IN SITU SIMULATION OF IN-HOSPITAL CARDIAC ARREST TO IMPROVE RESIDENT PHYSICIAN CONFIDENCE AND PERFORMANCE

Christine Sailer, MD[a], Lynne Rosenberg, MD[b], Alexis Tumolo, MD[a], Bridget Kovach, MAEdHD[c], Christopher P. Kovach, MD, MSc[a].

[a]Division of Cardiology, Department of Medicine, University of Colorado, Aurora, CO.
[b]Department of Medicine, University of Colorado, Aurora, CO.
[c]Department of Professional Development, Children's Hospital Colorado, Aurora, CO.

Background: In-hospital cardiac arrest (IHCA) resuscitations at academic institutions are frequently led by resident physicians with one year of post-graduate training who have not received formal teamwork, communication, or leadership training.[1-3] Resident physicians who respond to an IHCA are thus called upon to implement infrequently used, non-technical skills in an emergent situation with high mental workload and an ad hoc team. Recent studies have suggested that reinforcement of ACLS skills every two years is insufficient to maintain high-quality resuscitation practice.[1,4-6] Brief, repeated, in-situ (i.e., workplace-based) resuscitation training, however, may lead to improved skill retention.[7, 10-14] Cardiac arrest simulation is a well-established educational strategy for enhancing learner performance in resuscitation.[7-9]

Methods: A needs assessment performed in May 2021 demonstrated that 46% of all internal medicine residents and 95% of rising PYG 2s feel unprepared to lead a cardiac arrest resuscitation. A one-hour, monthly educational intervention utilizing in-situ, scenario-based medical simulation was developed and implemented to enhance the technical, leadership, and communication skills of resident physicians providing care in the cardiac intensive care unit (Fig 1). A Prestan Series 2000 CPR Manikin and the Simpl app were purchased as a low-cost alternative to high-tech simulation manikins. Pre- and post-intervention self-assessments of resident confidence were obtained using a 5-point Likert scale questionnaire. Skill performance was assessed during the first and last simulation using a standardized rubric (Fig 2). Changes in resident confidence and performance were described and compared using a paired t-test.

Results: A total of 7 educational interventions involving 42 internal medicine residents (20 PYG 1, 21 PYG2, 1 PYG3) have been completed to date. Preliminary data from the skills assessment demonstrated significant improvement in time to first defibrillation (114±44 vs 50±33 seconds, p=0.005, Fig 3), interruptions in CPR (18±5 vs 7±2 % of time off chest, p=0.001, Fig 4) and leadership and communication score (3 of 6 vs 6 of 6, p=0.0002). Following the intervention, more residents reported feeling "somewhat or very confident" to lead a cardiac arrest resuscitation (31 vs 72%), provide feedback on CPR quality (41 vs 69%), order appropriate medication and specify dose (38 vs 62%), provide high-quality post-resuscitative care (34 vs 76%) and discontinue cardiac arrest resuscitation for futility (14 vs 69%) (Fig 5). 100% of respondents reported the simulation curriculum improved their understanding of cardiac arrest resuscitation (76% "strongly agree", 24% "somewhat agree").

Conclusion: An in-situ simulation curriculum was effective in improving resident physician performance in leading an IHCA resuscitation. Further studies are needed to evaluate retention of performance gains over time.

