

Practice Makes Perfect Better: Making the Case for a Novel Hospitalist Resuscitation Curriculum

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The prevalence of cardiopulmonary arrest in pediatric inpatients is roughly 1 in every 1300 admissions.¹ These code situations can be both clinically challenging and anxiety producing for the anticipated code team leaders. Hospitalists practicing at tertiary children's hospitals have the luxury of a robust, highly trained, and experienced PICU team that takes over the resuscitative efforts, usually within 5 minutes of the code call. That is not necessarily the case in many community hospitals where pediatric hospitalists practice. Most often they are expected to lead resuscitative efforts through to resolution, including a postresuscitative phase while awaiting critical care transport. Delays in transport or rapid decompensation may leave pediatric hospitalists vulnerable to self-doubt and burnout if they are not confident in their resuscitation efforts.²

Despite an almost universal mandate for cardiopulmonary resuscitation (CPR) training (Basic Life Support and Pediatric Advanced Life Support [PALS]) every 2 years, the rarity of participation in actual arrest events or other opportunities to refresh these skills leads to significant skill decrements over time. In a study with military pediatric residents, researchers demonstrated this point. When residents were trained to "mastery" levels, 92% maintained their mastery at 2 months, but only 56% retained mastery by 6 months.³ Hospitalists are expected to perform better than pediatric residents, yet their routine exposure to refresher training is usually much less frequent. Additionally, there is a significant discrepancy between resuscitation knowledge and skill retention.⁴ Proficiency in cognitive matters does not necessarily indicate proficiency in the practical life-saving, hands-on skills.⁵

Fortunately, many pediatric inpatient units have continuous cardiorespiratory monitoring, use early warning systems, and can access ICU-based rapid response teams to escalate concerns. These have been shown to both decrease the incidence of cardiopulmonary arrests on general inpatient units and increase survival.^{6,7} The American Heart Association and American Academy of Pediatrics experts agree that the critical focus of inpatient resuscitative efforts for children should be on early recognition and timely effective CPR in the first 5 minutes, before the code team arrives. Unfortunately, timely effective CPR is not routinely delivered. Hunt et al⁸ analyzed 34 pediatric mock codes and found 75% failed to meet National Registry of Cardiopulmonary Resuscitation standards. Others found deficiencies in performance including absent pulse and rhythm checks, and delays in initiation of bag valve mask ventilation, CPR, and defibrillation are common.⁹ Each of these, not surprisingly, has a negative impact on patient outcomes.¹⁰

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The use of timely, effective CPR with defibrillation, as needed, performed correctly by unit personnel has been shown to dramatically improve survival odds.^{11,12} Regrettably, inadequate performance of CPR is all too commonplace even when delivered by “experts.” In adult resuscitation, chest compressions were found to be too slow and too shallow 28% and 37% of the time, respectively, with rescue breaths delivered too fast 61% of the time.¹³ When PICU and emergency department staff were recorded during 18 actual pediatric and adolescent arrests, findings revealed chest compressions were too shallow 27.2% of the time, were too slow 43%, and had residual leaning force 23.4%.¹⁴ These findings are used to suggest that more frequent exposure to code events alone does not suffice to achieve or maintain high quality resuscitation skill levels.

Many refresher training models exist to enhance skill retention. Sutton et al¹⁵ found that using CPR recording defibrillators along with instructor feedback during brief, frequent training led to incrementally increasing retention of CPR skills up to 3 times higher after 3 refresher sessions. The literature is replete with reports on how using mock code training improves providers’ knowledge, simulated performance, leadership skills, and comfort level.^{16–18} Much of the improvement was attributed to active participation and expert debriefing. Andreatta et al¹⁹ correlated pediatric mock code frequency with actual improved cardiopulmonary arrest survival rates. Over a 4-year period as the hospital’s mock code rate tripled, the cardiopulmonary arrest survival rate increased from 33% to 56%.¹⁹

Roughly two-thirds of our large pediatric hospitalist group practice in community hospitals where they function as code team leaders during pediatric resuscitation. Most of our hospitalists, averaging >10 years of practice reported that it had been >5 years since they placed an intraosseous line, replaced a tracheostomy, intubated a child outside the delivery room, or personally performed CPR. Nearly one-third have never performed these procedures on an actual patient! Seeing this as an opportunity for

improvement, our leadership directed that a novel curriculum be created, taught by hospitalists for hospitalists and focused on refreshing pragmatic pediatric resuscitation skills. The objective was to increase resuscitation knowledge, comfort with skill performance, and confidence levels of pediatric hospitalists in performing and leading resuscitations.

