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ORIGINAL ARTICLE

Simulation as an adjunct to didactics to increase acquired knowledge retention of learning how to avoid a "never event" of unintended retained foreign objects: 6-month and 1-year follow-up study

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Abstract

Purpose: Previous research has identified multiple risk factors implicated in unintended retained foreign objects (URFOs), which were incorporated into our community hospital's URFO policy. The purpose of this quality improvement study was to use simulation along with didactics to improve retention of learned knowledge and implementation of the policy changes. **Methods:** An initial didactic session was performed followed by a survey at 3 months. Results indicated the need for improvement in retention of learned information. In addition to didactics, a multidisciplinary simulation curriculum with scenarios susceptible to URFO of an emergency operation was performed followed by debriefing. A survey was performed at 6 months and 1 year to measure follow-up retention of acquired knowledge. **Results:** Survey results showed that knowledge retention improved significantly, with 96.7% correct identification of URFOs as a sentinel event and 100% choosing crew resource management as an important strategy in preventing URFOs. Furthermore, at 6 months, 93.5% indicated that "finding the individual responsible for the mistake" was not the goal, and 91.9% correctly identified the primary root cause analysis for this scenario was failure of appropriate "system design." **Conclusions:** Simulation provides the opportunity to learn the concept of root cause analysis and identification of factors that lead to URFOs. Simulation as an adjunct to didactics can help increase retention of patient safety policies.

Keywords: *root cause analysis; retained object; simulation; didactic; debrief*

Introduction

Unintended retained foreign objects (URFOs) or retained surgical items are classified as "never events," a term coined at the time of a 2002 communication by the National Quality Forum (NQF).[1] The latest update by the NQF is a 2011 consensus report on "Serious Reportable Events".[2] In this report, URFOs are defined as unintended retention of a foreign object after surgery or other invasive procedure. The Joint Commission issued a Sentinel Event Alert #51 in 2013, which defined URFOs as any object left behind after closure, even if the patient is still under anaesthesia.[3]

In our institution, a 500+ bed community hospital, our executive leadership mandated that our count policy and procedures should be aligned with Joint Commission and Association of Perioperative Registered Nurses' guidelines.[3] We started by implementing guidelines to standardize the processes for counting, and special scenarios where intra-operative radiographs are required. A white board was introduced to display the counts and serve as a reminder for any intra-operative packing or devices to be removed before patient closure. We also implemented guidelines to obtain radiographic studies in certain scenarios identified as high risk for URFOs. The hospital staff was

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educated regarding our updated policies in the usual didactic manner during our department meetings and grand rounds.

Our ultimate goal was to assess the retention of knowledge during didactic sessions. Therefore, at 3 months after the implementation of these guidelines, a survey was conducted (Table 1). At this time, it was determined that there was poor follow through of the new policies because of lack of understanding among nursing staff. In addition, a survey was distributed to residents to evaluate their knowledge of the new policy. The results indicated gaps in their knowledge. The initial survey taken by residents (n = 14) before policy implementation revealed that 28.6% of residents were unaware that a retained sponge was a sentinel event. Furthermore, 21.4% did not correctly identify the importance of crew resource management (CRM), a safety approach used by high-reliability health care institutions to help ensure positive outcomes in high-risk situations,[4] as a communication tool for prevention of URFOs. This led to the design and implementation of a combination of didactics along with a simulation curriculum as a service improvement project that included didactic teaching, developing a policy, teaching using simulation studies and surveying staff knowledge of each aspect, to audit compliance and understanding of the new hospital policy (Fig. 1).

The aim of this study was to assess the impact of simulation as an adjunct to didactics to increase knowledge retention of learning to avoid a never event of URFOs. We present our 6-month and 1-year follow-up data in this article.

Methods

Based on previous work by The Mayo Clinic,[5] we assembled a multidisciplinary team to come up with a plan for our institution to increase knowledge retention of policies to decrease URFOs. The team determined that a demonstration of the new policies must be carried out using a high-fidelity in situ simulation.

Table 1. Survey questions at 6 and 12 months

Is crew resource management (CRM) a preventative measure?
Do the majority of cases of retained surgical equipment occur in operations with correct counts?
Is a retained object considered a sentinel event?
What is the best time to conduct a radiologic study in an emergency surgery?
Do you need a count in all operating room cases?
What are the indications for X-rays for operating room counts?
Understanding of the policy: when is "Full Stop" performed in an operation?

