



## ILCOR 10 Steps to improve IHCA - Case Study - Cincinnati Children Hospital & Medical Center Pediatric Intensive Care Unit - Reducing IHCA Through Enhanced Situation Awareness

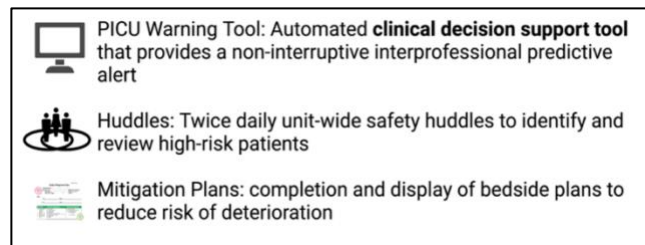
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**Background:** Pediatric cardiac arrest affects thousands of hospitalized children each year. Almost all pediatric in-hospital cardiac arrest (IHCA) events occur in a pediatric intensive care unit (PICU), and are preceded by progressive respiratory failure and/or circulatory shock. While cardiac arrest survival outcomes have improved, more than half of these children will die prior to discharge, making prevention the best approach to improve pediatric patient safety. High-risk characteristics for IHCA and warning signs prior to arrest can aid in proactive identification. Using early identification, bedside care teams can strengthen shared situation awareness, i.e. the degree to which each team member possesses a common mental model, and apply risk mitigation strategies to prevent IHCA events and save children's lives.

**Steps Taken:** As nearly 95% of pediatric IHCAs occur in PICUs, we developed an interventional IHCA prevention bundle targeted to PICU healthcare providers at Cincinnati Children's Hospital Medical Center. Early identification occurs via the PICU Warning Tool, an automated, electronic medical record clinical decision support tool that provides a non-interruptive notification to care providers of high-risk patients. This prediction tool prompts a bedside huddle to ensure shared situation awareness and development of a mitigation plan.

Specifically, the bundle contains the following three core elements:

- 1) an automated clinical decision support tool to provide a non-interruptive interprofessional predictive alert,
- 2) twice daily safety huddles with unit leadership, and
- 3) bedside assessment including the care team and patient's family to complete and display a bedside mitigation plan to prevent deterioration.



**Challenges:** In foundational work, we developed an accurate paper high-risk checklist; however, implementation was limited by the burden of manual assessment. To increase the rate of adoption, we built an automated clinical decision support system, the PICU Warning Tool, modeled after the paper checklist. However, building an automated clinical decision support system is time intensive and may not be feasible for many centers.

**Results:** To measure the impact of the complete IHCA prevention bundle, we performed a single-center study over 2.5 years. The primary outcome metric, CPR event rate per 1000 patient days, decreased from a baseline of 3.1 to 1.5 CPR events per 1000 patient days or by 52% with reduction in mortality (Figure). Improvement in process metrics included increased prediction of clinical deterioration from 40% to 67%, and improved shared situation awareness for high-risk patients from 43% to 71%. Balancing metrics included time spent in daily safety huddle, median 0.4 minutes per patient, and a number needed to

screen of 16 were determined to be acceptable to key stakeholders. Neither unit acuity nor the percent of deaths in patients with do not attempt resuscitation orders or electing withdrawal of life sustaining technologies changed over time.

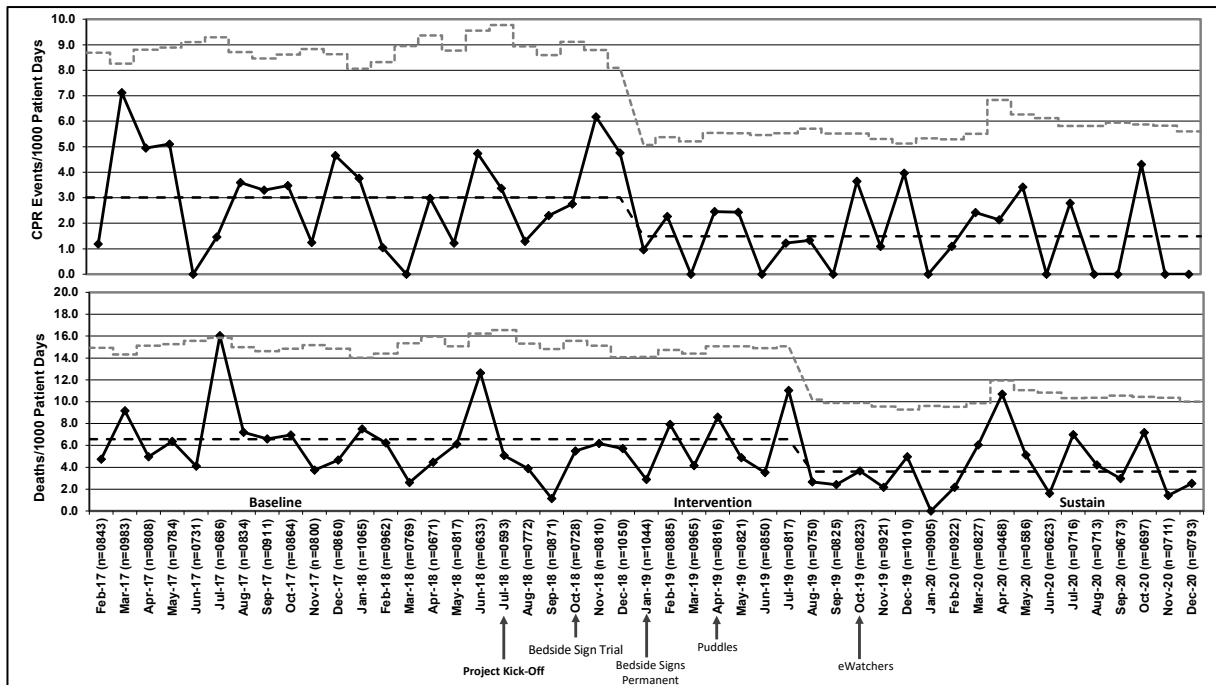


Figure From Dewan M, Soberano B, Sosa T, Zackoff M, Hagedorn P, Brady PW, Chima RS, Stalets EL, Moore L, Britto M, Sutton RM, Nadkarni V, Tegtmeier K, Wolfe H. Assessment of a Situation Awareness Quality Improvement Intervention to Reduce Cardiac Arrests in the PICU. *Pediatr Crit Care Med.* 2022 Jan 1;23(1):4-12.

**Outlook:** This intervention remains in place with sustained results at Cincinnati Children’s Hospital Medical Center and is currently being studied in five centers through a grant from the Agency for Healthcare Research and Quality through the Pediatric Resuscitation Quality Collaborative (AHRQ 1R18DS029301-01).

## References

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