Cardiopulmonary Arrest in the Outpatient Setting:

Enhancing Patient Safety Through Rapid Response Algorithms and Simulation Teaching

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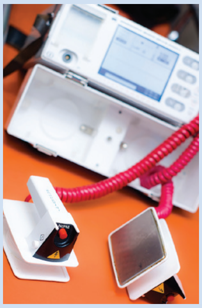

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Ambulatory and outpatient centers constantly are challenged with administrating cancer treatments in an efficient and safe way. With the advent of numerous novel cancer medications known to cause hypersensitivity reactions, nurses have become experts in managing these emergencies. However, patients rarely exhibit severe infusion reactions or cardiopulmonary arrest. Outpatient nurse knowledge and comfort with grade 4, life-threatening emergencies requiring cardiopulmonary resuscitative measures often is low because of infrequent occurrence. That is largely a result of nurses' ability to immediately identify the need for emergency intervention, thus preventing the sequelae of patient deterioration that could lead to cardiopulmonary arrest. This article describes how the authors' institution developed methods to improve emergency care by bridging the gap between knowledge and experience of handling life-threatening emergencies.

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Administration of cancer treatments in an efficient and safe manner is a persistent occurrence in ambulatory and outpatient centers. Increased patient volume and acuity, decreased staffing, and limited funds have challenged nurses to effectively provide care (Peberdy, Boze, & Ornato, 2002). In addition, a number of cancer medications could cause anaphylaxis, leading to cardiopulmonary arrest (Gobel, 2005, 2007). Nurses must be able to readily identify and assess emergent situations, provide interventions required to stabilize or prevent worsening of the patient's condition, and determine the need for calling emergency medical service responders (LaVelle & McLaughlin, 2008). Nurses often are exposed to and care for patients with hypersensitivity reactions and are involved in preventing the sequelae of cardiopulmonary arrest. However, nurse knowledge and comfort level with cardiopulmonary resuscitative measures often is low because of infrequent occurrence in the outpatient setting (Adams, Dobbs, Greene, MacGillis, & Stockhausen, 2002).

The Joint Commission Standard PC.02.01.19 dictated that hospitals recognize and respond to changes in a patient's condition, as well as provide rapid and effective stabilization of patients (Sherman & Romfh, 2003). Many patients who have cardiopulmonary or respiratory arrest exhibit medical deterioration in advance. Prompt response to changes in a patient's condition by specially trained individuals may reduce the risk of cardiopulmonary arrest, thereby reducing patient mortality (Joint Commission, 2013). In one study, 66% of patients showed abnormal signs and symptoms within six hours of arrest and the physician was notified by the nurse in 25% of cases (Five Million Lives Campaign, 2008). According to the Five Million Lives Campaign (2008), rapid response teams can effectively manage patients needing medical emergency and lifesaving interventions. In addition to code teams, hospitals have been highlighting the importance of rapid response teams (Ralston & Zaritsky, 2009).

At an outpatient National Cancer Institute (NCI)-designated comprehensive cancer center, nurses identified the need to improve emergency care by bridging the gap between knowledge and experience of handling an actual cardiopulmonary arrest. That improvement could help to ensure high-quality care for patients experiencing these types of medical emergencies.

The outpatient area is located in a different building, across from the inpatient hospital; therefore, the hospital staff does not provide a code team to respond to medical emergencies in the outpatient infusion area. Rather than calling 911, a direct number connects the outpatient area to emergency medical services. In addition, physicians and nurse practitioners are not located in the infusion area but rather a separate part of the outpatient building referred to as the clinic area.

