Using Defibrillator Feedback Technology to Measure and Improve the Quality of Pediatric CPR

Holli Stanford BSN, RN, CCRN, Monica Smith, BSN, RN, CPHQ, Curran Hunter Daigle, MD, Amanda Puro, MD, Elise Flores, MSN, RN, CPN, and Annie Thomas, BSN, RN, CCRN-K

BACKGROUND

- High quality CPR is associated with improved outcomes in pediatrics, but quality is often measured only through physiologic monitoring or subjective team debriefs.
- In 2022, our facility acquired defibrillator (DF) monitors that provide measurable feedback (Fig. 1) during arrest events. The DF software provides a graphic display of compression rate and depth and uses an audible metronome at 110 bpm, offering teams real-time data to "course correct" during CPR.
- After each CPR event, data from the DF is downloaded to a case review dashboard for further analysis (Fig. 2).

Figure 1. Left- graphical display on defibrillator monitor during resuscitation. Right- defibrillator patient pads.

METHODS

- Education on the new DF devices and feedback features was delivered via simulation-based training, bedside check-ins, shift huddles, and staff meetings.
- Each PICU resuscitation included a cycle of DF data review, beginning with real-time feedback during CPR, followed by a hot debrief, cold case review, SWOT analysis, and concluding with an action plan for improvement.

Education
- Simulation
- Staff meetings
- Shift huddles
- Staff check-ins

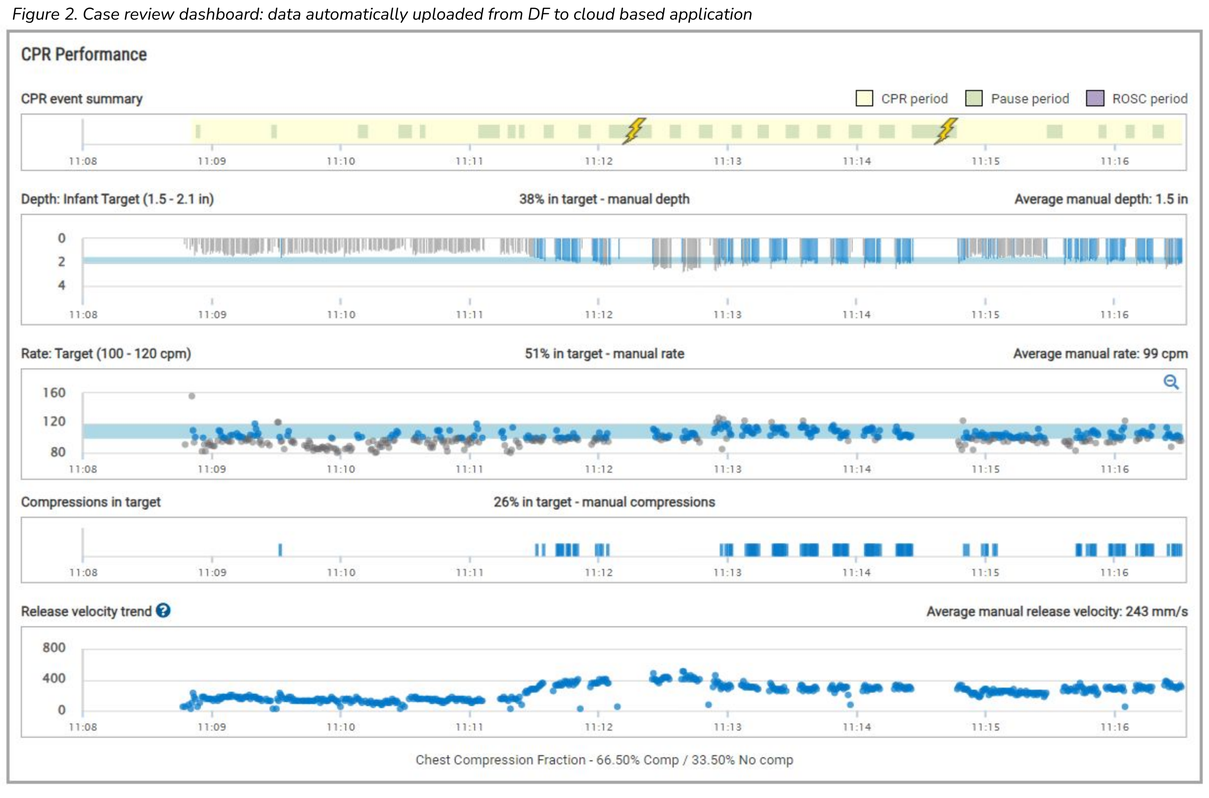
DF Feedback
- Audio and visual feedback for depth, rate, release velocity,etc

Hot Debrief
- Same shift review to capture perceived quality by CPR team

Cold Review
- Virtual meeting 2-4 weeks post-event with CPR team and program leaders
- SWOT identification

Action Plan
- Process changes
- Improvement projects
- Education

Figure 2. Case review dashboard: data automatically uploaded from DF to cloud based application



RESULTS

While no data exists to measure CPR quality prior to the DF implementation, nearly four years of post-installation data show consistent improvement in compression depth and rate over time.

