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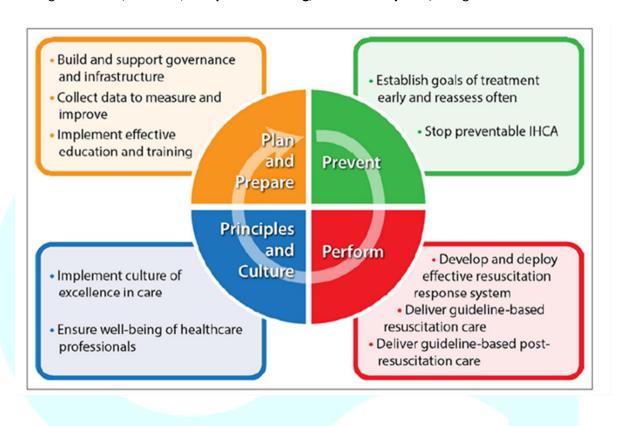
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<u>Mission:</u> To save children's lives through discovery, dissemination, and support of optimal resuscitation practice in every hospital and community.

<u>Vision:</u> To advance discovery and **implementation of best pediatric resuscitation practice** through pioneering innovation, research, **exceptional training**, **extraordinary care**, and genuine collaboration.





Step 1: Build and support governance and infrastructure

Form a multidisciplinary, high-quality Pediatric Resuscitation team, advisory board, and stakeholders

CHOP's Resuscitation Committee, co-chaired by a nurse/physician dyad, meets monthly to review code events and quality improvement issues. The multidisciplinary interprofessional committee consists of key partners and leaders across the organization.

The committee discuss and decide on any policy, practice or regulatory requirements related to resuscitation. Each unit/line has its own resuscitation governance to internally review and improve high-quality resuscitation.

The co-chairs of the Resuscitation Committee report a yearly summary to our Patient Safety Committee (PSC) which includes both Philadelphia Campus (PC) and King of Prussia Hospital (KOPH). We work closely with our Patient Safety Team who classifies if an event as Root Cause Analysis (RCA) or Apparent Cause Analysis (ACA).

CHOP Resuscitation Committee Unit/ Line Representatives Nodal Leads Liaisons / Partners корн Respiratory Care Pharmacy **Emergency Department** Equipment & Supplies **Hospital Operations** Critical Care Education & Training NICU PCOTI Program Pediatric Residency Cardiac Center CCOT Program ITCU (5E & 4E) Data / Analytics SDU General Med/Surg Emergency Transport Primary Care Regulatory & Compliance

RCAs are facilitated by a Patient Safety Manager, include

a multidisciplinary team of 8-10 people, assigned an Executive Sponsor, and develop corrective actions to prevent recurrence (CATPRA). RCAs are performed on serious safety events (SSE) and those events that pose a serious threat to the safety of our patients and staff. Findings and updates are reported back to PSC.

ACAs are performed by 1-2 people on Prescursor Safety Events (PSE) and near miss events that have minor or no harm, more of a review of what occurred, and completed at the local level. Trends are reported to PSC quarterly.

The Safety and Quality programs at CHOP are designed to continuously improve the care provided to our patients and families. While it maintains a primary focus on safety, effectiveness, equity and patient family centeredness, this plan supports efforts across all six "STEEEP" domains of quality as defined by the National Academy of Medicine (safe, timely, effective, efficient, equitable, and patient/family centered). The activities identified in this program description demonstrate CHOP's adherence to the requirements of relevant regulatory agencies, including but not limited to The Joint Commission, Centers for Medicare, and Medicaid Services (CMS), Occupational Health and Safety Agency (OSHA), New Jersey Department of Health (NJDOH), and Pennsylvania Department of Health (PADOH). They are explicitly defined as performance improvement activities, and therefore subject to the privileges and immunities of the Pennsylvania MCARE statutes.



Step 2: Collect data to measure and improve

Establish local integrated Cardiac Arrest Database — integrate with electronic health record, Learning Management System, education/training data, R2 clinic/long-term follow-up. Implement GWTG-Resuscitation/pediRES-Q data collection and entry, starting with core measures. Link to Patient Safety, QI, Risk Management dashboards.

