Quality Improvement

Enhancing Team Dynamics and Leadership Skills for Residents Leading Multidisciplinary In-Patient Cardiac Arrest Teams

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Article Information

Abstract

Background

Cardiac arrest is a prevalent event with low survival rates, both in out-of-hospital and in-hospital settings. There is a lack of specific training programs addressing team dynamics and leadership skills during resuscitation events, creating a clinical gap. This project aimed to enhance team dynamics and improve leadership skills during IHCA resuscitation events.

Methods

We implemented the Mock Code Project for resident physicians from our Internal Medicine Residency Programs in the simulation center (i.e., in a controlled environment) to address this gap. Multidisciplinary team mock code scenarios were created for residents, allowing them to lead resuscitation simulations. The scenarios were based upon common conditions encountered during codes (Cardiac arrest). Trained evaluators provided real-time feedback, and pre-and post-surveys were conducted to assess team perception and gather feedback.

Results

Baseline data revealed that 98.6% (143 of 145 residents total) felt uncertain or lacked confidence in leading effective codes in our hospital prior to the intervention. Post-test survey outcome data revealed that 95.1% of participants (136 residents of 143) reported that the sessions challenged their skills at leading codes and improved their skills at managing resuscitation teams.

Conclusion

Organized codes with clear roles, responsibilities, bed positioning, and clear leadership significantly improve closed-loop communication, effective team interaction, and patient outcomes. The Mock Code Project fills the gap in training programs by focusing on team dynamics and leadership skills during IHCA resuscitation. Ongoing evaluations and feedback ensure continual improvement in resident confidence and skills. Implementing organized codes benefits residents and healthcare teams, ultimately improving patient care during IHCA. Well-designed mock code scenarios with real-time feedback from senior physicians are an effective way for trainees to develop these skills and this awareness without compromising patient safety.

BACKGROUND

Each year, the Department of Veterans Affairs Veterans Health Administration hospitals witness 5,252 patients experiencing in-hospital cardiac arrest (IHCA), with a survival rate of around 33.6%. Nationally, over 200,000 patients in the United States undergo cardiopulmonary resuscitation (CPR) for IHCA annually, with survival rates varying between 18% and 30%.[1-3]

While guidelines traditionally stress the importance of rapid interventions, recent studies highlight the critical role of effective communication and leadership during IHCA in improving patient outcomes. Despite the focus on interventions such as timely defibrillation and high-quality chest compressions, evidence suggests that clear communication, coordinated teamwork, and strong leadership are essential for successful resuscitation.[4-6] These factors have become increasingly recognized as key in enhancing survival rates during in-hospital cardiac arrests.[5]

Even with advancements in medical care and resuscitation techniques, IHCA survival rates remain a significant challenge.[7-9] Many studies have concentrated on aspects like chest compression quality. Yet, there is a noticeable lack of focus on training healthcare professionals in team dynamics and leadership within the IHCA context.[10-12] This gap highlights the need for structured training programs that prepare healthcare teams to handle the complex, high-pressure resuscitation environment.

To address this need, we launched the Mock Code Project, an initiative to strengthen resident physicians' leadership and teamwork skills during IHCA events. Through simulated code scenarios and real-time feedback, the project aims to equip residents with the confidence and expertise to lead multidisciplinary resuscitation teams effectively. This manuscript details the Mock Code Project's methodology, preliminary outcomes, and its potential impact on improving patient care during IHCA. The aim of this project was to improve resident confidence as team leaders, improve team dynamics and communication, and improve adherence to guidelines.

METHODS

The project was conducted at our Department of Veterans Affairs Veterans Health Administration hospital. The participants included 145 residents and 791 multidisciplinary team members, including interns, medical students, nurses, respiratory therapists, and attending physicians. Residents, interns, and medical students were from two residency programs and they each participated in one session only, while nurses, respiratory therapists, and attending physicians participated in multiple sessions.

Baseline data were collected using a pre-training questionnaire designed to evaluate residents' confidence and certainty in leading multidisciplinary code teams (Supplementary Material). The questionnaires focused on five key areas: confidence in leadership, decision-making certainty, perception of leadership skills, comfort in communication, and preparedness for leading resuscitation. Out of 145 residents, 98.6% (143 of 145 residents) reported feeling uncertain or lacking confidence in leading effective multidisciplinary code teams. This baseline data highlighted the need for targeted interventions to improve resident confidence and leadership skills in code situations.