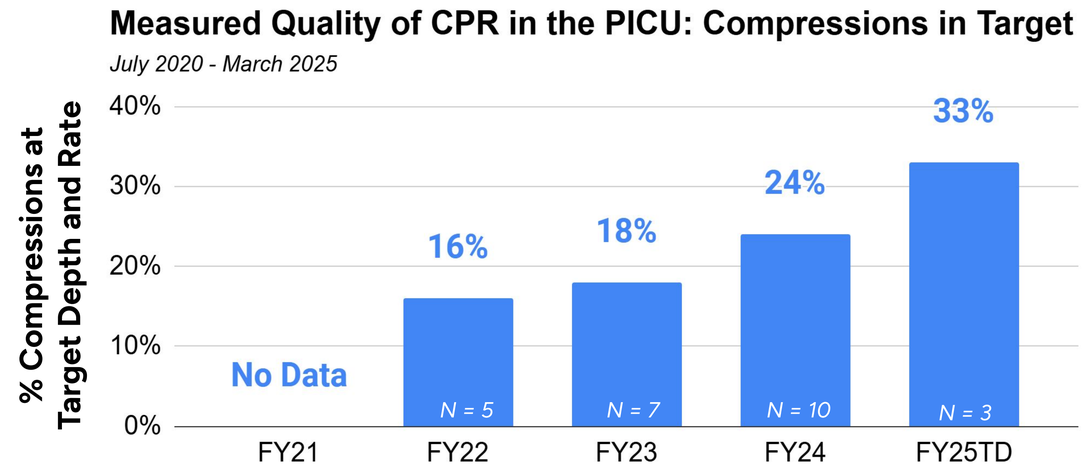
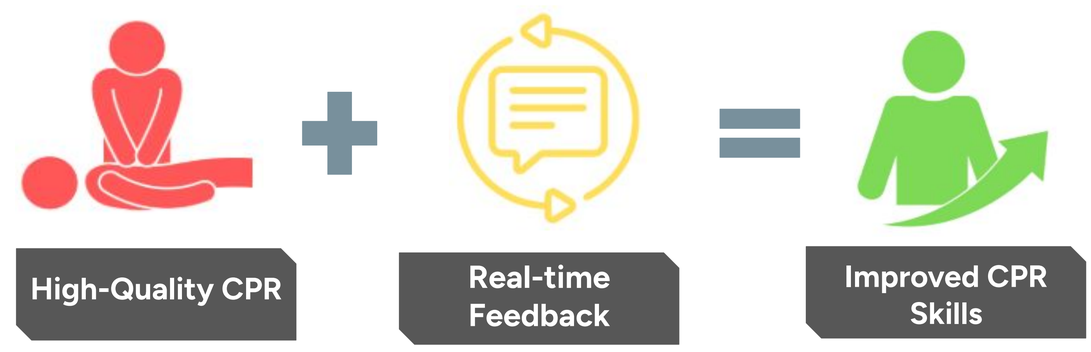


Figure 3.

CONCLUSIONS

The ability to measure CPR quality has enabled our code blue quality teams to evaluate the effectiveness of resuscitation program changes. Using PDCA cycles and other QI methodologies, we have launched and objectively assessed several initiatives, including a CPR Coach program, preassigned code roles, and new resuscitation records.



REFERENCES

Morgan RW, Kirschen MP, Kilbaugh TJ, Sutton RM, Topjian AA. Pediatric In-Hospital Cardiac Arrest and Cardiopulmonary Resuscitation in the United States: A Review. JAMA Pediatr. 2021 Mar 1;175(3):293-302. doi: 10.1001/jamapediatrics.2020.5039. PMID: 33226408; PMCID: PMC8787313.

Freedman, A. J., Madsen, E. C., & Lowrie, L. (2023). Establishing a Quality Improvement Program for Pediatric In-hospital Cardiac Arrest. Pediatric Quality & Safety, 8(6), e706.

Wolfe, Heather A et al. "Cold Debriefings after In-hospital Cardiac Arrest in an International Pediatric Resuscitation Quality Improvement Collaborative." Pediatric quality & safety vol. 5,4 e319. 8 Jul. 2020.

ACKNOWLEDGEMENTS

We gratefully acknowledge the support, creativity, and commitment of the staff and leadership of the Dell Children's PICU in advancing this work.

CONTACT

For more information and additional references, contact Holli Stanford, BSN, RN, CCRN, Clinical Lead for the PICU at Dell Children's Medical Center: holli.stanford@ascension.org