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Strategies to Prevent the Unintentional Retention of Foreign Objects in Surgical Patients

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This is to certify that the doctoral study by

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MA, New York University, 1992

BSN, Medgar Evers College, 1988

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Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice.

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Abstract

The Institute of Medicine's report in 2000, *To Err Is Human: Building a Safer Health System,* highlighted the seriousness of medical errors in the U.S. health care system. The unintentional retention of foreign objects in surgical patients is one of those errors. At the time of this study, there was no standardized counting policy and process across operating rooms in the United States. The purpose of this project was to develop a best practice educational counting program to help prevent the unintentional retention of foreign objects in surgical patients. The Logic Model was used to guide the design of the educational program and expected learning outcomes. A draft of the educational program was distributed to 10 perioperative stakeholders for an initial formative review. Changes were incorporated into the program and it was distributed to 6 perioperative experts for an additional summative assessment and content validation utilizing the AGREE II Instrument. The overall quality evaluation of the educational program was 85%, indicating that it was of high quality. Four of the respondents recommended the educational program for implementation without any changes and 2 recommended it for implementation with some minor modifications related to rewording of one question in the pretest-posttest. There were no recommended modifications in the content of the educational program. As a result, the project was recommended for adoption as a best practices-based educational program to prevent the unintentional retention of foreign objects in surgical patients. The study promotes positive social change by providing suggestions to improve the provision of safe care to surgical patients and decrease health care costs.

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Dedication

To my wife, Catherine: Without your love and support, this accomplishment would not have been achieved. Your support and understanding motivated me to achieve my goal.

To all potential surgical patients: It is my hope that the widespread utilization of this best practices-based educational program will educate operating room nurses and technicians to enhance their practice and prevent the unintentional retention of foreign objects.

Acknowledgments

To my wife Catherine Ramdas and my children Steven, Ian and Kristen: Thank you for your love, support and understanding as I pursued this degree.

To Ms. Tessie La Porte, MA, RN, FNP, who has been my mentor: Thank you very much for your assistance, invaluable advice and guidance throughout my DNP course of study.

To my project committee chairperson Dr. Deborah Lewis, member Dr. Stoerm Anderson, and university research reviewer Dr. Ann Vitale: Thank you for your assistance. Dr. Deb, you have been the impetus behind my success. I could not have been successful without your guidance. Obtaining my doctorate is the achievement of a lifelong goal and the pinnacle of my professional career.

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Section 1: Nature of the Project

Introduction

The Institute of Medicine's (IOM) 2000 report *To Err Is Human: Building a Safer Health System* highlighted medical errors as major patient safety issues in U.S. health care institutions (Rupp et al., 2012). This revolutionary report estimated that 44,000 to 98,000 medical errors occurred in American hospitals annually that resulted in significant patient injuries (Jun & Blaha, 2012). The report ignited a major national effort to initiate quality strategies and interventions to ensure the provision of the safest care possible to the population (Moffatt-Bruce et al., 2012). However, despite the implementation of numerous safety initiatives and standards set by regulatory agencies and policies and procedures by health care institutions, some of these medical errors continue to occur and have led to increased patient morbidity, mortality and healthcare costs (Rupp et al., 2012).

These medical errors initiated intense public demands for more scrutiny and accountability of healthcare providers and institutions. One category of those errors is the unintentional retention of foreign objects (URFOs). A URFO is the leaving of an object such as a sponge, sharp, instrument or piece of equipment in a patient after surgery (Stiller, Thompson & Ivy, 2010; The Joint Commission Sentinel Event Alert, 2013). In health care settings, these incidents can occur in operating rooms, labor and delivery units, cardiac catheterization laboratories, gastrointestinal laboratories, interventional radiology units, emergency departments, and ambulatory surgical centers (The Joint Commission Sentinel Event Alert, 2013). Counting of supplies and instruments is a

practice performed by nurses and technicians to prevent URFOs (Rowland & Steeves, 2010). Incorrect counts after surgical and medical procedures can create stress, increase the length of the procedure, and be perplexing to operating room staff (Rowlands, 2012). This project was designed to focus on the prevention of URFOs in the operating room.