Experiment

- Multiple scenarios were designed and planned for simulation.
- In addition, we added a "Full Stop" final count event to our policy, in which the surgeon must stop operating and verify the correct count with the nursing staff before closure of the last wound layer.
- 6 months after the implementation of our new policy, a multidisciplinary simulation session was arranged during our weekly grand rounds.
- This scenario was undertaken by residents and highlighted the URFO policy changes.

Simulated scenario

One of the scenarios involved a patient with tachycardia and hypotension who presented to the trauma bay with a stab wound to the abdomen. Although this was a simulated scenario, participants were initially unaware of this. The simulated patient required an urgent transfer to the operating room (OR) for exploration, hemostasis and closure. Initial counts were not completed because of the urgent nature of the case. During wound closure, concern was raised by the nursing staff regarding the need for radiographic studies in emergency cases (as mandated in our updated policy). Our chief resident recognized this concern and made a "Full Stop" in the operation for the radiographs to be completed. If this occurs, a retained sponge would be revealed.

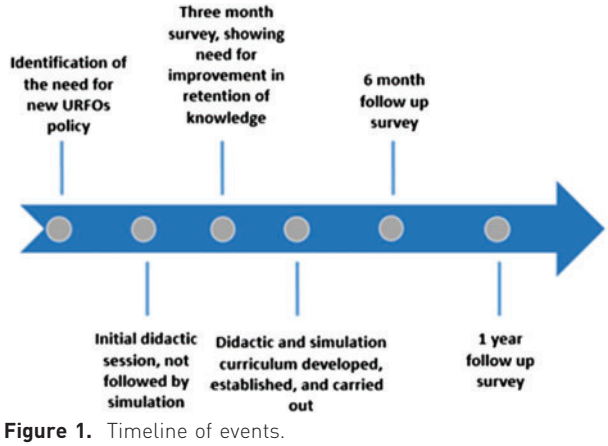

Figure 1. Timeline of events.

Results

Our 6-month survey (n = 62), which included the initial 14 residents and additional OR nurses showed an improvement in identification of a retained object as a sentinel event from 71.4% at baseline to 95.2% ($P = 0.019$). Similarly, correct identification of CRM as a preventative measure for URFOs improved from 78.6% at baseline to 98.4% ($P = 0.018$) at 6 months (Table 2). The survey also assessed knowledge retention from debriefing and teaching by a patient safety officer on the principles of root cause analysis. This showed that at baseline, only 78.6% were able to correctly identify that "finding the individual responsible for making the mistake" was not the goal of root cause analysis. This increased to 93.5% ($P = 0.112$) at 6 months after implementation of the new policy. In addition, the respondents improved from 78.6% to 91.9% ($P = 0.116$) on the ability to identify the primary issue at our root cause analysis.

Correctly identifying a URFO as a sentinel event was further improved at 12 months (n = 30). Assessment included the initial 14 residents and 16 OR nurses. Results showed identification of a retained object as a sentinel event increased from baseline to 96.7% ($P = 0.029$). This was a small increase from 6 months. Similarly, identifying CRM for prevention of URFOs improved to 100% from baseline ($P = 0.027$). When comparing results from the 6- and 12-month simulation surveys, we found a significant improvement in the understanding of the initiation of a "Full Stop" from 75.8% to 100% ($P = 0.002$). There was also a significant improvement in the overall understanding of our new policy from 72.6% to 96.7% ($P = 0.005$). We found that 100% of our participants knew the new requirements for radiographs before closure in emergency surgeries. This improved from 90.3% at 6 months; however, this was not statistically significant ($P = 0.172$). We also found a numerical but not statistically significant improvement in knowledge retention on radiographic studies being necessary to verify correct counts, from 75.8% to 90% ($P = 0.161$), as well as knowledge that a count needs to be performed in all operative cases, from 87.1% to 96.7% ($P = 0.262$). Lastly, we identified no improvement (85.5% at 6 months and 83.3% at 12 months, $P = 0.766$) in recognition that most cases of URFOs occur in cases with correct counts (Table 3).