Little is known about strategies to enhance staff comfort level in handling grade 4 emergencies such as anaphylaxis and cardiopulmonary arrest in outpatient areas. Because these types of medical emergencies do not occur regularly in the outpatient setting, and a code team with the experienced skills is not available, a solution is needed to increase staff comfort and competency (Adams et al., 2002). Studies have shown that mock codes should be performed to improve practitioner confidence and decrease anxiety during emergent situations (Toback, 2007). An "ongoing curriculum addressing code team roles and responsibilities, team leadership education, and multidisciplinary mock codes is critical to ensure a proficient staff response to a code" (Dorney, 2011, p. 242). Therefore, the current study's authors used the Plan-Do-Study-Act Model for Improvement to guide their change project. According to the Institute for Healthcare Improvement (2011), the Plan-Do-Study-Act Model for Improvement is not meant to replace change models that organizations may be using already, but rather accelerate improvement. A team was formed consisting of a nurse educator, nursing director, nurse manager, and two staff RNs. The team agreed on the project aim: to increase nurse competence and comfort level during medical emergencies.

Methods

The comfort levels of the outpatient infusion staff (nurses and medical health technician, 23 total with 14 responses returned) were assessed prior to the mock medical emergency training through an anonymous survey developed by the project team staff nurses. The survey contained four questions assessing comfort performing basic life support (BLS) (e.g., compressions, airway, breathing [CAB]), automated external defibrillator (AED) operation, code cart knowledge, and emergency situation delegation (see Table 1). Many identified that the defibrillator located on the code cart was different from that used during BLS training renewal classes, resulting in decreased comfort. Time constraints also were mentioned as a barrier to continuing education.

After evaluating the survey results, the next step was the development of emergency case scenarios by the nurse educator. A successful training program would need to include adult learning principles, engage multiple senses, and provide practice with emergency scenarios (Sherman & Romfh, 2003). The mock scenarios included opportunities for staff to engage in dialogue as well as acquire and practice essential emergency skills (Schiavone, 2009). Teams of three nurses were scheduled for the one-hour training sessions. The sessions were scheduled throughout the day to minimize interruptions to patient care in the infusion area. A patient room was reserved for the training.

Led by the nurse educator, the hands-on teaching sessions simulated mock medical emergency scenarios, including cardiopulmonary arrest. The code cart and Chester Chest™ were obtained for the training as a low-budget method to simulate a real emergency experience (the model of Chester Chest was used to simulate the chest wall and a means to place the AED pads). In addition, the code cart defibrillator was connected to the CS301 ECG Simulator from Symbio Corporation, which produced lethal arrhythmias. The device gave staff the ability to see, hear, feel, and use the manual/AED defibrillator on the code cart in the AED mode to shock lethal arrhythmias. Mnemonic devices were used during the code cart review to assist staff with remembering drawer locations for particular equipment. Return demonstrations then were used to measure nursing competence.

Results

Seven sessions were conducted and 23 staff participated. During the training sessions, staff identified a slow response time and lack of knowledge from the multidisciplinary team (i.e., physician, nurse, medical health technician, pharmacy, support staff, social workers) regarding their role during emergency situations. Code carts used in the outpatient area are supplied from the inpatient hospital. The staff found that equipment changes made throughout the hospital during the past several years were not included in the code cart (for example, vacutainers and butterflies were not converted to the needleless system). In addition, several pieces of equipment were inadvertently omitted from the drawers of the code carts used during the trainings. Staff shared that they were hesitant to "crack open" the code cart to access emergency equipment based on the thought that the patient was charged a flat fee of $3,000 regardless of the number of items used. Staff also suggested setting aside time to conducting a SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis of each "live" emergency situation.