The true incidence of URFOs is unknown because institutions do not report them consistently and URFOs can remain unrecognized and undetected in patients for months to years (Cima et al., 2007). However, several studies assessing post procedure radiographs on surgical patients have shown that URFOs occur more frequently than is documented in the literature, including in patients with whom the final instrument count was determined to be correct by the staff (Cima et al., 2007).

Problem Statement

I engaged in a need assessment process for my identified problem of URFO and identified the target population of operating room nurses and operating room technicians (ORTs) per the guidelines of Hodges and Videto (2011). I needed to understand how to research and conduct the program, determine who could assist me, how much money and time it would take to conduct the assessment, and what tasks will have to be completed before, during and after the needs assessment (Hodges & Videto, 2011). I identified my project problem by observing the counting practices used by operating room staff in several different health care institutions, interviewing operating room staffs, and reviewing literature including the Joint Commission's (TJC) standards, Sentinel Event publications, and the Centers for Medicare and Medicaid Services' (CMS) survey policies.

The surgical count is a vital activity conducted during surgical procedures to prevent URFOs and protect patients from harm (Rowlands & Steeves, 2010). However, counting practices are considered to be high-frequency, high-risk, and problem-prone activities (Edel, 2012). Counting practices to prevent URFOs across operating rooms are also not consistent and uniform. Edel (2012) reviewed 20 policies and practices from across the United States, noting that there was a great degree of count practice variability among all levels of staff. Physical and emotional patient harm, increased healthcare costs, increased length of stays, no reimbursable healthcare costs, astronomical litigation costs, and negative publicity for the involved healthcare institution compel them to develop strategies and interventions to prevent this problem. Institutions' varying counting practices, which have been the primary method to prevent URFOs in surgical patients, have proven to be unreliable (Stawicki et al., 2013). Patient needs have become more complex. Therefore, to assist in the delivery of safe patient-centered care, the nursing education system in the United States must be addressed and improved (IOM, 2010).

There is a strong need to reduce counting practice variability by improving on the current counting processes, and other practices such as good communication and teamwork and investigating new technological advances (Stawicki et al., 2013; The Joint Commission Sentinel Event Alert, 2013). Addressing this need requires developing and disseminating a best practices-based educational program inclusive of the topics mentioned for operating room nurses and ORTs to adopt universally to assist in the prevention of URFOs. Addressing this gap requires translating current evidence into

evidence-based knowledge and practices for implementation to prevent the escalation of this issue.

Purpose Statement

The purpose of this project was to develop a best practices-based educational program through operating room leadership and peer review assessment and validation for future implementation to enhance the knowledge of operating room nurses and ORTs in the prevention of URFOs in surgical patients.

Significance/Relevance to Practice

The rate of medical errors continue to escalate despite major emphasis by regulatory bodies such as The Joint Commission (TJC), the Centers for Medicaid and Medicare Services (CMS) and many strategies and interventions attempted by health care institutions. Recently, CMS raised the bar and highlighted certain medical errors by publishing a list of those that should not occur in health care institutions. The agency labeled the list "Never Events" in which they tethered the penalty of no reimbursement to health care institutions for these conditions. One of those "Never Events" is URFOs. Further, should a "Never Event" occur, Medicare requires that the patient not be billed for any additional care that may be needed for further diagnostic studies and treatment (Torrey, n.d.). As a result, healthcare institutions will be required to cover any additional costs incurred from the additional patient injuries (Torrey, n.d.). Therefore, health care institutions are being forced to take a closer look at the health care provided to the population served with an emphasis on improved practices to ensure safe, quality health care and to remain financially viable.

Project Question

What components should comprise an effective, best practices and evidence-based educational program for educating operating room nurses and operating room technicians to reduce the incidence of unintentional retention of foreign objects?

Evidence-based Significance of the Project

Implementing evidence-based practices has been demonstrated to significantly improve the provision of safe care to patients. The evidence-based significance of this project is the creation of a best practices-based educational program to educate operating room nurses and ORTs and increase their knowledge. The implementation of this program is designed to enable these medical personnel to improve their practices and decrease counting errors, and thus increase the prevention of URFOs in surgical patients. Positive results from this project will be disseminated widely within the health care community.

