CE

1.0 ANCC Contact Hour

Low-Fidelity Code Blue Simulation on the Orthopaedic Unit

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Orthopaedic nurses care for a range of patients with comorbid conditions, but because of the implementation of Rapid Response Teams, rarely do orthopaedic patients experience cardiac or respiratory arrest. Rapid Response Teams decrease emergent arrest situations on nursing units by intervening to treat clinical deterioration or move patients to a higher level of care prior to cardiac or respiratory arrest. Orthopaedic nurses still need to be prepared to act emergently with basic life support skills, which are only renewed every 2 years. Review of actual code blue events and the implementation of low-fidelity code blue simulation may improve comfort levels and performance of basic life support skills. The purpose of this article is to describe how educators designed a low-fidelity mandatory annual code blue simulation exercise for nurses to help increase confidence when faced with the rare cardiac or respiratory arrest emergency. The low-fidelity code blue simulation has been repeated annually and has been an effective exercise for orthopaedic nurses.

"I need some help in here!" We have all heard it and easily recognize that unmistakable call from one of your colleagues whose patient is in cardiac or respiratory arrest. Cardiac or respiratory arrests are infrequent events on the orthopaedic floor. Orthopaedic nurses discharge patients to receive new postsurgical patients, transfers from intensive care unit, or emergency department admissions. Orthopaedic nurses are accustomed to a rapid workflow, but the arrest situation is never part of the shift's plan.

Anxiety runs high when a code happens on the orthopaedic floor. Orthopaedic nurses maintain basic life support (BLS) skills, but BLS may be difficult to recall when faced with a real cardiac or respiratory arrest. Code blue critiques for one orthopaedic unit identified deficiencies by orthopaedic nurse first responders. Code blue simulation can help ease the anxiety and increase comfort levels with cardiac or respiratory emergencies.

Background

The Institute for Healthcare Improvement (IHI) 100,000 Lives Campaign (Berwick, Calkins, McCannon, & Hackbarth, 2006) launched an initiative in 2004 to significantly reduce morbidity and mortality in American healthcare. One of the IHI strategies, implementation of Rapid Response Teams (RRTs), sometimes called medical emergency teams, was pioneered in Australia and has since been adopted by many healthcare facilities with great success (Institute for Healthcare Improvement, 2016). The foundation for RRTs is based on evidence that supports that patients often exhibit signs of deterioration or instability for several hours prior to cardiac arrest. Criteria are established that allow nurses to call the RRT to intervene before patients experience a crisis. Hospitals using RRTs typically observe reductions in the number of cardiac arrests, unplanned intensive care unit transfers, and even overall mortality rate (Institute for Healthcare Improvement, 2016). Orthopaedic patients may experience clinical deterioration and most hospitals have RRTs. Nurses have grown comfortable with RRTs and value the support of the RRT when a patient demonstrates clinical signs of deterioration.

The literature supports that an increase in the number of RRT events correlates to a decrease in code blue (cardiac or respiratory arrest) events. Thomas Jefferson University Hospitals data from 2012 to 2014 demonstrated a significant increase in RRT activations across the hospital accompanied by a significant decrease in non–intensive care unit code blues (Avis, Grant, Reilly, & Foy, 2016). A retrospective study analyzing the impact of RRTs by Hinkulow, Crouch, and Meadows (2013) reports a similar decrease in code blue events in an acute care environment. The hospital reported increased RRT events, demonstrating staff nurses' reliance on this essential 24-hour support. Earlier interventions for deteriorating patients may be responsible for better outcomes, also resulting in less code blue situations.

Cates (2011) describes simulation as a training technique that has been used in the aviation industry since the 1930s. High-fidelity simulation technology evolved and is used in a variety of industries including healthcare. Simulation in the inpatient healthcare setting provides safe exposure to complex and high-risk clinical

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events without patient or team member risk. High-fidelity simulation is an excellent tool to improve teamwork, practice technical skills, and improve patient outcomes and safety.

Several journal articles about the use of high-fidelity simulations for resuscitation in pediatrics, obstetrics, and neonatal specialties can be found in the literature. High-fidelity simulations decreased delays in initial resuscitation interventions and improved the function of the resuscitation teams (Allan et al., 2010; Boon et al., 2014; Hunt, Walker, Shaffner, Miller, & Pronovost, 2008; Lipman et al., 2010; Roy, Miller, Schmidt, & Sagy, 2011).

Huseman (2012) utilized high-fidelity code blue simulation to assess for short- and long-term influence on nurses' self-reported competency. The impetus for the project was that nurses reported feelings of incompetence with resuscitation skills, and many nurses had never experienced a cardiac arrest situation. Huseman reported that nurses expressed a positive attitude toward the code blue simulation and had improved feelings of competence. The simulation had a positive effect on code blue performance; however, the improved response was inconsistently maintained after training. Educators need to be aware of the deterioration in resuscitative skills, and periodic reviews should be considered.