Discussion

Following the simulation, the new policy went into full effect. The nurses and OR staff were then empowered to enforce these guidelines. For leadership support, daily OR rounds were held with the Chair of the Department of Surgery, who was notified if surgeons or staff had not followed the correct updated procedures. In order to gauge compliance 1 month after the simulation session, an auditor was sent to the ORs during closure to evaluate whether the new policy was being followed. The auditor provided monthly data to hospital executives and reminded the operating teams of the new procedures.

Table 3. One-year follow-up: survey results

	6-month survey (n = 62) (%)	1 year survey (n = 30) (%)	*P* value
Understanding of new policy	72.6	96.7	0.005
Requirements for radiograph before closure	90.3	100	0.172
Knowledge retention of radiograph as a method to verify correct count	75.8	90.0	0.161
Knowledge of count as mandatory at the end of operative cases	87.1	96.7	0.262
Recognition of URFOs occurring in cases of correct count	85.5	83.3	0.766

Table 2. Survey follow-up: relevant results

	Six-month follow-up (n = 62)			One-year follow-up (n = 30)		
	Before new policy implementation (%)	After new policy implementation (%)	*P* value	Before new policy implementation (%)	After new policy implementation (%)	*P* value
Correct identification of a retained object as a sentinel event	71.4	95.2	0.019	71.4	96.7	0.029
Correct identification of CRM as a preventative measure	78.6	98.4	0.018	78.6	100	0.027

Table 4. Recommended practices for sponge, sharps, and instrument count (adapted from the Association of Perioperative Registered Nurses (AORN) recommendations)[6]

	Recommendations by AORN	Institution adjustments
Recommended practice I	Sponges should be counted for all procedures in which the possibility exists that a sponge could be retained	We perform both time-out and counts in all cases Pre-operative counts are always written on a white board visible to everybody in the room and confirmed by multiple personnel
Recommended practice II	Sharps and other miscellaneous items should be counted for all procedures	We avoid having sharps on the operating table when not being used to avoid both URFOs and accidental injuries
Recommended practice III	Instruments should be counted for all procedures in which the likelihood exists that an instrument could be retained	In emergency cases, a radiograph is obtained if counts are not performed
Recommended practice IV	Additional measures for investigation, reconciliation, documentation, and prevention of retained surgical items should be taken	"Full Stop" is performed in which the surgeon must stop operating and verify the correct count with the nursing staff before closure of the last wound layer
Recommended practice V	Sponge, sharp, and instrument counts should be documented on the patient's intra-operative record by the registered nurse circulator	Surgeon expected to document status of counts in the operative report
Recommended practice VI	Policies and procedures for sponge, sharps, and instrument counts should be developed, reviewed periodically, revised as necessary and readily available in the practice setting	Policy to be reviewed annually

As previous research has shown, we were able to demonstrate that simulation and debriefing can identify root causes, which can facilitate corrective action.[5] Furthermore, we used proven methods of audit and continuous feedback[5] methodology as well as empowering nursing staff[5] to help improve compliance with this new policy after education. CRM as a tool was incorporated in our didactic teaching; it is a powerful tool because it empowers nurses and OR personnel to have control of the situation and eliminates hierarchies between team members, allowing for better communication and team work.[4] We were able to achieve and maintain 100% compliance within 2 months of implementation of this method. In the future, we plan to assess the prevention of URFOs in our hospital based on our initial and post-policy implementation rates of URFOs.

The current URFO policy implemented at our institution was adapted from the Association of Operating Room Nurses Recommended Practices Committee, 2012.[6] These regulations became widely effective on 1 January, 2006 with updates from revised guidelines. Relevantly, these guidelines do not address who and how to perform the counts. However, in our institution, only surgical technicians and experienced nurses are allowed to perform counts. If there is a miscount, we always re-count before presuming an instrument is retained. Our current regulations are based on the recommendations shown in Table 4.

Conclusions

Simulation provides the opportunity to learn the concept of root cause analysis and identification of factors that lead to URFOs. Simulation as an adjunct to didactics can help increase knowledge retention of patient safety policies. Other relevant practices applied at our institution include the neutral zone: a given space on the instrument table which is pre-determined to be an area where sharps are placed to avoid the surgeon and the scrub technician touching the same sharp instruments at the same time. This also encourages students and residents to be more aware of sharps, especially in academic cases in which there are several people participating in the cases.

Conflict of interest

None declared.

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