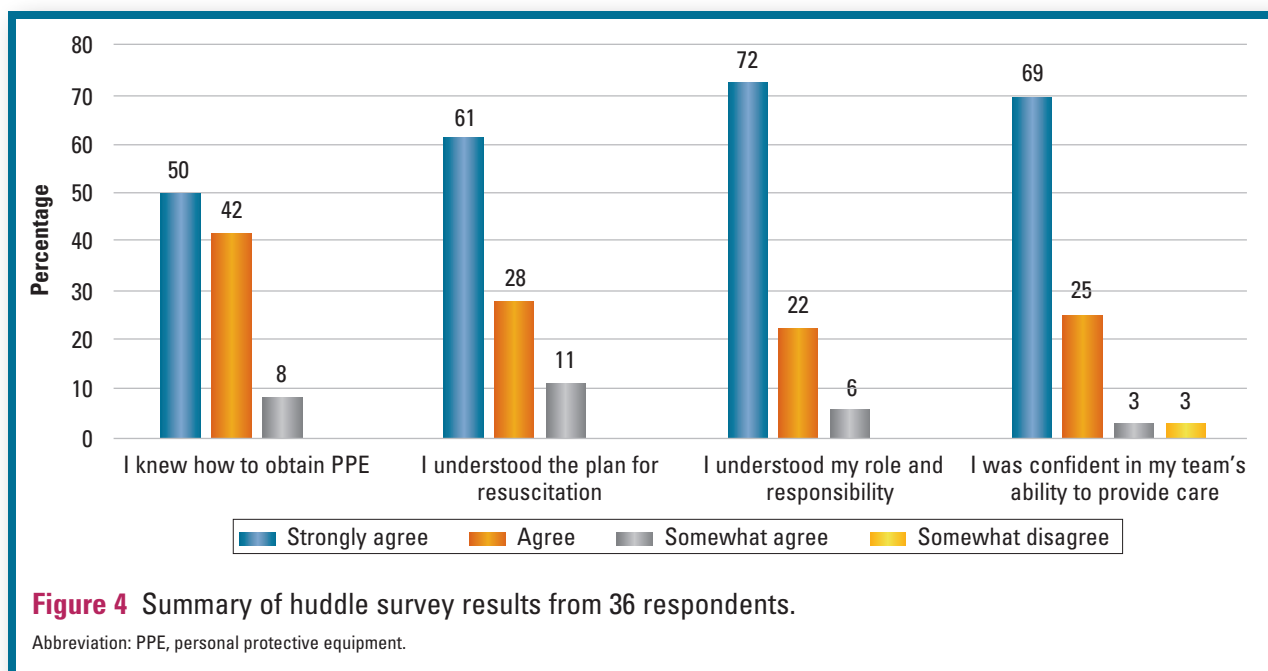


Figure 3 ECPR/bedside procedure algorithm for the CICU.

Abbreviations: CICU, cardiac intensive care unit; CPR, cardiopulmonary resuscitation; CVOR, cardiovascular operating room; ECMO, extracorporeal membrane oxygenation; ECPR, extracorporeal cardiopulmonary resuscitation; equip, equipment; ESU, electrosurgical unit; ETT, endotracheal tube; ICU, intensive care unit; OR, operating room; PPE, personal protective equipment; PUI, person under investigation; RN, registered nurse.

member and identified who would be inside the room and who would remain outside the room in the event of decompensation or a necessary intervention. These

assignments served to both minimize the staff's risk of exposure and reduce the amount of PPE they used. Team members were given the opportunity to voice



concerns or ask questions about their role or the overall process. The team also discussed ECMO and the patient's candidacy for extracorporeal cardiopulmonary resuscitation. When not present during the huddle, the cardiothoracic surgery team was made aware of these patients each shift.

Huddles were held during every shift until the patient was determined to be at lower risk for acute decompensation. For example, huddles were held for a patient with cardiomyopathy and decompensated heart failure until a left ventricular assist device was placed; for a patient with trisomy 21 who had tested positive for SARS-CoV-2 and had an unrepaired complete atrioventricular septal defect and acute heart failure requiring intubation; and for a patient with complex congenital heart disease who had been admitted with acute decompensated heart failure and ventricular arrhythmias, and required ECMO cannulation. In addition to the preshift huddle, a second huddle was held before any significant intervention or procedure such as intubation. During these secondary huddles, the team confirmed each member's role and plans for mitigating decompensation, and had another opportunity to ask questions or voice concerns.

