

# Using Simulation Technology and The Root Cause Analysis Process to Assess Nurse's Attitude toward Patient Safety

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Received: July 03, 2017; Published: July 14, 2017

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## Abstract

Root cause analysis (RCA) provides an important opportunity for healthcare workers to identify the underlying factors that may contribute to medical errors or sentinel events and subsequently prevent their recurrence. Because of its efficacy, The Joint Commission's (TJC) recommended RCA framework together with In-situ simulation were used to assess nurses' attitudes toward patient safety immediately after simulation training and six months later. Thirty-three nurses from a hospital setting participated in RCA sessions which included: a lecture, a simulated patient scenario and debriefing. A 36-item "Safety Attitudes: Frontline Perspectives" survey was given before and after each session and six months' later. Twelve (39%) nurses responded favorably to patient safety initiatives on the first survey, and twenty-nine (89%) responded favorably after six months ( $p=0.001$ ). A significant number ( $p=0.003$ ) of nurses perceived that the institution still needs to improve some patient safety measures. Consequently, In-situ simulation may be an effective tool and have lasting benefits for guiding RCA sessions among nurses.

**Keywords:** Root cause analysis; In-situ simulation; Frontline perspective; Patient safety

## Introduction

Every year in the US, a number of patients are harmed (estimated 1.5 million) while receiving care in a hospital because of system or human errors [1,2]. For several decades, healthcare experts, professional organizations and medical institutions have been working diligently to identify solutions that will prevent the recurrence of preventable mistakes (National Patient Safety Foundation [NPSF], 2015; Patient Safety Network [PSNET], 2014). Some of these mishaps have resulted in an unanticipated event in a healthcare setting resulting in death or serious physical or psychological injury (sentinel event) to a patient or patients, not related to the natural course of the patient's illness (The Joint Commission, 2010). Thus, the TJC recommends that all healthcare organizations conduct a root cause analysis (RCA) to determine the underlying cause of the event and develop a prevention strategy to eliminate any recurrences of the same or similar mistakes (The Joint Commission, 2010).

Although RCAs were originally developed by industrial companies to analyze accidents, healthcare organizations routinely use this method as a tool to analyze medical errors [3]. In most instances, a RCA protocol is used to collect data and reconstruct the event through participant interviews and medical record review (NPSF, 2015). These results should identify the sequence of events leading to the error and some possible underlying causes. James Reason's "Swiss Cheese Model" is commonly used to describe a systemic approach to RCAs. This approach helps to identify both active errors (occurring at the point of interface between humans and complex systems), and latent errors (the hidden problems within health care systems that contribute to adverse events) [4]. One key element of an RCA is to avoid focusing on human mistakes and increase efforts to identify underlying problems that might increase the likelihood of errors [5].

Although the efficacy of RCAs has not been thoroughly studied in healthcare, it is a widely-used approach to improving patient safety [5]. Though healthcare organizations and providers embrace this approach, few formal mechanisms exist for analysis of multiple RCAs across institutions [5]. According to some researchers there is no consensus on how hospitals should follow up or analyze RCA data. This inhibits the utility of RCA as a quality improvement tool [6]. However, a repository of RCAs may help organizations identify patterns of errors and lead to solutions designed to prevent common mistakes [7].

Korndorffer & Slakey's et al., [8] research suggests that routine, memory-based reviews of sentinel events in healthcare may not yield enough information to allow an improved evaluation of the entire system. They imply that using a similar approach to assist in evaluating adverse events as high-reliability industries outside of medicine may be more feasible, since these organizations evaluate the adverse event using a context and environment that are similar to those of the original event [8]. Researchers suggest that simulated environments in healthcare can be used to recreate the event and allow more people to participate in the encounter and not just those involved in the actual event [9,10].

The discussion of a sentinel event with staff nurses has been a difficult task for both managers and employees because human factors do not allow total transparency [11]. Nurses are responsible for most medication and other errors committed in health care organizations because they are accountable for administering medication and a variety of technical procedures [12]. Nurses are also considered as the final safeguard before the patient receives the medication or undergoes a procedure [13]. Therefore, nurses have been the target of the shame and blame associated with medical errors that result in sentinel events. Nurse's state that the process to review a sentinel event in an effort to perform a RCA has been demoralizing, embarrassing and most of all traumatizing [11]. Hence, this study approached the RCA process differently, using a collaborative effort to combine In-situ simulation teaching strategies as a way of helping nurses understand various patient safety initiatives [9]. The purpose of this study was to assess nurses' attitudes towards patient safety immediately after conducting a RCA session using In-situ simulation training and six months later. The research questions used to guide this study were:

- A. Can In-situ simulation be used to conduct a RCA session among a group of nurses, and
- B. Does the combination of In-situ simulation and using the RCA process have a positive effect on nurses' attitudes toward patient safety?