Implications for Social Change in Practice

Nurses can improve patient safety outcomes by identifying and reducing risks, monitoring patient status, intervening appropriately and utilizing surveillance systems (White & Dudley-Brown, 2012). Achieving the national goal of improving the overall health status of the population of the United States requires developing and implementing clinical prevention and population health activities by nurses (American Association of Colleges of Nursing, 2006). Implementation of these activities to improve patient safety has been determined to be a priority in healthcare (IOM, 2000). Implementing evidence-based practices to prevent URFOs will lead to social change in practice. Uniform

policies, procedures and practices of counting sponges, towels, needles, sharps and instruments according to evidence-based practices, better communication and teamwork, and the use of assistive technologies can lead to the prevention and reduction of URFOs and thus a healthier population (Feldman, 2011; The Joint Commission Sentinel Event Alert, 2013). The educational program developed and implemented for this project was designed to promote programmatic changes and improve health care. The developed educational program can also be utilized in other projects, programs, and further research including longitudinal studies.

Definitions of Terms

Assistive technologies: The use of electronic technologies such as barcoding, radiopaque materials, radiofrequency (RF) tags and radiofrequency identification (RFID) systems to assist in counting and detection of soft goods (The Joint Commission Sentinel Event Alert, 2013).

Final count: The last enumeration of sponges, towels, needles, sharps, and instruments at closure of the patient's skin in surgical cases (Association of periOperative Registered Nurses, 2013a).

First count: The initial enumeration of sponges, towels, needles, sharps, and instruments before a surgical case is started. The first count is used to establish a baseline and identify manufacturer packaging errors (Association of periOperative Registered Nurses, 2013a).

Laparotomy pads: Radiopaque sponges sized 18 in. by 18 in. that are used to absorb blood during surgical procedures (Association of periOperative Registered Nurses, 2013a).

No Thing Left Behind: A standardized sponge-counting practice developed by Dr. Verna C. Gibbs (The Joint Commission Sentinel Event Alert, 2013).

Operating room nurses: Registered nurses who scrub and circulate on surgical cases in the operating room (Association of periOperative Registered Nurses, 2013a).

Operating room technicians: Technicians who scrub on surgical cases in the operating room (Association of periOperative Registered Nurses, 2013a).

Radiopaque: The ability to be detected by x-rays (ECRI Institute, 2015).

Raytex: Radiopaque sponges sized 4 in. by 4 in. that are used to absorb blood during surgical procedures (Association of periOperative Registered Nurses, 2013a).

Sentinel event: "An unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof " (The Joint Commission Sentinel Event Alert, 2013). An incident of URFO is considered as a sentinel event according to the statement "the risk thereof" (The Joint Commission Sentinel Event Alert, 2013).

Soft goods: Radiopaque sponges (4 in. by 4 in. raytex, 18 in. by 18 in. laparotomy sponges, neurological patties) and towels (The Joint Commission Sentinel Event Alert, 2013).

Surgical count: A patient safety practice of manually counting sponges, towels, needles, sharps and instruments in operating room procedures to prevent their

unintentional retention in surgical patients (Association of periOperative Registered Nurses, 2013a, Rowlands, 2012).

Unintentional retained foreign objects (URFOs): Any surgical item left unintentionally in a surgical patient after a wound is closed (The Joint Commission Sentinel Event Alert, 2013).

Assumptions and Limitations

Below are noted some assumptions and limitations of my project. My educational program acts in accordance to The Joint Commission's Sentinel Event Alert publication (2013) on strategies and interventions to prevent URFOs and the Centers for Medicare and Medicaid (CMS) October 2008 publication of their "Never Events" policy. Highlighting URFOs and the promulgating evidence based practices by these agencies enhances nursing efforts and practices to keep patients safe by the prevention and reduction of this issue.

Assumptions

1. Operating room nurses and ORTs in the United States currently practice the counting of sponges, towels, needles, instruments and sharps inconsistently.
2. Educational programs to prevent URFOs are inconsistent and not standardized.
3. Inconsistency and lack of standardization of URFO educational programs contribute the high rate of URFOs.
4. Operating room nurses and ORTs do not follow the policies and procedures for counting consistently.