Data Collection

CHOP Resuscitation Database (Ryan Morgan, Katie Graham)

Database that collects information on in-hospital cardiac arrests (IHCA) and out-of-hospital cardiac arrests (OHCA). Research coordinators are notified via text page by the local team if there is an arrest and email the distribution list CARG (Cardiac Arrest Research Group) for broader notification. For IHCA, data is collected from ED, PICU and CICU. As of May 2024, the N/IICU keeps a separate database. CPR quality and physiologic data is captured for each arrest by ZOLL defibrillators, GE monitors and SickBay. Video Capture is utilized in the ED. PICU has cameras installed in 10 of the 75 beds, but without connection to emergency activation system.

Hospital Code Team (Ryan Morgan, Mary Kate Abbadessa)

Code events are also manually entered into CHOP's Porter (QI) REDCap database. The code data is entered by the ED and ICUs. ED enters all ED team hospital responses and Resuscitation Clinical Nurse Specialist enters and tracks all hospital code team responses outside of the ICU.

The ED and ICUs (with exception to N/IICU) utilize the Epic electronic health record (EHR) system in the flowsheet named Code Narrator designed for real-time documentation of events during a code. Any code events outside the ICU are documented on paper code sheets. Code sheets are then scanned into the patient's EHR.

Rapid Response Team: Critical Assessment Team (CAT)

At CHOP, the CAT team is a resource to the inpatient units outside of the ICU activated by clinicians or family members if there are concerns for change in respiratory status, change in cardiovascular status, change in neurological status or general concern/"gut feeling". The CAT team's critical care expertise is utilized beyond the walls of the ICU to aid in prevention of clinical deterioration and is explained more later in this document.

PICU (Hannah Stinson, Megan Bernstein)

CAT data is captured via paper form by the CAT nurse and then manually entered into a REDCap database by a PICU co-op with oversight from Clinical Nurse Specialist. Plans are in place for electronic data collection to start in 2025.

CARDIAC CENTER (Dave Hehir)

The Cardiac CAT note helps identify when a Cardiac CAT took place and is reflected in the Cardiac Center Dashboard. Information is pulled from this note to track any relevant trends related to patient care.

N/IICU (Mary Haggerty, Anne Ades, Lauren Heimall)

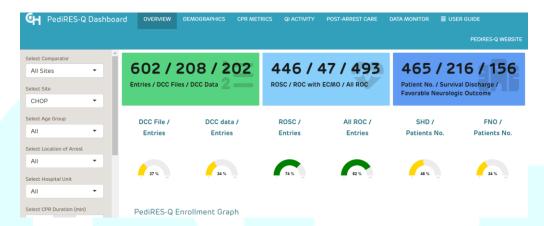


As of June 2024, the NICU has a CAT team for floor specific populations followed by Neonatology. The team is in process of creating a data collection system to track NICU CATs.

External Registry

pediRES-Q

Cardiac arrest registry where data is entered into a REDCap database. The data is then broken down and displayed in a dashboard for sites to utilize for quality improvement work and/or research.



CHOP also contributes data to <u>Get With The Guidelines (GWTG)</u> and <u>The Pediatric Cardiac Critical Care</u> <u>Consortium (PC⁴)</u>

Long-term Follow up (Neethi Pinto)

<u>CHOP's Recovery and Return (R2) Clinic</u> supports children and families in the first year of recovery after pediatric cardiac arrest or critical illness. R2 is using a registry the team built in Healthy Planet to capture data on their outreach and follow-up.

Analysis and Display

Event Reviews, Debriefs, and Dashboards

Code event reviews are unit specific for each ICU and the ED.

PICU

Code events are manually entered into CHOP's Porter (QI) REDCap database and tracked by a Nursing Leader who reports these events at the monthly hospital wide Resuscitation Committee meeting. There is also an internal group of code champions who review any cardiac arrest that occurred the prior month. Topics discussed include review of Zoll data, Code Narrator documentation and any CQI related concerns. Data is displayed in the CAT and Code Blue Events dashboard further explained in the Dashboards section below.