Nurses may exhibit fear, anxiety, confusion, and even immobilization during actual code blue situations (Delac, Blazier, Daniel, & N-Wilfong, 2013). Delac et al. (2013) implemented a high-fidelity code simulation on a medical–surgical telemetry floor using the unit's emergency equipment and a video briefing activity. Before implementation of the simulations, proficient nurses reported anxiety as high as the newly graduated nurses. The educators found a significant decrease in time to both cardiopulmonary resuscitation (CPR) and defibrillation and an increase in number of nurses who felt very confident initiating appropriate first responder interventions after the simulation.

Not every facility has access to high-fidelity simulation equipment. The literature also supports low-fidelity code blue simulations and improved nurse effectiveness. In fact, simulation condensed to 30–45 minutes can improve the initial response to cardiac or respiratory arrest situations and can be more cost-effective than high-fidelity simulation (Brown, Latimer-Heeter, Marinelli, Rex, & Reynolds, 1995).

Purpose

Consistent with the literature, the introduction of RRTs at our facility resulted in a decrease in the number of code blue events. After RRTs were implemented at our facility, the nurses reported feeling more anxious during code blues on the orthopaedic unit, likely due to the lack of warning signs that the patient was deteriorating. Our orthopaedic unit experiences less than 10 code blue events annually for a staff of approximately 30 full-time registered nurses. The purpose of this project was to increase orthopaedic nurses' confidence in code blue situations through implementation of a low-fidelity code blue simulation.

Gap Analysis

First responder performance during a code blue is critiqued for the facility on a case-by-case basis by the code blue team. The team identifies opportunities for improvement and notifies the appropriate nursing unit educator. Remediation of errors is handled individually in coaching sessions for nurses involved with the code. For example, one gap noted during a code blue event on the orthopaedic unit was ineffective rate and depth of compressions. Orthopaedic nurses who participated in that particular code received coaching in a mandatory skills laboratory, reviewing BLS principles and then practicing compressions on a manikin in a classroom setting.

Other medical–surgical nursing units had similar issues identified in the code blue critiques, and it became clear to the code blue review team that opportunities to improve nurse performance existed across the facility. The unit-based clinical educators formed a subgroup to create a code blue simulation to implement on all medical–surgical hospital units.

Goals

The goal of the code blue simulation included increasing nurses' comfort level in a life-threatening emergency such as cardiac or respiratory arrest. The expectation was for 100% orthopaedic nurse participation. Orthopaedic nurses need to understand the critical nature of recognizing the emergency, beginning BLS interventions as quickly as possible, roles of the team members, and using the automatic external defibrillator (AED) and delivering a shock if advised.

Intervention

The code blue simulation was conducted by the clinical educator on every inpatient unit during different months. Our facility does not have access to high-fidelity simulation equipment, so clinical educators designed a low-fidelity alternative. Equipment for the code blue simulation included a CPR manikin with trainer mode, crash cart with AED, and an empty patient room on the unit. The on-unit location was thought to be beneficial because it was a familiar work environment for the unit nurses.

A computer-based tutorial was assigned via the hospital online learning management system for completion prior to the code blue simulation. The tutorial reviewed roles and teamwork principles that are taught in the American Heart Association BLS class. Clinical staff members recertify BLS every 2 years, so the tutorial reinforced previously acquired knowledge. Staff nurses completed the computer-based tutorial before attending the code blue simulation.

Orthopaedic staff nurses signed up in groups of four for the 30-minute code blue simulation. The mandatory simulations took place in a 2-week period. The educator set up an empty patient room and created a typical orthopaedic case to make the simulation as realistic as possible. The group of nurses was given the case with an explanation to bring the crash cart and to operate the AED just as they would in a real code blue.

In the first year of the code blue simulation, the teams were required to phone the hospital operator to announce the mock code blue on the overhead paging system. There had been opportunities previously identified with hospital operator communication of code blue situations and including the call to the operator in the simulation provided practice for the operators and nurses. Both nurses and operators were expected to utilize a script to standardize the telephone communication to ensure that the code situation was announced overhead to the correct patient room. The nurse's script with the operator during a code is similar to the read back methodology and includes nurse's name, unit, patient room number, and code blue. The nurse is required to stay on the phone to ensure that the correct information is announced by the operator.

The nurses performed the code blue simulation once, including shock delivery with the AED in training mode. The educator completed an audit tool while observing the nurse teams completing the code blue simulation. The audit tool contained BLS critical elements and room for comments on the team performance. The audit tool (see Figure 1) helped the educator record key elements to provide positive feedback and opportunities for improvement. Critical elements included whether a shock was delivered if indicated by the AED, the use of a one-way valve mask, and adequate rate and depth of chest compressions. After the shock was delivered, the unit educator stopped the scenario and asked for feedback from the team.