5. Operating room nurses and ORTs do not communicate and work as a team consistently.
6. Operating room nurses and ORTs use other technologies to assist them in the prevention of URFOs.
7. Operating room nurses and ORTs currently have some knowledge of how to prevent URFOs.
8. Education can enhance the knowledge of the operating room nurses and ORTs in order to improve their practice.
9. Health is a priority for most people.

Limitations

1. A small sample size that affected assessing and validating the educational program.
2. The project scope was limited to the development of an educational program.
3. Limited time was available to determine if there was knowledge enhancement by implementing the educational program.

Summary

The unintentional retention of foreign objects in surgical patients has been identified as a major and costly healthcare issue. URFO incidents have continued to occur at a high rate despite numerous federal, regulatory, and institutional interventions and mandates. Failure to address these issues comprehensively will lead to increased morbidity, mortality and healthcare costs to the population and government. Agencies such as The Joint Commission, the Centers for Medicare and Medicaid Services and the

Institute of Medicine reports have all noted that this is unacceptable. Therefore, it is imperative that strategies and interventions be researched and implemented to address the issue. The development of a best practices-based educational program is imperative. Adopting evidence-based, standardized education of operating room nurses and ORTs for strategies and interventions to prevent URFOs is essential to URFO prevention. This adoption will facilitate creating a healthier population and decreasing healthcare costs.

Section 2: Review of Literature and Theoretical and Conceptual Framework

Introduction

The purpose of this project was to develop a best practices-based educational program for operating room leadership through peer-review assessment and validation for future implementation. This program was specifically designed to enhance the knowledge of operating room nurses and operating room technicians in the prevention of unintentional retention of foreign objects (URFOs) in surgical patients. This literature review provides an overview of the current state of knowledge on medical errors in healthcare institutions, including URFOs.

The search engines used to identify and retrieve information on URFOs included CINAHL, Medline, PubMed, Ovid Nursing Journal Full Text, ProQuest and Google Scholar. The search engines were explored using keywords in various combinations. These search keywords included: *retained foreign objects*, *unintentional retention of foreign objects*, *retained surgical items*, *retained foreign objects and counts*, *surgical counts and retained surgical items*, *incorrect surgical counts*, *prevention of retained foreign objects*, *risk factors for retention of surgical items*, *surgical patient safety*, *nursing*, and *no thing left behind*. The majority of the search results were articles from evidence-based, peer-reviewed journals that ranged from 1-8 years in age. I retrieved and examined both quantitative and qualitative research for this project.

Specific Literature

Surgical items have been left unintentionally in patients since the practice of surgery began (Gibbs, 2005). An estimated 50 million surgeries are performed annually

in the United States (O'Reilly, 2013), each of which surgeries may involve the use of and counting of sponges, towels, needles, sharps and instruments (Edel, 2012). Unintentional retention of a foreign object (URFO) occurs when a foreign item or object related to any operative or invasive procedure is left inside a patient (The Joint Commission, 2014). The Joint Commission (2014) refers to these incidents as sentinel events. Sentinel events are described as patient safety events that affect patients negatively and results in death, permanent harm, temporary harm and medical intervention is required to maintain life (The Joint Commission, 2014).

The types objects left behind after surgical procedures include soft goods such as sponges and towels; small miscellaneous items, including device components or fragments (such as broken parts of instruments), stapler components, parts of laparoscopic trocars, guide-wires, catheters, pieces of drains, needles, bovie tips and other sharps, and instruments (The Joint Commission Sentinel Event Alert, 2013). The most commonly reported retained objects are large laparotomy pads (18 in. by 18 in.) and raytex gauze pads (4 in. by 4 in) (Stiller et al., 2010). These objects have been retained in almost every body cavity, but the thorax and abdomen are the most commonly affected body cavities (Stiller et al., 2010). Estimates of this problem's frequency range from 1 retained foreign object in every 1,000–1,500 abdominal operations to 1 in every 8,000–18,000 inpatient operations (Cima et al., 2007). Researchers at Johns Hopkins University Medical Center in Baltimore conducted a rigorous analysis of malpractice claims, concluding that a foreign object such as a sponge, towel, or instrument is left inside a

U.S. patient's body after an operation 39 times a week (John Hopkins Medicine, 2012). This approximates to 2,028 incidents annually.