For every code event, a hot debrief occurs at the bedside. The unit uses a REDCap tool with QR codes that are located at every code cart to complete a debriefing form that is reviewed internally. Education on how to lead a hot debrief is reviewed in debriefing education with the trained MD and RN leaders in the unit. Cold debriefs happen monthly during the Cardiac Arrest Debrief meeting. The meetings are attended by nurses, advanced practice providers, respiratory therapists and are led by an MD



Resuscitation leader. There is a local email communication sent to everyone alerting the unit what patients are being reviewed.

Data for code events are entered manually into a REDCap database by the unit RN Resuscitation leader. The RN Resuscitation Leader reports these events at the monthly hospital wide Resuscitation Committee meeting. PICU dashboards are utilized to review all data.

Cardiac Center

For every code event, a hot debrief occurs at the bedside. The unit uses a REDCap tool with QR codes that are at every code cart and on ID badges. Education on how to lead a hot debrief is reviewed in debriefing education with the Simulation Center. Cold debriefs happen monthly during the Cardiac Arrest Prevention, Education, Resuscitation & Research (CAPER) meeting. The meetings are attended by nurses, advanced practice providers, respiratory therapists and are led by a MD Resuscitation leader. There is a local email communication sent to everyone alerting the unit what patients are being reviewed. Data for code events are entered manually into a REDCap database by the unit RN Resuscitation leader. Cardiac dashboards are utilized to review all data.

N/IICU

For every code event, a hot debrief occurs using an electronic REDCap with QR code (implemented March 2024). Cold debriefs occur ad hoc. All events are reviewed quarterly at the N/IICU Code Review meeting. A N/IICU MD Resuscitation leader conducts manual log and chart reviews to determine any themes or trends. The N/IICU does not have a dashboard but are in the process of creating one.

Dashboards (as of April 2024, harmonizing Qlikiew, RStudio and QlikSense)

CHOP utilizes the CAT and Code Blue Events Qlikview Dashboard. The dashboard aims to harness available data to predict and identify patients at high risk for clinical deterioration/cardiac arrest (e.g., Watchers). The Qlikview Dashboard merges hand chart reviewed data on both CAT and Code events with data that is extracted out of EPIC. All hospital and unit events are captured and displayed here.

Step 3: Implement effective education and training

Implement spaced learning/RQI Programs that integrate with Learning Management System (LMS)

Life Support and Education

The Children's Hospital of Philadelphia's Center for <u>Life Support Education</u> focuses on several key areas:

- 1. Training and Certification: The center provides comprehensive training and certification programs for healthcare professionals in life support techniques. This includes courses like Basic Life Support (BLS), Advanced Cardiovascular Life Support (ACLS), and Pediatric Advanced Life Support (PALS). CHOP has adapted the AHA Resuscitation Quality Improvement (RQI) teaching to every nurse and support staff. ICU MDs are not required to complete RQI training.
- 2. Simulation-Based Education: They utilize high-fidelity simulation technology to create realistic clinical scenarios, enhancing the practical skills and decision-making abilities of healthcare providers in life-threatening situations.



3. Research and Innovation: The center participates in ongoing research to improve life support techniques and protocols. They continuously innovate and update their training programs based on the latest evidence and technological advancements in the field of life support.

Access Life Support Education cardiac arrest training videos here.

Unit Specific Education

In both the ED and ICU, attendings and fellows are required to obtain BLS, PALS and ACLS certifications. Nursing is required to obtain BLS, PALS and *ACLS (*required for charge nurses only). Surgeons, Radiologists (except interventional) do not have BLS. Primary Care and Specialty Care outpatient providers do not require BLS. Most Primary Care attendings and a small amount of outpatient specialty care attendings do keep active BLS.

Clinical Simulation: How often do you have mock codes?

PICU

Multidisciplinary simulations every Thursday morning.

CICU

N/IICU

Multidisciplinary simulations once a month at minimum. Nurses attend 2-3 mock codes a year during frontline leader classes. Each side of the unit creates a specific safety goal and list attending mock codes as one of these options to achieve goal.

ED

Systems/Process/Testing: unannounced mock codes? Frequency?