After the huddles had been integrated into the daily operations of the CICU, we developed and administered a survey to staff (attending physicians, advanced practice providers, nurses, and respiratory therapists). This

survey comprised 11 items that focused on both the huddle process and content, with each item rated on a 7-point Likert scale. We sent the survey via email using SurveyMonkey. Survey participants provided consent for their participation, although the survey was exempt from institutional review board approval because of the anonymous nature of surveys and the absence of patient-related information from the survey and its results.

Results

In total, 36 providers responded to the survey: 4 attending physicians (11%), 3 charge nurses (8%), 10 resource nurses (28%), 13 bedside nurses (36%), 5 respiratory therapists (14%), and 1 advance practice provider (3%). Survey respondents indicated that it was clear who was leading the huddle (97%), felt supported by their team (100%), and were confident in their team's ability in the event of a decompensating patient (97%). Participants knew how to obtain PPE in an emergent situation (100%), understood the plan for resuscitation (100%), and understood their role in the resuscitation (100%). All respondents indicated that they found the huddles helpful and would like to see them used in the future in similar patient situations. Survey results are summarized in Figure 4.

Survey respondents were given the opportunity to provide free-text comments at the conclusion of the survey. Important comments identified various issues such

as maintaining decorum during an emergency, even when a huddle had been held; the challenge of gathering all key participants at a huddle in a timely manner; and ensuring that staff donned proper PPE before entering the room of a patient requiring enhanced respiratory precautions.

Discussion

The COVID-19 pandemic has created a new reality in ICUs. The care provided to complex patients in an ICU has always required a multidisciplinary approach; the presence of enhanced respiratory isolation requirements, PUIs, and limited PPE, among other factors, has added a layer of complexity to this care. Because patients could not be strictly isolated in a separate unit, situational awareness was crucial among staff, as they could move quickly between caring for a noninfected patient and caring for an infected patient. For acutely decompensating patients, the need for staff to focus on their own safety by wearing appropriate PPE was paramount. By preparing for such scenarios in advance, staff more readily assumed their roles upon arrival at an event.

Among the challenges we faced while implementing these huddles was bringing providers from all necessary disciplines to the huddle in a timely fashion. In a busy ICU, where providers typically focus on acute events and evolving medical situations, it can be difficult for staff to take a moment to focus on a scenario that may or may not occur. This difficulty in focusing on potential events, coupled with the need to involve the ECMO team and operating room nursing staff, increased the difficulty of consistently accomplishing these huddles. By limiting the huddles to patients who we believed were at imminent risk of decompensation or were undergoing a procedure during that shift, the CICU team maintained staff commitment, engagement, and willingness to participate.

The driving force of the initial success of the huddles seemed to be staff anxiety surrounding the rapidly evolving medical situation as the pandemic unfolded. Providers in an ICU are by nature prepared for a certain degree of uncertainty and ambiguity in their day-to-day care of patients, but the familiar and predictable work structure in and the environment of the ICU usually mitigate this unpredictability. When that structure or environment becomes compromised, however—as both have during the COVID-19 pandemic—provider discomfort and anxiety increased rapidly. The huddles seemed to

restore the structure that some providers thought was lacking for staff treating these high-risk patients.

Although not all staff working a given shift participated in each huddle, the situational awareness from the huddle “socialized” the presence of high-risk patients requiring isolation in the CICU. Staff throughout the unit were knowledgeable about these patients and scenarios. This socialization helped prevent an excessive response by staff to any emergency and limited responders to those who had participated in the huddle and had been assigned a role. This limitation helped preserve PPE as well.

As huddles become more common in ICUs, it becomes increasingly important that the content of the huddle provides staff with the necessary tools to optimize patient care and potentially improve outcomes.^{12,13} Although the initial goal of our huddle process was to

decrease anxiety among staff, the process has set the stage for

an altered approach to patient care in the CICU. The ability to be proactive during these situations changes providers’ mindset: they arrive at an emergency already understanding the patient’s situation, plans for mitigating the event and for resuscitation, and their role in the process.^{10,11}

Another positive aspect of this process has been generalization of the huddle process to other patients and situations in the CICU. Now, huddles are commonly held before a routine intubation or procedure in the CICU. When a process becomes second nature to staff during routine day-to-day operations, they can more easily incorporate it into less routine situations. Huddles also improve communication among team members as important aspects of the huddle process, such as role assignment and emergency preparedness, become the rule rather than the exception. This preparedness includes the use of the process maps for all patients who are at risk of decompensation, not only those who require isolation.