URFOs have major consequences to patients and organizations. The Joint Commission's Sentinel Event database reported 772 incidents of URFOs from 2005–2012 (The Joint Commission Sentinel Event Alert, 2013). Sixteen deaths resulted from these incidents; approximately 95% of those incidents resulted in additional care, extended hospital stays, and increased costs (The Joint Commission Sentinel Event Alert, 2013).

In a study, the Pennsylvania Patient Safety Authority estimated the average total cost to care for a patient with an URFO as $166,000 (The Joint Commission Sentinel Event Alert, 2013). This amount includes costs for legal defense, insurance payments, and additional surgical costs not reimbursed by the Centers for Medicare and Medicaid (The Joint Commission Sentinel Event Alert, 2013).

The surgical count is a patient safety practice consisting of a manual counting process done by operating room nurses and ORTs; it is designed to account for items used on the sterile field to prevent their unintentional retention in a patient. However, surgical items still can be retained unintentionally even when the final count is recorded as correct. Many other strategies have been implemented by healthcare organizations to prevent retention of foreign objects, but these incidents still prevail (Rupp et al., 2012). URFOs may manifest immediately or remain dormant for months or even years without being identified (Cima et al., 2007). Many URFOs eventually lead to a variety of complications, including unnecessary diagnostic tests, additional surgical procedures,

physical and emotional pain, and even death (The Joint Commission Sentinel Event Alert, 2013).

The unexpected discovery of surgical items is often the subject of intense public interest and debate (Cima et al., 2007). Risk factors for URFOs include emergency procedures, unplanned change in operation, increased body mass index, longer duration of surgery, multiple concurrent surgeries, safety variances, and incorrect counts during the procedure (Cima et al., 2007; Stawicki et al., 2013). Unintentional retained foreign body cases are avoidable, frequently injurious, and are associated with a high likelihood of litigation (Lincourt et al., 2007). For these reasons, identifying risk factors associated with this type of medical error is important in informing changes in operating room policy, procedures, and practices designed to reduce these types of errors (Lincourt et al., 2007).

General literature

Patient safety has been catapulted to the number one concern in the healthcare environment since the Institute of Medicine's landmark report was published 15 years ago (Rupp et al., 2012; Stawicki et al., 2013). Agencies such as The Joint Commission (TJC), the Centers for Medicare and Medicaid Services (CMS), The Institute of Health (IHI), the National Quality Forum (NQF), and the Agency for Healthcare Research and Quality (AHRQ) are leading the way in promoting evidence-based practices and national initiatives to transform health care into a safer health care system (Steelman, 2014). The policies of these agencies have been instrumental in significant improvements made in the reduction of hospital-acquired infections (HAIs) such as catheter-associated urinary

tract infections (CAUTI), central line associated blood stream infections (CLABSI), and ventilator associated pneumonia (VAP)(Steelman, 2014). These agencies are now looking for similar success in preventing the unintentional retention of foreign objects in surgical patients. The Joint Commission's seven National Patient Safety Goals (NPSG) of identifying patients correctly, improving staff communication, using medicines safely, using alarms safely, preventing infections, identifying patient safety risks, and preventing mistakes in surgery are all geared towards improving patient safety (The Joint Commission, 2015).

Beginning in October 2008, CMS curtailed reimbursements to healthcare institutions for 11 *never events* (CMS, 2008). Never events are events classified by CMS as adverse patient events that should never occur in healthcare institutions (CMS, 2008). The Centers for Medicare and Medicaid refusal to reimburse for these never events has propelled healthcare institutions to seek innovative ways of preventing them, including working specifically to prevent URFOs.