Evaluation

A debriefing followed the code blue simulation. The unit educator asked the team of nurses to identify what went well during the simulation. Orthopaedic nurses complimented their team members for actions such as responsiveness to the call for help, initiation of compressions, bringing the crash cart to the room, AED pad placement, and using the safe sequence for delivering a shock. Opportunities for improvement were identified next by the nurses. The orthopaedic nurse teams often

Auditor: _____

Date/Time of session: _____

Time	Y/N	Criteria	Comments
		Recognition of need for CODE BLUE	
		Calls for help – lays patient flat	
		Time compressions started	
		Mock Code request made to telecom (x.3333)	
		Time **MOCK** code announced overhead	
		Respirations with one-way valve mask	
		Crash cart at bedside	
		Back board placed?	
		Adequate compressions?	
		Suction setup ready	
		IV patency established or new IV started	
		Time multi-purpose pads placed	
		Pads placed properly?	
		Time shock delivered if indicated	
		Amount of time off chest compressions	
		Time current SBAR report available at bedside	
		Code Blue recorder identified & documenting in EPIC	
		Time of Code team arrival--Determined by facilitators?	
		MD arrival time	
		RT arrival time	
		RT with capnography device arrival	

1. Have participant(s) give brief, efficient report as they would to code team members as they arrive.
2. Participant critique:
   a. What went well? What would you do differently? How can we improve?
3. Discuss facilitators' observations.
4. Run second code, changing participants' roles.

Prior to end of session – Have each participant demonstrate:

- ✓ Multi-purpose pad placement
- ✓ Mouth to mask rescue breaths

Figure 1. Audit tool—Mock code blue. EPIC = electronic medical record used at this facility; RT = respiratory therapist; SBAR = Situation-Background-Assessment-Recommendation.

pointed out missed opportunities and realized, for example, that the AED pads should have been placed sooner or that initial pulse check was not correctly performed according to BLS standards.

Next, the teams repeated the simulation with greater confidence and competence. Mistakes made in the first scenario were typically not repeated, and the entire flow of the simulation was smoother. During the second debriefing, the orthopaedic nurse teams also reported increased confidence and decreased anxiety. They were observed to be more relaxed, yet focused on performing critical BLS elements. There was a more cohesive and better functioning team, as they gained greater understanding of the roles for each team member. Each nurse practiced using one-way valve mask ventilation as well as hands-on with the AED to ensure that pads were correctly placed, connected, and the nurse knew how to deliver a shock. The AED models use an audible metronome feature for timing of compressions at the correct rate. This was an "ah-ha" moment for some nurses as most stated that the anxiety and excitement during previous code blue events distracted their attention and they had never heard the sound of the AED metronome.

Each nurse completed a postevaluation of the code blue simulation (see Figure 2). The postevaluation consisted of six questions based on a 5-point Likert scale, ranging from 1 (disagree) to 5 (agree). The evaluation also included space for comments on how to improve the experience and additional learning topics for the future. The evaluation of each item has averaged 4.9–5 for the past 3 years.

Our hospital has conducted annual mandatory code blue simulation for the past 3 years. The code blue simulation for orthopaedic staff nurses achieves 100% participation each year. Feedback from orthopaedic nurses is consistently positive. Comments by orthopaedic nurse participants included several responses of "would like to be able to do this more often," "good practice and familiarity to this kind of situation," "I feel more comfortable now that I was able to practice a mock code," "great calming, positive environment to re-learn skills," and "good team, good comments, constructive criticisms." Others comments suggested "more mock code blues per year" including several suggestions of monthly or quarterly opportunities for code blue simulation. "I think this is good practice especially since it doesn't happen frequently, it is a good review." Other staff comments include the following: "very helpful especially gaining more confidence in doing a code blue" and "was a non-stress way of learning."

Code Management
Simulations – 2017

KEY: **5 = Agree**
4 = Agree slightly
3 = Neither agree nor disagree
2 = Disagree slightly
1 = Disagree

Please check the number to the extent you feel the objective was covered in this educational program:

Objectives	Disagree				Agree
	1	2	3	4	5
1. I understand when and how to call, RRTs and Codes.					
2. I am able to identify my role in an emergency.					
3. This participation increased my knowledge.					
4. The educational techniques used were helpful and easy to understand.					
5. Debriefing after the simulation improved the experience.					
6. I will be able to apply this to my practice.					

Comments:

What would improve this experience for you?

Additional Learning Topics you would like covered in future programs:

FIGURE 2. Postevaluation of the code blue simulation. RRTs = Rapid Response Teams.

Conclusion

Code blue simulation has been supported in the literature as an effective way to improve the performance of resuscitation teams and nurses' self-reported competency. Code blue simulation is an annual, mandatory skill for all nurses at our facility. The low-stress simulation provides opportunities for learning and reinforcing critical BLS skills that could positively impact patient outcomes. The simulation is a review for many of the experienced staff nurses and novel experience for early career nurses. Seasoned staff and newer nurses work together as a team in the exercise, just as they do in a code situation. Code blue simulation has been a valuable experience for every nurse on the orthopaedic unit, and staff verbalizes increased confidence with potential code blue emergencies. One comment from an orthopaedic staff nurse after the 2016 exercises sums it up best: "Practice makes perfect."

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