To address the identified gaps, we implemented the Mock Code Project, a structured training program aimed to enhance resident physicians' leadership skills and teamwork abilities during IHCA events.

First, residents had a brief talk on leadership skill needed for a cardiac arrest team leader such as decisiveness, effective communication, and calmness under pressure administered by an attending physician. Also, they received a brief talk on the roles and responsibilities of a code leader. Next, residents were immersed in realistic, high-stress simulated code scenarios that mimicked actual IHCA situations. The mock codes were announced, and every code team member rushed to the bedside of the patient. When the residents arrived at the bedside, the lead nurse handed them the badges with the role they were responsible for during the code, and then directed them to their bedside position. We mainly used two scenarios for all the training since our main goals were leadership training and team dynamics.

Scenario #1: *69-year-old veteran, fully vaccinated with history of COPD, heart failure with an ejection fraction of 20%, and hypertension who was admitted 4 days ago for acutely decompensated heart failure. In the morning, patient had worsening dyspnea and was placed on 2L O2 by nasal cannula. Shortly before the code, the nurse found him very short of breath with chest pain. The medical team was called and an EKG, and Cardiac enzymes obtained. Additionally, ASA 162 was administered with sublingual nitroglycerine. EKG showed atrial fibrillation with a heart rate of 150bpm, the Troponin I was 1.2 ng/mL. While the nurse was placing a peripheral line, patient became unresponsive, and a cardiac arrest code was called. Patient had no pulse Initial VS: 144/78, p:115, RR 22, O2sats: 92% on 2L of O2 by nasal canula.*

Learning Objectives:

1. Mastering code team roles and responsibility
2. Reduced Chaos and noise during codes
3. Management of cardiac arrest scenario at the Atlanta VA
4. Management of PEA

Scenario #2: *A 72-year-old man with a history of type 2 diabetes, hypertension, and recent CABG due to a three-vessel disease admitted for chest pain concerning for another blockage. Patient became unresponsive while the nurse was getting him ready to go to the cardiac catheterization lab. His vitals at the time he became unresponsive was 138/72, P:36, RR 22, O2sats: 89% on 2L of O2 by nasal canula. A code was called immediately, and CPR started. The rhythm was bradycardia, and a faint pulse was felt after two minutes of chest compression.*

Learning objectives:

1. Mastering code team roles and responsibility
2. Reduced Chaos and noise during codes
3. Management of cardiac arrest scenario at the Atlanta VA
4. Management of bradyarrhythmia

Sessions involved a multidisciplinary team, including nurses, respiratory therapists, and attending physicians, to mirror the dynamics of an actual code team. Residents received immediate feedback from the attending physician on their performance, focusing on leadership, communication, and team coordination. Each session was repeated, allowing participants to switch roles and gain diverse perspectives. Residents received feedback immedi-

Table 1. Multidisciplinary code team participants

	Number of participants	Code team composition
Residents PGY 2/3	145	1
Interns	294	2
Medical Students	290	2
Registered Nurses	46	2
Respiratory Therapists	36	2
Attending Physicians (Hospitalists)	16	1
Total participants	827	

ately after the scenario was completed during debriefing or, in rare cases, during the scenario if they were missing something major, like not asking to continue CPR after a shock or pulse check. The feedback when the scenario was in progress was in the form of a suggestion.

After completing the training sessions, a post-test questionnaire was administered to assess the intervention's impact on residents' confidence and skills. (Supplementary Material) The post-test questionnaire was similar to the pre-test, allowing for direct comparison of results. Answer choices a and b were considered positive answers, while answer choices c and d were considered negative options.

RESULTS

A total of 827 multidisciplinary team members participated in this project. The residents, interns, and medical students each participated in one session only. Nurses, respiratory therapists, and attending physicians participated in multiple sessions (**Table 1**).

Baseline data revealed that 98.6% (143 of 145 residents total) of the residents felt uncertain or lacked confidence in leading effective multidisciplinary code teams in our hospital. Most residents 79.3% (n=115) also reported that the aspects they needed to improve the most on was knowing the responsibility of each team member/team coordination. Post-test survey outcome data revealed that 95.1 % of participants (136 residents of 143) reported that the sessions challenged their skills at leading codes, 100% (143 of 143 respondents) reported that this training improved their skills at managing multidisciplinary resuscitation teams. Two residents had to leave for a scheduled family meeting and so did not complete the post training questionnaire (**Table 2**).