Conceptual Model

This project was designed to use the logic model as its evidence-based practice conceptual model. This model explains the sequence of actions in regards to what a program is and will do – for example, how investments link to results. The logic model identifies how efforts or initiatives are supposed to work and explains why certain strategies are good solutions for a problem encountered in practice (University of Wisconsin, n.d.). Effective logic models provide a visual account of the activities that will cause change and the results that are expected for the program and population health

(University of Wisconsin, n.d.). A logic model also provides participants with information that they are moving in the right direction by providing a common language and point of reference. Included in this model are 5 core components:

1. Inputs: Raw materials, resources, and investments that are invested into a program. This includes the use of computers and stationery supplies in the development of an educational program.
2. Process: Activities that use inputs to achieve the targeted objectives. This will include the leadership and peer reviews and the developed educational program.
3. Outputs: Activities, services, events and products that are provided to people who participate or who are targeted (e.g., peer reviewers) and measurement of services provided.
4. Outcomes: The results or changes for individuals, groups, communities, organizations, or systems (validation of the educational program).
5. Impact: Changes that are measureable occurring in organizations, communities, or systems as a result of services (University of Wisconsin, n.d.).

The impact of the implementation of the educational program on knowledge enhancement of operating room nurses and ORTs will occur after my graduation from my DNP program. This implementation will take place via a pilot project with a one-group, pretest-posttest design study intended to determine if the educational program was successful in enhancing the staff's knowledge. Statistical analysis with a paired *t* test will be utilized to determine if there are any statistical difference in the scores, indicating success or failure.

The logic model can be utilized in planning, implementation, evaluation and communication of educational activities (Milstein & Chapel, n.d.). It assists stakeholders and program planners in deciding on short-term and long-term objectives during the planning process, outline activities and establish clear criteria for evaluation during the program (Milstein & Chapel, n.d.). When the program ends, it provides a framework for assessing its overall effectiveness, as well as the activities, resources, and external factors that were involved in the outcome (Milstein & Chapel, n.d.).