## Methods

### Setting

Institutional approval was granted for this study, and all procedures took place on the hospital's 35-bed general post-surgical care ward. In this patient care area, most admissions and transfers are related to a variety of elective surgical procedures (ENT, Cardiothoracic and Vascular [including post recovery of

heart and lung transplantation]), and a variety of other required surgical procedures. A fast track system for admissions, discharges and transfers is routinely used to receive patients from the Post-Anesthesia Recovery and Surgical Intensive Care Units. Additionally, this patient care area has four post-operative beds for patients requiring a higher intensity of nursing care that may require continuous pulse oximetry, remote telemetry and frequent suctioning. The care of these patients is coordinated by the nurse manager to incorporate a group practice approach using an interdisciplinary team.

### Sample

A convenience sample of thirty-three full-time staff nurses from a general surgical care step-down unit participated in this study. All nurses were licensed and specifically trained to work in this area. Nurses from both day and night (12-hour) shifts were included in this study. Nurses who were recently hired (less than one month), on vacation or sick leave during the one week study period or six months later, were excluded from the study. However, some of the new nurses still participated in the RCA process using In-situ simulation but were not asked to complete the 36-item survey due to insufficient time spent in this care area.

### Procedures

Four to six nurses were scheduled every day for each time period over the course of one week. RCA sessions were arranged by the nurse manager and clinical educator, consisting of: a lecture, a simulated patient scenario and debriefing allowing constructive feedback. A patient case report was provided as a prelude to the scenario, and a SimMan3G® human patient simulator was used in all sessions to provide a more realistic patient encounter. One nurse was expected to get a complete handoff from the nurse (educator) caring for the simulated patient and perform the initial assessment. A few minutes after the handoff, the patient began to deteriorate and the nurse manager, nurse educator and simulation expert observed the team performance. The other nurses assisted when a call for help was activated, and they completed tasks such as: received an abbreviated report from the primary nurse, helped stabilize the patient, checked the patient's medication record, and verified all necessary equipment (functioning IV and pump, oxygen device, cardiac monitor, etc.) or external devices for proper functioning. Once the intended objectives were met, the scenario ended. Both the nurse manager and educator guided the debriefing process using open-ended questions to allow the participants to speak about their simulation and RCA experience. Additional time was provided to nurses so they could comment on current patient safety strategies used in this unit to prevent common errors.

A 36-item "Safety Attitudes: Frontline Perspectives" survey (Figure 1) was given to each participant before and immediately following the session, and six months' post training. Each of the 36-items were answered using one of six choices (strongly disagree, slightly disagree, neutral, agree slightly, agree strongly or not applicable). All surveys were completed anonymously and collected by the simulation expert and research staff.



trying to determine who has been at fault so that the offender can be disciplined. Unfortunately, this approach has also led to hiding rather than reporting errors among nurses and other healthcare providers [13].

While the RCA case presented for this study was considered a failure to rescue or call for help in a timely manner, most nurses in this cohort responded favorably to several survey items (4-7 and 14-19) regarding appropriate safety measures demonstrated in this area. These favorable responses suggest that nurses have support, feel comfortable asking questions, like their job, and would feel safe being treated as a patient in this clinical area. The nurses imply that a culture of safety is in place but have not reached a balance between not blaming individuals for errors and not tolerating egregious behavior. This concept of a "Just Culture" includes a clear focus on effective teamwork to provide high quality patient care, and promote safety through education and training [11]. The nurse manager and educator in this setting are committed leaders that promote patient safety engagement and empowerment of all employees in this care area.

Several nurses advocated that the In-situ simulation portion made the RCA session less intimidating by using a high-fidelity mannequin in the same patient care area. These nurses implied that the use of simulation was preferred to the didactic courses typically used to teach RCA, because they were allowed to actively participate in the sessions and freely communicate their opinions during the debriefing process. Since TJC mandates that RCAs are conducted after every sentinel event, nurse managers and clinical educators should provide routine RCAs to improve patient safety by identifying and preventing potential problems in real time [14]. Using In-situ simulation to guide RCA sessions may be an effective tool for this process, and these benefits may last as long as six months post-training. Also, the development of teaching strategies using simulation could decrease tension between management and staff to promote transparency of such events.

### Conclusion

Addressing sentinel events in a hospital setting using TJC root cause analysis framework has been a daunting and stressful task for both nurse managers and staff nurses. However, using a collaborative effort to combine In-situ simulation with traditional RCA strategies may provide additional opportunities for nurses to become more aware of patient safety strategies and lessen negative stressors between managers and staff nurses.

### Future Implications

Since there are few formal mechanisms that exist to analyze multiple RCAs across institutions, conducting RCA training in a

simulation center may solve this dilemma because all sessions are video recorded. Nurse Managers, educators and simulation experts will be able to review the performance of the team in real time and obtain a retrospective view to research any nuances that may exist with this methodology. Efforts should continue to be made to help bridge the gap between managers and staff nurses addressing sentinel events using the RCA process as a way to reduce future preventable errors.

### Study limitations

Some limitations to this study was that it was performed in a single site, used only one patient care area, and had a small sample size. Thus, these results may not be generalizable to the entire nursing population but may provide some additional strategies to assist the RCA process for sentinel or near miss events.

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