

Blue Light Special: Visual Identification of High-Risk Patients in the Pediatric Cardiac Intensive Care Unit using a Cardiac Arrest Prevention Bundle

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Background

Cardiac arrest (CA) occurs in 7/1000 hospitalizations for children with congenital heart disease, 10 times the frequency of those without cardiac disease. Implementing a cardiac arrest prevention (CAP) bundle for critical patients to identify and treat deterioration has been shown to prevent a subset of CAs in the pediatric cardiac intensive care unit (PCICU). Additionally, integration of the bundle into the electronic medical record (EMR) has been shown to contribute to sustainability.

Problem Statement

In 2024, risk-adjusted post-surgical cardiac arrest rates showed a concerning increase, rising from 1.93% in Q1 2024 to 4.21% in Q3 2024 in the PCICU.

SMART Aim

Design and implement a center-specific CAP bundle with the goal of reducing post-operative CA occurrences by **20% by the fourth quarter of 2025**.

Methods

- Multidisciplinary committee created fishbone and key driver diagrams to design CAP bundle
- The bundle was implemented in March 2025
- A Blue Light above each room indicated patient enrollment (**Figure 4**)
- In addition to using PC4 platform data, center data were collected via retrospective chart review, real time monitoring of bundle compliance, and nursing workload score was extracted from electronic dashboard.
- PDSA cycle included feedback survey, changes to bedside action sheet and medication integration into EMR.

Data Analysis

Run and control charts tracked primary metrics:

- Cardiac Arrest Rate (%)
- CAP Bundle Compliance (%)
- Nursing Workload Score

Results

As CAP Bundle Compliance increased from ~60% to over 90%, the Cardiac Arrest Rate showed a corresponding decline from ~3.8% to below 1.5%.

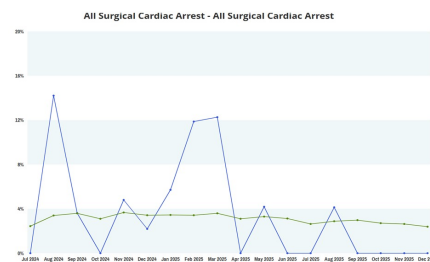


Figure 1. Risk adjusted cardiac arrest rate by month compared with national average – PC4 database

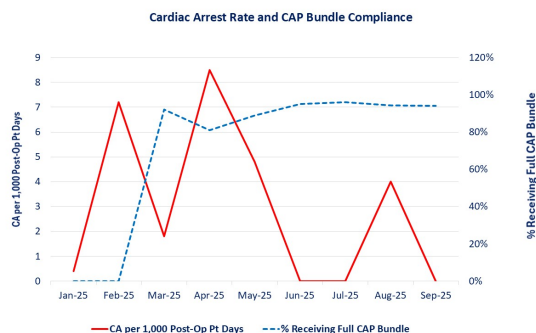


Figure 3. Cardiac Arrest Rate and CAP Bundle Compliance Jan25-Sep25

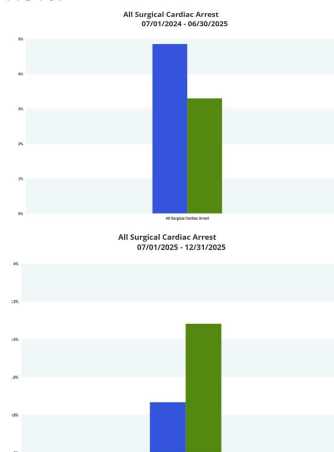


Figure 2. Post-surgical cardiac arrest rates compared to national average from 7/1/2024-6/30/2025 (above) and from 7/1/2025-12/31/2025 (below)



Figure 4. Blue light to identify patients on CAP bundle

Discussion / Conclusions

Consistent with published literature, implementation of a CAP bundle decreased rates of CA in the PCICU.

Key Outcomes:

- **Process Improvements:** Standardized use of the CAP bundle, improved documentation, proactive rounding, and medication integration into the EMR.
- **Clinical Outcomes:** Reduction in CA rates by over 50% from peak levels.
- **Strengths:** Strong interdisciplinary collaboration and buy-in with real-time feedback loops.
- **Challenges:** Difficulties with medication workflow and EMR process change.

Unintended Consequences:

- Positive: Increased staff awareness and vigilance led to earlier escalation of care.
- Negative: Temporary increase in documentation burden during rollout.

Next Steps

- Create CAP bundles specific to various patient populations, such as those on mechanical circulatory support.
- Integrate all medications in the bundle to the EMR order-set.
- Increase just-in-time bedside training with rolling refreshers.

References

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