In the first year of the curriculum, an average of 35 hospitalists and fellows voluntarily participated in each of a series of 3 quarterly 2-hour small-group high-fidelity simulation-based training sessions with deliberate pauses for skills practice and coaching. We emphasized the use of a comprehensive rapid 30-second cardiopulmonary assessment followed by the management of the first 5 minutes of each resuscitation scenario. During the year, we worked through all the PALS algorithms, affording multiple opportunities for code team leadership as well as hands-on procedural skills training, including bag valve mask ventilation, chest compressions, intraosseous line placement, push-pull bolus technique, endotracheal intubation, rapid epinephrine delivery, cardioversion, and defibrillation. Throughout each scenario, deliberate pauses were taken for coaching and practical tips. Participants were encouraged to constructively critique their colleagues’ performance as they would if they were a code team leader. Debriefings allowed for expressions of visceral reactions, summaries of physiology driving the arrest scenario, and opportunities to discuss successes and areas for improvement as well as time for more directive teaching and takeaways. Scenarios increased in complexity throughout each session and over the course of the year.

Key differences with this simulation curriculum compared to others include increased training frequency done serially, training by and for hospitalists only, and the use of deliberate pauses. Thus far, the response has been overwhelmingly positive, particularly for the nonrushed pauses during scenarios for the teaching and practice of hand-on skills. Repeated emphasis on the rapid cardiopulmonary assessment incrementally improved

performance with subsequent sessions. Although our hospitalists have participated in various other types of simulation training in the past, they overwhelmingly rated this approach with expert peer coaching and deliberate pauses for skills practice “better” or “much better” than what they had experienced before. Notable quotes gleaned from the anonymous feedback mentioned this was a “non-academic/non-cerebral practical approach when things go to @#\$%, and you need to act,” because it “reinforced skills and knowledge that we all learn throughout our training but rarely have the opportunity to practice.” When asked what the most useful aspect of the curriculum was, a typical response included the “hands on, frequent breaks to debrief/explain/clarify” and the “non-threatening environment among division peers...[since it] has been intimidating ... when doing PALS with other divisions and nurses.” We believe this approach uniquely meets the needs of hospitalists, allowing them to learn in a low stress environment with active engagement and nonjudgmental peer coaching to demystify and remaster basic skills commensurate with their presumed expertise.

Critical to the initial success of our program was the encouragement and protected administrative time from leadership to pursue this as a vital area for faculty development. For divisions without well-developed simulation programs for hospitalists, we strongly recommend seeking buy-in from leadership to create a thoughtful and sustainable curriculum led by expert peer coaches. Such a program can be infinitely adaptable to newborn, subspecialty-focused, community-based, and intensive care—hospitalist groups. In our second year of curriculum, more involved skills, such as supraglottic airway placement and needle decompression of tension pneumothorax, are covered, while the basics are reemphasized, including the 30-second rapid cardiopulmonary assessment and timely, effective CPR. Simulated sedation complications and more complex resuscitations for both community and tertiary-based hospitalists are included. On-site community hospital-based team resuscitations and videotaped simulation

scenarios allowing for more comprehensive debriefing and improving perceived self-efficacy are included in future plans.²⁰

Division-wide enthusiasm for the program remains high. Several participants have reported using the skills learned and reinforced for rapid cardiopulmonary assessment on unstable patients. The participants commented on having increased situational awareness during crises, a higher confidence level in performance of resuscitation, and improved comfort teaching and debriefing trainees; however, robust ongoing data collection is needed to validate the attainment of the higher Kirkpatrick levels of changed behavior and improved performance. As pediatric hospital medicine evolves and hospitalists assume responsibility for varied inpatient populations and acuities, we have found initial success in this model of hospitalist-driven quarterly simulations. We anticipate this curriculum will enhance the cognitive, psychomotor, and affective domains in our hospitalist's resuscitation armamentarium.

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