PICU

CICU

N/IICU

ED

Debriefs: Refer to <u>Step 5: Stop preventable IHCA</u>.

External Outreach

EMS Outreach

The center conducts outreach programs for Emergency Medical Services (EMS) providers, offering specialized training and resources to support pre-hospital care and improve outcomes for critically ill and injured children.

PA Department of Health EMS Training Institute

The center is recognized as a Pennsylvania Department of Health EMS Training Institute, providing EMT certification and continuing education opportunities to ensure that EMS professionals remain current with best practices and advancements in emergency medical care.



pediRES-Q

Cardiac arrest registry where data is entered into a REDCap database. The data is then broken down and displayed in a dashboard for sites to utilize for quality improvement work and/or research.

Step 4: Establish goals of treatment early and reassess

Identify and document appropriate goals of care (e.g., DNAR). https://pathways.chop.edu/clinical-pathway/end-of-life-care-clinical-pathway

Resuscitation Limits

Do Not Attempt Resuscitation (DNAR) orders are considered for patients whose conditions cannot be cured, or adequately ameliorated, and when the medical team believes that the harms of receiving resuscitation outweigh the potential benefits for that patient. The process of discussing a DNAR order aims to determine the right thing to do if the patient experiences cardio-pulmonary failure or arrest. If the patient, family, or medical team feel that the DNAR Order should be rescinded, a discussion must take place again that includes the Attending Physician or designee and the patient or the patient's authorized decision makers. During an episode of cardiopulmonary failure or arrest, if a patient's authorized decision maker requests resuscitation despite the DNAR Order, the resuscitation should be provided.

Palliative Care Decision support for termination of resuscitation. System for activating palliative care, GOL. DCD.

Decision support for conversations related to DNAR and end of life care are provided by our PACT team, chaplain, or ethics team.

Step 5: Stop preventable IHCA

Identify patients at High-Risk of Cardiac Arrest (hot spots and early warning systems)

Recognition

Early Warning Systems (EWS)

CHOP's EWS systems were created to help identify and alert teams of patients at-risk for clinical deterioration. Our Risk Score, Clinician Concern Score, Watchers/Hot Spots, Situation Awareness Huddle and Critical Care Outreach Team (CCOT) will be discussed in this section.

Risk Score (Wards)

The Clinical Deterioration Risk Score is a tool that is not forward facing to the wards. It was created by CHOP to replace MPEWS. The score is calculated based on Heart Rate, Systolic BP, Respiratory Rate, Oxygen Saturation, Oxygen Requirement, Respiratory Effort, Cap Refill. The score informs our CCOT team.

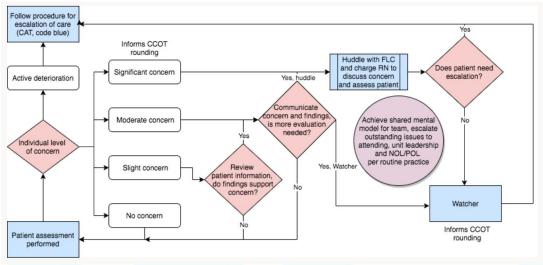
Clinician Concern Score (Wards)

Clinician concern is part of the detection system for identifying patients at risk of clinical deterioration. Subjective assessment of patient's deterioration risk performed by bedside RN as part of routine vital sign documentation and with any clinical changes. Decision support aims to drive team discussions for identified concerns. Patients with 'Moderate' and 'Significant' concern are added to a surveillance list in



EPIC managed by CCOT, along with 'Watchers' and other at-risk patients (e.g., patients who remain on the floor after CAT activation).

Process for escalation of care on the wards.



Watchers/Hot Spots (Wards and ICUs)

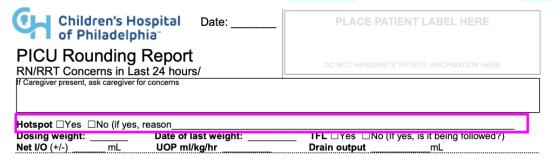
Wards

The Watcher Program is a team situational awareness process for floor patients. A "Watcher" is a floor patient whom the clinical team identifies as being at risk for clinical deterioration (e.g. CAT call in the past 24 hours, change in respiratory, cardiovascular or neurologic status, concern for sepsis, HFNC at high settings based on hospital guidelines, any determined risk for deterioration (e.g., clinical or family concern, complex fragile medical illness requiring additional resources).