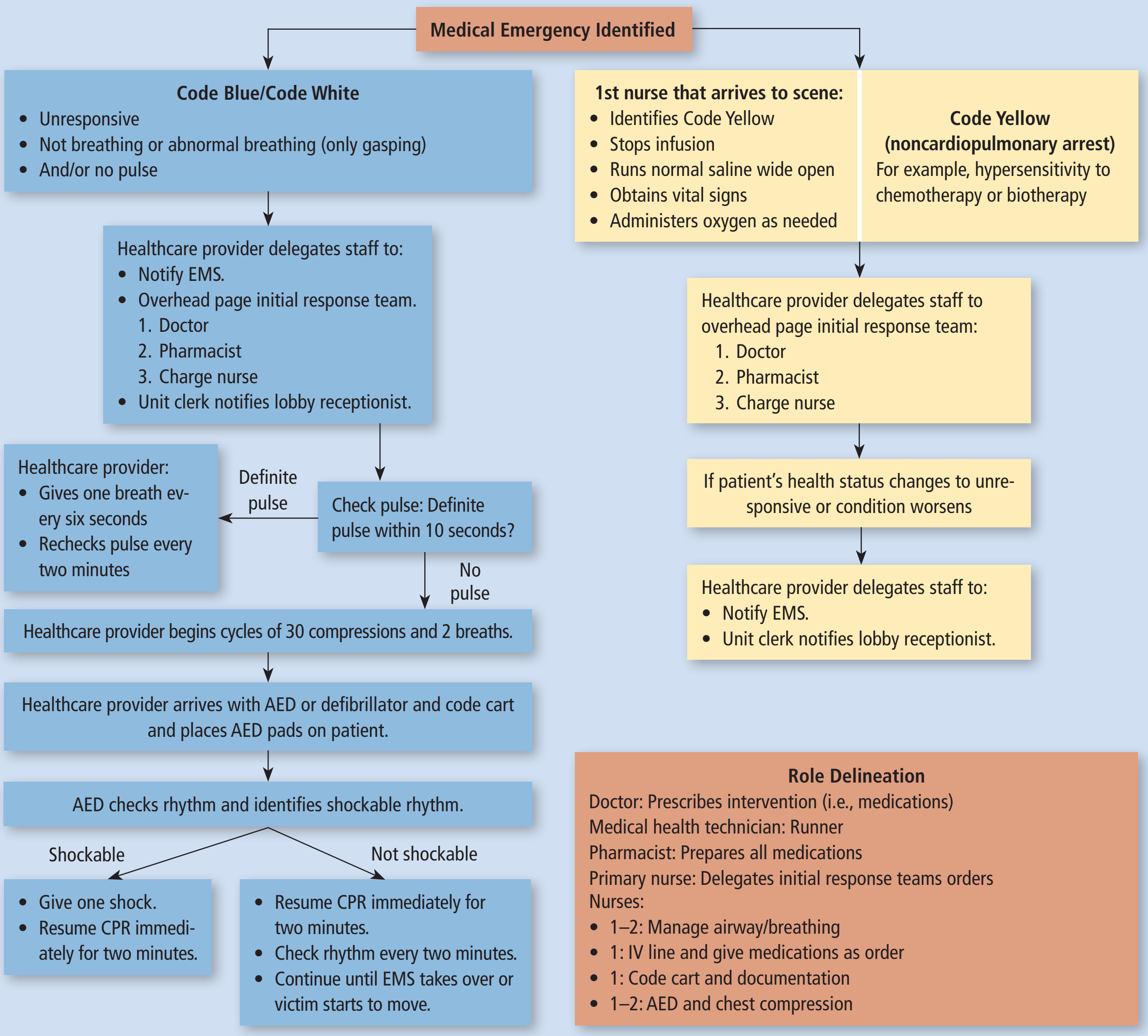
Outcome

After the training sessions, the project team met with the inpatient code cart committee and verified that patients are charged based on equipment used from the code cart rather than a flat fee. The committee also agreed to update vacutainers and butterflies to the current needleless system. Finally, if equipment was found to be missing from the code cart drawers, the committee asked to be notified to

TABLE 1. Survey Results (N = 14)

Assessment Area	Presurvey Comfort Level			Postsurvey Comfort Level		
	Least	Somewhat	Very	Least	Somewhat	Very
AED operation	6	7	1	1	8	5
CAB assessment	3	7	4	–	3	11
Code cart knowledge	4	9	1	–	8	6
Emergency situation delegation	2	6	6	–	3	11

AED—automated external defibrillator; CAB—compressions, airway, breathing



AED—automated external defibrillator; CPR—cardiopulmonary resuscitation; EMS—emergency medical services

FIGURE 1. Medical Emergency Algorithm: Step-by-Step Approach to Handle Emergencies in Outpatient Area

Note. Figure courtesy of Rutgers Cancer Institute of New Jersey. Used with permission.

help with quality assurance, as the individuals stocking it are accountable for proper assembly.