The literature supports the huddle process because it improves staff satisfaction with patient care, the safety of patient interventions, and is thought to improve patient outcomes.¹⁴ We witnessed such improvements in real time: staff felt better prepared to care for more complex

Situational awareness huddles should have a regular role in the ICU and should be held for any patient who is at risk for decompensation.

patients with acute medical issues and a high risk for decompensation. The knowledge and confidence provided by the huddles empowered bedside staff to provide more efficient care to their patients.¹⁵

Limitations

Limitations of this study include all those inherent in a single-center report, such as extrapolating the data to other centers with different staffing models or center-based biases that influence huddle practices. Another limitation was the limited number of survey responses from staff who participated in huddles. Although we distributed the survey after the patient situations cited by example above, the survey items focused more on the huddle process in general rather than on particular procedures or resuscitations that followed a huddle. However, participants included some thoughts regarding their experiences after huddles in the free-text portion of the survey.

Conclusions

We have described the implementation of bedside huddles to increase situational awareness among staff and reduce their anxiety in a busy tertiary pediatric CICU during the rapidly evolving COVID-19 pandemic. This process would be especially helpful for institutions where patients with COVID-19 are cared for within regular ICUs and cannot be grouped in separate areas. Situational awareness huddles have become a regular practice in our CICU for patients who require enhanced respiratory precautions and who are at risk of imminent deterioration. The results of our survey suggest that situational awareness huddles should have a regular role in the ICU and should be held for any patient who is at risk for decompensation. Next steps include convening a task force that will continue to generalize this process for all patients in the CICU, and developing simulation scenarios that will improve staff readiness for acute decompensation among this unique patient population. **CCN**

Financial Disclosures
None reported.

See also

To learn more about caring for patients with COVID-19, read "Development of a Prone Team and Exploration of Staff Perceptions During COVID-19" by Miguel et al in *AACN Advanced Critical Care*. Available at www.aacnconline.org.

References

1. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020;382(18):1708-1720.
2. Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 among children in China. *Pediatrics*. 2020;145(6):e20200702. doi:10.1542/peds.2020-0702
3. Greene AG, Saleh M, Roseman E, Sinert R. Toxic shock-like syndrome and COVID-19: a case report of multisystem inflammatory syndrome in children (MIS-C). *Am J Emerg Med*. 2020;38(11):2492.e5-2492.e6. doi: 10.1016/j.ajem.2020.05.117
4. Hong H, Wang Y, Chung HT, Chen CJ. Clinical characteristics of novel coronavirus disease 2019 (COVID-19) in newborns, infants and children. *Pediatr Neonatol*. 2020;61(2):131-132.
5. Nakra NA, Blumberg DA, Herrera-Guerra A, Lakshminrusimha S. Multi-system inflammatory syndrome in children (MIS-C) following SARS-CoV-2 infection: review of clinical presentation, hypothetical pathogenesis, and proposed management. *Children (Basel)*. 2020;7(7):69.
6. Zheng F, Liao C, Fan QH, et al. Clinical characteristics of children with coronavirus disease 2019 in Hubei, China. *Curr Med Sci*. 2020;40(2):275-280.
7. Ong JSM, Tosoni A, Kim Y, Kissoon N, Murthy S. Coronavirus disease 2019 in critically ill children: a narrative review of the literature. *Pediatr Crit Care Med*. 2020;21(7):662-666.
8. Ortega R, Gonzalez M, Nozari A, Canelli R. Personal protective equipment and Covid-19. *N Engl J Med*. 2020;382(26):e105. doi:10.1056/NEJMc2014809
9. Cook TM. Personal protective equipment during the coronavirus disease (COVID) 2019 pandemic - a narrative review. *Anaesthesia*. 2020; 75(7):920-927.
10. Goldenhar LM, Brady PW, Sutcliffe KM, Muething SE. Huddling for high reliability and situation awareness. *BMJ Qual Saf*. 2013;22(11):899-906.
11. Parker MW, Carroll M, Bolser B, et al. Implementation of a communication bundle for high-risk patients. *Hosp Pediatr*. 2017;7(9):523-529.
12. Brady PW, Muething S, Kotagal U, et al. Improving situation awareness to reduce unrecognized clinical deterioration and serious safety events. *Pediatrics*. 2013;131(1):e298-e308. doi:10.1542/peds.2012-1364
13. Brady PW, Wheeler DS, Muething SE, Kotagal UR. Situation awareness: a new model for predicting and preventing patient deterioration. *Hosp Pediatr*. 2014;4(3):143-146.
14. Franklin BJ, Gandhi TK, Bates DW, et al. Impact of multidisciplinary team huddles on patient safety: a systematic review and proposed taxonomy. *BMJ Qual Saf*. 2020;29(10):1-2.
15. Johnson I. Communication huddles: the secret of team success. *J Contin Educ Nurs*. 2018;49(10):451-453.