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# Test of a Color Coded SMOCK System on CPR Primary Measures and Medical Errors during Simulated Emergencies

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*Background*

Nearly 100,000 people in the nation die and approximately 1.3 million people are injured annually due to preventable medical errors (Kohn, Corrigan, & Donaldson, 2000) defined as failure of a planned action to be completed as intended or the use of the wrong plan to achieve an outcome. Medical errors occur 39 times more frequently during emergencies. Nurses are the largest group of healthcare workers and may account for nearly 55% of medical errors in hospital settings (CAPS Link, 2003). To date, few initiatives have shown a reduction in preventable medical errors (Watcher's, 2010). One of the most promising strategies is the use of simulation technology.

Emergency code- related errors pose a greater risk of physical harm or death when compared to patients with similar diagnosis and conditions receiving care in non-emergency situations (Lipshutz, Morlock, Shore, Hicks, Dy, Pronovost, and Winters, 2008). Changes that start at the policy level may help sustain patient safety initiatives that reduce patient harm and identify system weaknesses that allow these errors to occur. If code related errors are not corrected immediately, the risk for harm to similar patients increases significantly (Lipshutz et al., 2008). Even though corrective actions may be in place, medical errors may still occur due to reduced staffing, complex care required by patients, and advanced knowledge of technology for new medical devices.

In a prospective study Pape and colleagues used an innovative teaching strategy to reduce errors during medication preparation and administration when nurses wore a red vest and used a checklist throughout the medication administration process (Pape, Guerra, Muzquiz, Bryant, Ingram, Schanner, Alcala, Sharp, et al, 2005). They demonstrated that medication errors during critical moments can be reduced by 70%

when distractions and interruptions were eliminated prior to and during medication administration (Pape et al., 2005). This innovative strategy resulted in nurses making fewer mistakes and they were less likely to forget to administer medications while having sufficient time to identify the right patient, right route, and right dose (Pape et al., 2005).

The proposed experimental study investigating the use of a color-coded smock system that identifies nurses' roles during an emergency situation (Cardiopulmonary Resuscitation [CPR]) in a simulated environment is one intervention that may potentially increase the safety of patients during emergencies.

*Study Purpose and Research Questions*

The purpose of this study is to test a color-coded SMOCK system on time to implement emergency patient care measures, team performance, and medical errors committed during simulated emergencies among two groups of nurses (control and intervention).

Research Questions: Comparing control and intervention (smock) groups during emergencies (codes), will there be a difference in:

1. Time to implement ventilation, compressions, medication administration and defibrillation

2. The number of recorded medical errors (i.e. sequence in initiating ventilation and compression; medication administration [giving the wrong medication via the wrong route,]; omission of ventilation, compressions, requested medications or defibrillation; or errors in providing ventilation, compressions, or defibrillation)

3. Performance of Technical Skills (mean scores for ventilation, compression, medication administration, defibrillation, and total)

4. Team performance (problem solving, situational awareness, leadership, resource utilization, and communication)

*Theoretical perspective:* The frame work that guides this study is Donabedian's classic paradigm to assess quality of care based on a three component approach; structure, process, and outcomes. Donabedian's model was chosen to guide the study by evaluating the environment in which medical errors are more likely to occur and improving outcomes through changing the process in the delivery of safer emergency care. Since nurses contribute to the chaotic environment in which medical emergencies occur, their technical and critical thinking skills will be evaluated as part of the care management process during CPR and its potential impact on patient outcomes.

*Methodology*

This study will use a quasi experimental design to test the use of a smock system among two groups of nurses during CPR training in a simulated environment. Each group (control and intervention) will consist of 20 groups of eight individuals with a total of 320 nurses participating in different roles on a resuscitation team. Nurses in the (160) control group will complete a clinical scenario requiring resuscitation measures using the current standard of training for basic life support (BLS) or advance life support (ACLS) in a hospital setting.

Nurses in the (160) intervention group will use all the same measures as standard training in addition to wearing colored labeled smocks that identify the role on the resuscitation team for each individual participating in the training exercise. In each group, the study will evaluate the nurses' timing and task performance skills for ventilation, chest compressions, medication administration, and defibrillation, team performance and

number of medical errors committed. Data will be collected by direct observation in real time, and with video recordings that will be reviewed post sessions to capture timing of each emergency patient care measure, total team performance scores, and number of medical errors.

The BLS/ACLS (2010) technical assessment score sheet, a 24-item AHA recommended score sheet, is currently being used in the UMH/JMH CPR re/certification program, and will also be used to assess the accurate completion (time and sequence) of each critical item related to CPR performance. Team performance will be measured using the five-item Ottawa Abbreviated Global Rating Scale (simulator session crisis management skills checklist) to assess five categories of crises resource management and team performance (problem solving, situational awareness, leadership, resource utilization, and communication). This checklist uses a three point scoring system to determine if these team performance components were demonstrated during the scenario. Each task will be assigned a numeric score from zero to two.

Data analysis will compare tasks performance between the control and intervention (smock) groups on time to implement emergency patient care measures, team performance, and medical errors using a two sample t-test. A power analysis for sample size was done using G-power 3.1 software. A large effect size for one-tailed two-sample t-tests with alpha 0.05 and 80% power yielded a sample size of 40 groups, 20 control and 20 intervention groups.

**References:**

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