PICU

Identifies hot spots each shift which are reported out during patient rounds. Hot Spots are defined by: High-risk transport, Difficult or critical airway with planned intubation or extubation, Other: At risk for clinical deterioration or extreme acuity.

Example of rounding script where hot spots are discussed during rounds.

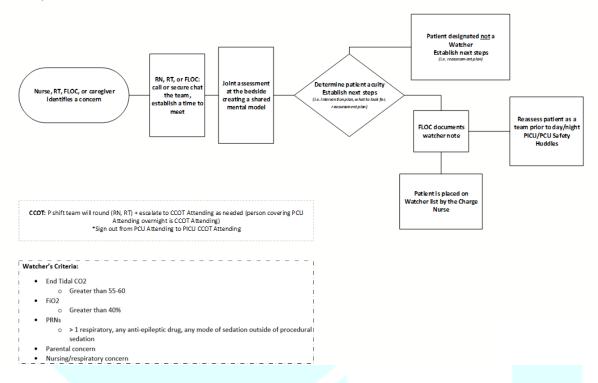


Progressive Care Unit (PCU)



During the day, watchers are identified during a joint assessment at the bedside with multidisciplinary team and discussed during safety huddle. At night, MD/APP notifies the 2nd on-call PICU attending/CCOT attending of the huddle outcome and of any patients who are Watchers. Watcher status for each patient is re-evaluated every shift by conversation with the Charge RN, APP and bedside RN prior to change of shift. Charge RN or APP reports which patients are designated as Watchers at each shift-based safety huddle.

Process for Watcher activation in the PCU.



N/IICU

There is no formal definition for EWS or Hot Spots. Flow Facilitator fills out a sheet identifying hot spots for RN awareness. All attendings on service and charge RNs huddle at night shift where hot spots are discussed and then morning fellow presents identified hot spots.

Cardiac Center (Maryam Naim, Michael Goldsmith)

The Cardiac Center focuses on prevention Focus on prevention by utilizing a column in EPIC called "Arrest Flag". The arrest flag is a point system that identifies prior arrests using EPIC to detect different patterns. If the flag is red a cardiac arrest huddle occurs utilizing a script.

Situation Awareness Huddle

The Situation Awareness huddle planning is in development and will be utilized on the wards. The goal is to increase local awareness of patients identified as Watchers.

CCOT (Wards)

Our Outreach Team is a proactive, free-standing team that consist of a PICU based RN, RT, MD, APP who round on inpatient floors based on the following criteria: new CAT activations, CAT call in previous 24



hours that remained on the floor, Watchers, Clinical Deterioration Risk Score of Moderate/High or Clinician Concern Score of Moderate/Significant. There is a situational awareness huddle with the charge nurse to review the list of identified Watchers. CCOT touches base with care team, provides any additional recommendations, or recommends CAT call if necessary (CAT call is the only way to have CCOT team go in and physically assess the patient).

Response

Rapid Response Teams

PICU

The PICU CAT team responds to inpatient units and most recently PACU and overflow units when hospital census exceeds capacity. Members include an APP or fellow, nurse, and respiratory therapist. The inpatient units activate a CAT by calling 4-RCAT.

Cardiac Center

The Cardiac Center CAT team responds to the CCU and ITCU. Members include a CICU nurse, FLC and attending. The Cardiac Center CAT is activated via "PHL Cardiac Center CAT" EPIC Group text sent as "urgent" linked to patient with description of problem.

N/IICU

As of June 2024, there is a N/IICU CAT team that is activated via the PICU CAT system. The PICU CAT RN fields the phone call and will send a secure message to a specific N/IICU Escalation group who will then respond.