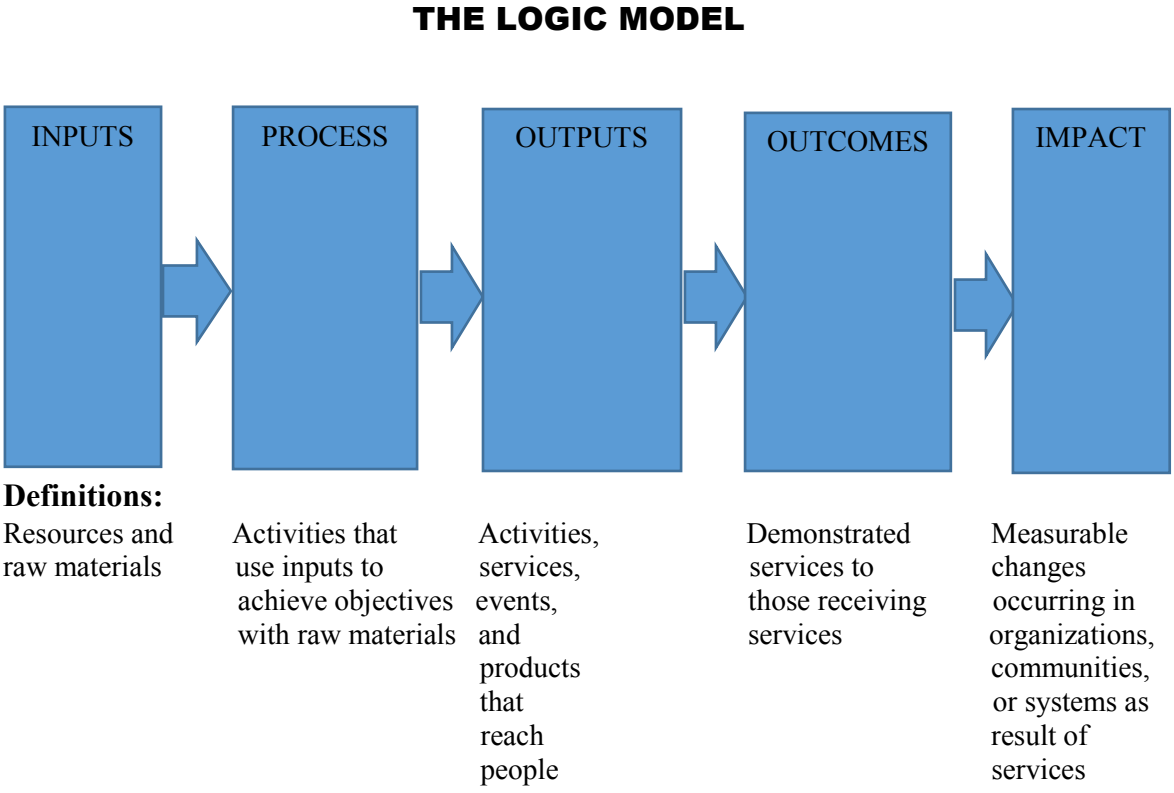

Figure 1. A flowchart showing the logic model. (Adapted from: Kettner, Moroney & Martin, 2008, p. 7. Copyright 2013 by Sage Publications, Inc.).

Summary

The specific and general literature review for this project demonstrated that medical errors including the URFOs continue to be high in healthcare institutions. Combined with patient morbidity and mortality, the healthcare costs to treat these patients, legal costs and insurance payments can be in the hundreds of thousands of dollars. In addition, CMS' refusal to reimburse healthcare institutions for *never events* has prompted them to explore innovative ways to reduce and eliminate URFOs. Current interventions designed to reduce URFOs are fragmented and there was a research gap at the time of this study in regards to a comprehensive approach to combat this problem. Utilization of the evidence-based logic model can assist in the development and implementation of a comprehensive educational program for operating room nurses and technicians that can be used universally in healthcare institutions. The following section (Section 3) will address the project design/methods, population and sampling, data collection, data analysis and project evaluation plan for URFOs that will guide the planning and implementation of the project.

Section 3: Methodology

Introduction

The purpose of this project was to develop a best practices-based educational program to prevent the unintentional retention of foreign objects (URFO) in surgical patients. This project was specifically designed to create a program using operating room leadership and peer review assessment and validation to enhance the knowledge of operating room nurses and operating room technicians (ORTs) and reduce the prevalence of URFOs.

According to Grove et al. (2013), a research design provides a blueprint for conducting a study. The research design provides a template, control and guide in the planning and implementation of a study in order to achieve the best possible results (Grove et al., 2013). This section describes the project design/methods, population and sampling, data collection, data analysis and project evaluation plan for URFOs in detail. This approach was used to guide the planning and implementation of the project. All data collection took place after the Walden University Institutional Review Board approved this project on June 2, 2015 (approval#: 06-01-15-0436631).

Project Design/Methods

Inconsistency in operating room nurses and ORTs counting practices has contributed to the retention of foreign objects in surgical patients and many near misses. A best practices-based educational program is needed because the current strategies and practices to prevent URFOs were not implemented uniformly and consistently at the time of this study to prevent this issue from occurring (The Joint Commission Sentinel Event

Alert, 2013). The focus of this project was the development of a comprehensive, best practices-based educational program for operating room nurses and ORTs based upon The Joint Commission's 2013 Sentinel Event #51 Alert. The educational program (see Appendices A, B, C and D) was evaluated by a group of perioperative professionals through a two-phased evaluation process to ensure that all topics were included and validated before implementation. Phase I included a formative evaluation (Appendix E) by a group of 10 stakeholders – operating room professionals to ensure all topics on the counting process were included and Phase 2 included a summative evaluation by a group of six stakeholders – operating room nursing experts (nurses and educators) utilizing the AGREE II Instrument (Appendix F) to ensure that the key characteristics of the educational program were based on up to date evidence.

The content of the educational session was divided into seven topical sections:

1. What is the definition of the unintentional retention of foreign objects? Regulatory bodies involved. Difference between sentinel events and never events.
2. Counting: Problems with current practices. Explanation of counting processes.
3. A standardized counting process known as "No Thing Left Behind" developed and narrated by Dr. Verna C. Gibbs, a general surgeon. This process utilizes a white board, clear front/blue back plastic bags, a two prong intravenous pole and a step by step standardized counting process. A 30-minute video narrated by Dr. Verna C. Gibbs was utilized in the educational program. It was retrieved from the web site: http://www.hospitalcouncil.net/post/surgical-safety-preventing-retained-

surgical-items (Hospital Council of Northern and Central California [HCNCC], n.d.).