APPENDIX

Figure 1. Overview of Educational Intervention

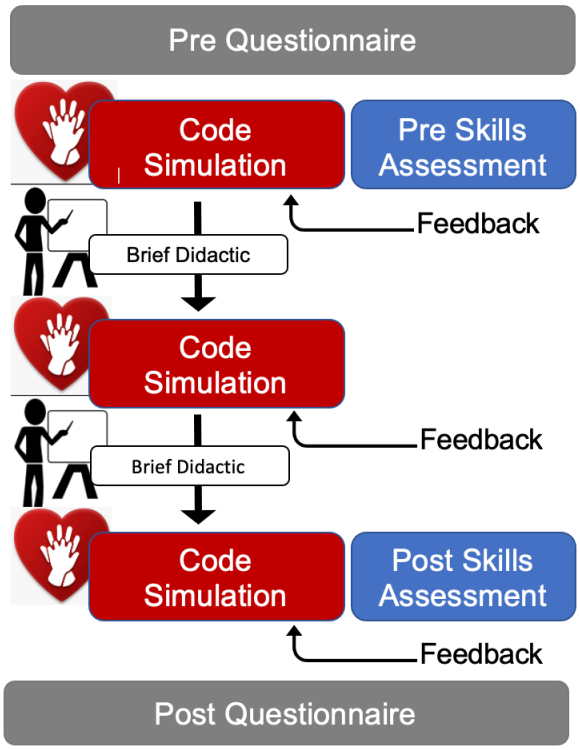


Figure 2. Pre and Post Intervention Skills Assessment Rubric

Simulation Skills Checklist
ACLS Skills Time to first shock: ___ seconds Interruptions in CPR: time off the chest ___seconds / total CPR ___seconds = ___ % time off chest Yes No ☐ ☐ Rate 100-120 >90% of the time ☐ ☐ Depth at least 2in >90 % of the time ☐ ☐ Appropriate dose/administration of epi and amio ☐ ☐ ECG obtained post ROSC, cath lab activated if STEMI ☐ ☐ Mental status assessed, TTM initiated **Leadership & Communication Skills** Yes No ☐ ☐ Leader identifies themselves, stands at foot of bed ☐ ☐ Leader identifies team members ☐ ☐ Leader concisely assigns tasks to specific individuals >90% of the time ☐ ☐ Team utilizes closed loop communication > 90% of the time ☐ ☐ Leader verbalizes rhythm at every pulse check ☐ ☐ Leader summarizes resuscitation course periodically (i.e., every 2-3 cycles)

Figure 3. Time to First Shock

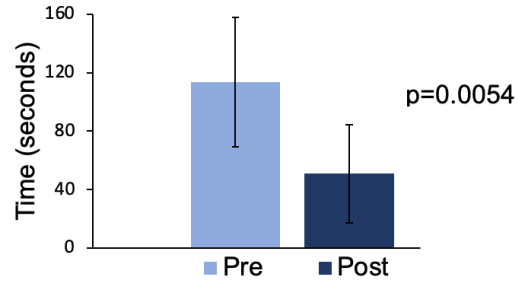


Figure 4. Interruptions in CPR

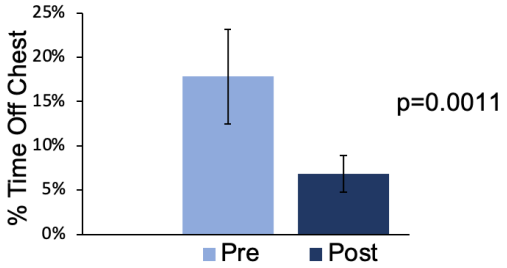
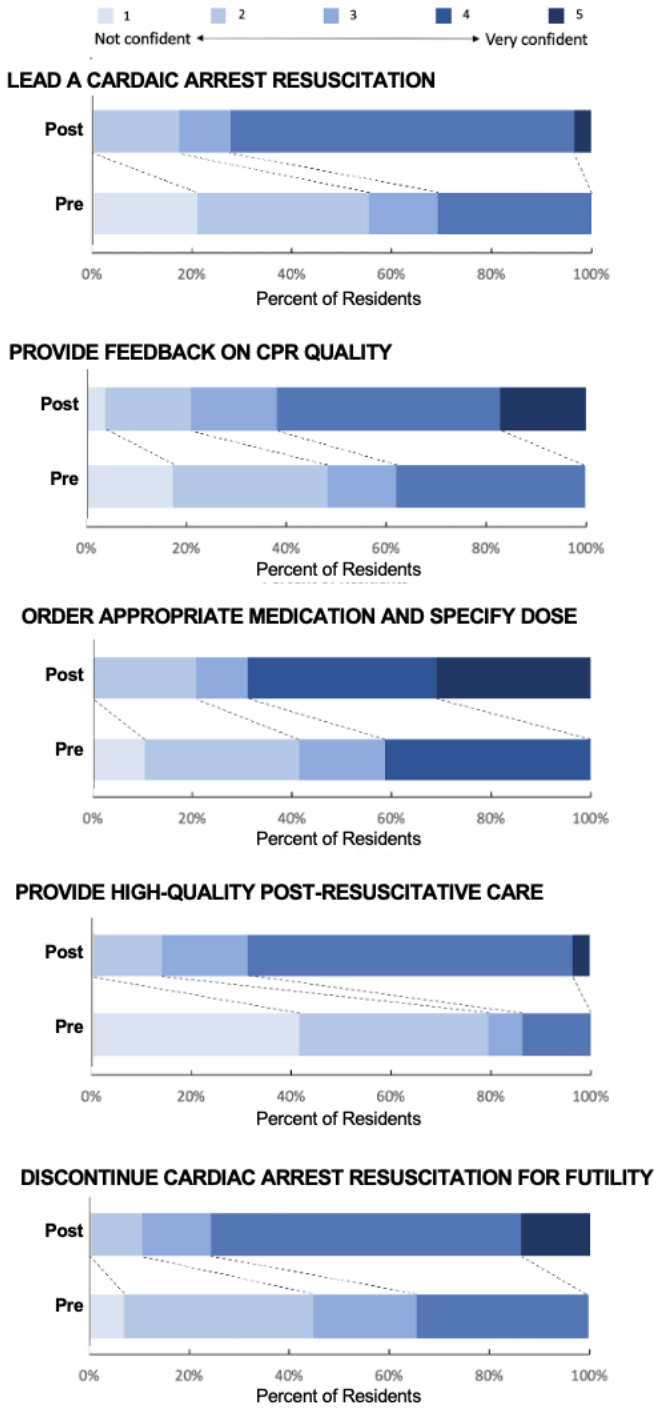


Figure 5. Resident Confidence Pre- and Post-Intervention



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