An additional outcome of the training sessions was the creation of a policy for handling medical emergencies in the outpatient area, which incorporated national code colors to signify the emergency type. However, what the national- and hospital-based color system lacked was a method to deploy an initial response team—in particular, a physician able to provide the infusion nurse with orders for managing noncardiopulmonary arrest emergencies, such as hypersensitivity reactions. That is critical, mainly in oncology outpatient infusion areas that do not have a physician or nurse practitioner stationed in the immediate area. Therefore, an emergency code color for noncardiopulmonary arrest was added.

The initial response team would be deployed via the overhead paging system. Roles of the initial response team were outlined within the new medical emergency policy. A medical emergency algorithm, which incorporated the BLS algorithm, was used as a step-by-step approach for all staff members to handle emergencies (see Figure 1). Algorithm-based simulation enhances learning new skills that can be applied during real-time situations (Ruesseler et al., 2012). The new code color system also helped nursing staff triage hypersensitivity reactions, differentiating those that were mild and did not require activating the initial response team. Educational inservices were conducted with all clinical staff to roll out the new medical emergency policy. A code color identification tag with telephone numbers for emergency, illness, or injury was distributed to all staff members throughout the institution.

After completion of the seven mock codes, an anonymous postsession survey was distributed to the outpatient infusion staff, and results revealed improvements in comfort with CAB technique, AED operation, the code cart, and emergency situation delegation, with a 99% overall improvement. These results are similar

Implications for Practice

- Use rapid response algorithms and hands-on simulation education in ambulatory care settings to ensure nurses are competent during emergency situations.
- Implement algorithm-based simulations to enhance learning new skills that can be applied during real-time situations.
- Use mock scenarios to assist organizations with identifying potential behaviors and solutions to performing procedures.

to those from Toback, Fiedor, Kilpela, and Reis (2006), where all medical participants reported an increase in confidence to perform the life-saving skills included in the mock code scenarios.

Shortly after all staff completed the training sessions, three hypersensitivity reactions occurred within one hour; all were handled calmly and efficiently, with an improved response time by the entire multidisciplinary team. During the SWOT analysis, staff commented that the flow of each emergency improved significantly. Sempowski and Brison (2002) found advance preparation allows staff to provide initial, efficient medical care. Anxiety, panic, and negative effects on other patients can be minimized when staff know their roles and are able to execute them as planned.

Discussion

Many hospitals require that staff be certified in Advanced Life Support (ALS), rather than be BLS certified. Outpatient areas also may be considering this initiative. However, the challenges outpatient areas face regarding the amount of live experiences with cardiopulmonary arrest should be taken into consideration. Therefore, comfort levels may be low because BLS skills infrequently are used in practice; emergencies requiring ALS skills in the outpatient area occur even less often. Mastering BLS skills leads to greater success and positive outcomes, as they are the basis of ALS.

Implications for Nurses

Outpatient infusion oncology nurses administering cancer medications may infrequently find themselves managing patients with anaphylaxis, which potentially could cause cardiopulmonary arrest or even death. Nurses not only need to be competent, but also not feel intimated during these emergent situations. The use of hands-on simulation educational programs and an initial response algorithm may be adapted in all ambulatory and outpatient settings to increase comfort and competency. Nurses can take the lead on making institutional changes for handling medical emergencies of patients with cancer.

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