Code Teams

Hospital Code Team

The hospital code team is a multidisciplinary team that responds to both Patient and Non-Patient immediate, life-threatening problems at Philadelphia Campus (PC) and King of Prussia (KOP) campus based upon a triage process that occurs when the Code Blue/Medical Emergency line is called. The multidisciplinary team includes 2 PICU RNs, PICU RT, PICU Fellow and PICU MD. The team is activated for all non-ICU code blue activations throughout the hospital, including Cardiology and Neonatology patients.

Activation of the code team is completed by dialing a direct line, pressing an app on CHOP work phones, or pressing the CODE Blue button/terminal located in patient rooms. To ensure code events outside the ICU are captured, a daily report is sent out to Resuscitation leaders based on the activation system.

Review

Debriefs

Each ICU has a Resuscitation group that reviews internal code events, discusses quality improvement, and implements test of changes or projects at the local level.

PICU (Amanda O'Halloran, Martha Kienzle, Megan Bernstein, Lori Boyle)

CICU (Monique Gardner, Wes Diddle, Annmarie D'Amato)



The Cardiac Center QI/QA group, named **C**ardiac **A**rrest **P**revention, **E**ducation, **R**esuscitation and **R**esearch (CAPER) is a multiple interdisciplinary team that meets monthly and review cardiac arrest events from the month prior, identify system issues and discuss how to improve and discuss any cardiac arrest prevention identification processes in place. The leads report out cardiac arrest events and any QI concerns from the events to the Resuscitation Committee. Leads of CAPER then meet as a smaller Steering group to review and discuss actions items. The CAPER Leads report out quarterly at the CICU CQI meeting any issues identified, themes noted during the arrest events and any documentation opportunities (e.g., code sheet, attending cardiac arrest note).

N/IICU (Mary Haggerty, Lauren Heimall)

The N/IICU QI/QA group meets monthly to review all code events and code sheet documentation. Members of this interdisciplinary group include medical, APP, FLC, RT, RN and SQS. The group discuss any issues or concerns and report out to the Resuscitation Committee. Hospital wide CPR coach training idea originated from this group.

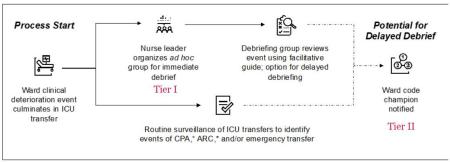
ED (Mary Kate Abbadessa, Alicia Dragon, Aaron Donoghue, Monica Prieto)

Hospital Event Reviews: Codes Outside the ICU (COTI)

(Kelly Papili, Hannah Stinson)

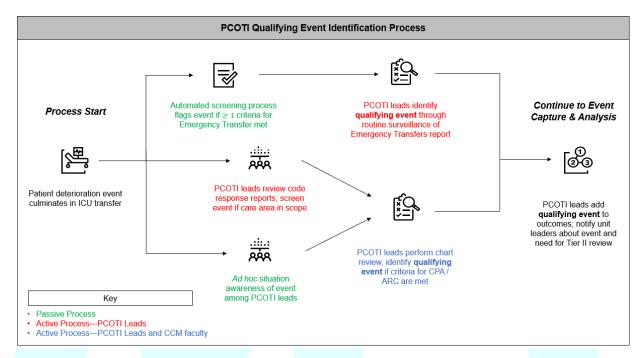
In 2018, Preventing Codes Outside the ICU (PCOTI) Program formed to prevent unrecognized clinical deterioration outside of critical care areas. This program reviews all code events outside the ICU.

In 2023, PCOTI's name changed to Preventing Clinical Deterioration Outside the ICU to highlight the overall goal of preventing clinical deterioration and focus on any unplanned transfer to an ICU (CAT or Code). The charge RN or member of nursing unit leadership will complete Tier I REDCap questions by the end of the shift the patient was transferred (12 hours). Tier II bedside review will occur for any CAT/Code event that meets CHA criteria, Emergency Transfer Criteria, or if requested by unit in Tier I RedCap. Code events outside the ICUs are also reviewed and presented to the Resuscitation Committee by PCOTI leadership.



+ Cardiopulmonary arrest; * Acute Respiratory Compromise





Harm Prevention Metric Tracking (COTI)

Events outside the ICU metrics include Emergency Transfers and Children's Hospital Association (CHA) definitions of Cardiopulmonary Arrest (CPA) and Acute Respiratory Compromise (ARC).