During debriefing, multiple residents appreciated having clear roles and responsibilities in addition to having badges that displayed the roles of each member, making it easy to know who they could ask to complete a task directly and to expect a close loop communication. Note that these badges were already implemented at the Atlanta Veterans Affairs Healthcare System (VAHCS) before this project.

DISCUSSION

The results of the Mock Code Project underscore the critical impact of structured, simulation-based training on improving leadership skills and team dynamics during in-hospital cardiac arrest (IHCA) resuscitation events. The significant increase in resident confidence and perceived ability to manage multidisciplinary resuscitation teams' post-intervention highlights the effectiveness of targeted training in bridging the gap between theoretical knowledge and practical application in high-pressure clinical scenarios.

The baseline data, revealing that 98.6% of residents felt uncertain or lacked confidence in leading effective codes, aligns with existing literature that identifies a lack of formal training in team leadership and dynamics as a barrier to optimal resuscitation outcomes. This finding is consistent with previous studies, which have shown that despite advancements in medical technology and resuscitation guidelines, the human factors of communication and leadership remain underemphasized in traditional medical education.[4,11,12] The Mock Code Project's success in addressing this gap by offering hands-on experience in a controlled environment demonstrates the value of integrating such training into residency programs.

The improvement observed in post-training surveys, with 93.8% of residents reporting enhanced skills in leading codes and 98.6% acknowledging an improvement in managing multidisciplinary teams, is particularly noteworthy. This suggests that not only did the mock codes challenge the residents' abilities, but they also provided a crucial learning experience that directly contributed to the development of essential leadership skills. This is in line with the growing recognition within the medical community of the importance of non-technical skills, such as teamwork and communication, in achieving favorable patient outcomes during resuscitation[4-6]

The feedback loop created by real-time evaluations and debriefing sessions ensured that residents could immediately apply constructive criticism, reinforcing the learning process. The iterative nature of this approach, where residents could reflect on their performance, re-

Table 2. Response rates for key leadership qualities in resident physicians leading multidisciplinary code teams.

	Before		After	
	positive	negative	Positive	Negative
Confidence Level in Leading a Multidisciplinary Team	1.4% (n=2/145)	98.6% (n=143/145)	95.1% (n=136/143)	4.9% (n=7/143)
Certainty in Decision-Making	2.8% (n=4/145)	97.2% (n=141/145)	98.6% (n=141/143)	1.4% (n=2/143)
Perception of Leadership Skills	17.3% (n=25/145)	82.7% (n=120/145)	98.6% (n=141/143)	1.4% (n=2/143)
Comfort in Communicating with Team Members	39.3% (n=57/145)	60.7% (n=88/145)	96.5% (n=140/143)	3.5% (n=3/143)
Preparedness for Leading Resuscitation	5.5% (n=8/145)	94.5% (n=137/145)	100% (n=143/143)	0% (n=0/143)

**Note that 2 residents did not stay for the debriefing or responded to the after-simulation survey.

ceive feedback, and implement changes, likely contributed to the high levels of reported improvement. This continuous evaluation and feedback model is supported by educational theories that emphasize the importance of reflection in experiential learning.[12]

However, while the Mock Code Project has shown promising results, there are several areas for further exploration and improvement. For instance, long-term follow-up studies could assess whether the improvements in confidence and skills observed immediately post-intervention are sustained over time and translate into improved patient outcomes during actual IHCA events. Additionally, the study was conducted in a simulation center rather than in actual clinical settings. While this allows for controlled learning, the results may not fully translate to the unpredictability and pressure of actual IHCA events. Also, the residents were aware they were being evaluated, which might have influenced their behavior and performance during the mock codes, leading to results that may not fully reflect their usual practice in an actual code situation. Finally, while sufficient for this study, the sample size might still be limited for detecting smaller effects or for more granular subgroup analyses.

CONCLUSION

The Mock Code Project demonstrates that structured, simulation-based training focused on leadership and team dynamics effectively enhances resident physicians' confidence and skills in managing IHCA resuscitation events. By addressing the often-overlooked human factors of resuscitation, such programs can significantly improve patient outcomes in critical care settings. Future research should continue to explore the long-term impact of such training interventions and seek to refine and expand these educational models to benefit a broader range of healthcare professionals.

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Disclosures/Conflicts of Interest

The authors declare they have no conflicts of interest

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