Emergency Transfers: escalations of care involving ≥ 1 of the following interventions within 1 hour of ICU transfer – intubation, initiation of vasopressors and/or ≥ 60 cc/kg fluid.

CPA: chest compressions and/or cardioversion/defibrillation

ARC: tracheal intubation, urgent or emergent use of positive pressure ventilation + ICU transfer + sustained/increased setting for >60 minutes.

Step 6: Resuscitation Response Systems

Hospital Code Teams

Code Team: A multidisciplinary team that responds to both Patient and Non-Patient immediate, lifethreatening problems at Philadelphia Campus (PC) and King of Prussia (KOP) campus based upon a triage process that occurs when the Code Blue/Medical Emergency line is called. The multidisciplinary team includes 2 PICU RNs, PICU RT, PICU Fellow and PICU MD. The team is activated for all non-ICU code blue activations throughout the hospital, including Cardiology and Neonatology patients. This team also responds to Specialty Care Clinics at each campus.

ED Tech Team: A team comprised of an ED Acute Care Tech and Security that responds to all Non-Patient medical emergencies at PC and KOP campuses. The communication specialist will dispatch the appropriate team based on the Non-Patient criteria.

ED Medical Team: A team comprised of an ED Acute Care Tech and Security plus ED RN and RRT



that responds to Non-Patient medical emergencies at PC and KOP campuses. The communication specialist will dispatch the appropriate team based on the Non-Patient criteria.

Airway Emergency Team: Anesthesia Attending Physician, ENT Physician and Charge Respiratory Therapist who respond to the bedside for care or consultation of any airway that cannot easily be secured.

Cardiac Code Blue

In September 2024, the Cardiac Code Blue response system was enacted. In the event the hospital code team leader identifies the need for cardiac content expertise, a secondary activation of "Cardiac Code Blue" group will occur. Team members include CICU Medical Command, CICU charge RN/resource/code RN, and Cardiology fellow.

Resuscitation and Emergency Services

How to Respond to a Patient or Non-Patient Emergency

Philadelphia Campus Emergency Response Algorithm

KOPH and SCC Medical Emergency Response Algorithm

Clinical Pathway for Children with Difficult/Critical Airway

Step 7: Guideline-based Resuscitation Care

Measure Real and Simulated Resuscitation Performance – Collect defibrillator, monitor, waveforms, live-capture data. Conduct performance debriefings (hot and cold).

Documentation

Effective team performance/communication

Metrics

Step 8: Guideline-based Post-Resuscitation Care

Implement Long-term follow-up (1-, 6- and 12-months post discharge) and Quality of Life interventions.

After CPR Team (ACTeam)

The ACTeam is a multidisciplinary group in the PICU that includes physicians, Safety and Quality Nurse Specialists (SQS), Clinical Nurse Specialists (CNS), RT and support staff. The goal of the ACTeam is to improve post-arrest care, identify areas for improvement in our post-arrest care and educate providers at the bedside in real time. The team provides resources to help with monitoring and are available for questions about approaches to post-cardiac arrest care (PCAC). There is a bedside checklist provided for severe post-CPR pathway patients as a guide.

Post-Cardiac Arrest Follow-up



Step 9: Implement Culture of Excellence

Create a Culture of Excellence - The Medical Model - Continuous Quality Improvement - Improve Skills, Dashboards, Survivorship celebrations (e.g., Nicoletti Conference), Award programs (e.g., GWTG platinum)

Step 10: Healthcare Professionals Wellbeing

Office of Employee Wellbeing

The Office of Employee Well-being empowers and supports individuals, leaders, and teams to manage stress and reduce burnout, make work easier by improving processes and leveraging technology, cultivate resilience and adopt healthy habits, improve employee engagement, and build healthy team culture.

Care for Colleagues

Care for Colleagues is a program where trained staff provide Peer Support Sessions for other staff who have experienced a traumatic event at the workplace. The aim is to provide rapid response (within 48 hours) to mitigate stress and provide active, short-term support.

EMBER



PICU Debriefing