4. Education on practitioners following a standardized counting policy of initial counting, before closing a cavity within a cavity (e.g. womb), before wound closure begins, at skin closure or end of procedure and at the time a scrub or circulating nurse is relieved (The Joint Commission Sentinel Event Alert, 2013).
5. Education on communication and collaboration among operating room team members. Utilization of effective communication skills learned from crew resource management (CRM) training and the TeamSTEPPS 06.1 program to instill confidence and assertiveness in various team members to speak up and overcome hierarchical communication barriers that has been inherent within surgical teams (The Joint Commission Sentinel Event Alert, 2013).
6. Documenting appropriately on the white board as the count is being conducted. Also, documenting in the medical record the results of counts, and any items left inside a patient (The Joint Commission Sentinel Event Alert, 2013).
7. The use of safe, assistive technological advances to assist in the counting process. These technologies include the use of barcoding, radiopaque sponges, radio-frequency tags in sponges and the use of radio frequency identification detection systems (The Joint Commission Sentinel Event Alert, 2013).

As part of the educational project development, the intended participants, operating room nurses and ORTs will be administered a supervised pretest of questions related to the URFOs. The 20-question instrument will assess knowledge related to

URFOs, counting procedures, team communication, documentation and the use of assistive safe technologies (Appendix D). The pretest will serve as a baseline measurement to assess the knowledge of the staff. A posttest of the same questions as the pretest will be administered to the same participants who participated in the pretest and took the educational program. The results of each participant's pretest and posttest results will be tabulated and analyzed to determine whether there was an enhancement of knowledge.

The validity of an instrument is its ability to measure the premise it was developed for (Grove et al., 2013). The reliability of an instrument is its ability to consistently measure an attribute, item or situation it was developed to measure in a particular study or clinical practice (Grove et al., 2013). Since a valid and reliable pretest and posttest was not located in the literature specific to this educational program, I developed one utilizing guidelines from the International Training and Educational Center for Health [I-TECH] (2010). The 20-question test was developed from educational programs' evidence-based literature and the Association of periOperative Registered Nurses' independent study guide for perioperative standards and recommended practices (2013b).

The International Training and Educational Center for Health (2010) noted that a valid and reliable test must be developed with well-written, clear questions and should be validated by asking at least four staff to take the test. The staff members taking the test should be asked to mark any questions that are unclear and discuss their understanding of each question to ensure that their understanding was the same as what the question was

intended to ask (I-TECH, 2010). They will also be provided the same educational program and the pretest and posttest. The answers will be reviewed as a group and participants asked how they interpreted each question (I-TECH, 2010). This will help to clarify ambiguous questions that needed to be revised. Their feedback will be utilized to adjust the questions accordingly before presenting to the sample population. I utilized the same process in the development of my test. The test was provided to one operating room educator, one staff nurse and two ORTs at the operating room that I presently work at to test its validity and reliability.

Population and Sampling

This project was conducted in the county of Queens and Brooklyn, New York City. Grove et al. (2013) defined a population as all the elements (people, objects, substances) that meet certain criteria to be included in a study. The eligibility requirements for Phase 1 of the project were that all participants be operating room leaders and clinicians who had at least two years of full-time experience in the operating room. Phase 2 participation requirements of the project entailed a different group of operating room leaders and clinicians with at least three years of operating room experience. Participants in both phases were required to read and understand English, be a graduate of nursing school and hold a baccalaureate degree for nurses and be a graduate of a surgical technician program for surgical technologists.

In Phase 1 of the project, the educational program (Appendices A, B, C, D) and a formative evaluation questionnaire (Appendix E) were distributed to 10 operating room professionals (n=10): two nurse leaders, two nurse educators, three registered nurses and

three operating room technicians. In Phase 2, the educational program and the AGREE II Instrument (Appendix F) were distributed to a group of six operating room professionals (*n*=6): three registered nurse leaders and three registered nurse educators who were able to interpret and evaluate the educational program for accuracy and evidence-based information in order to develop a best practices-based educational program for pilot implementation.

Data Collection

Protection of the human subjects and confidentiality was of prime importance during this project. Consent does not only imply participant's permission to partake in the project and the imparting of information by the researcher to the subjects but also that the subjects understood the information provided to them (Grove, et al., 2013). To meet these imperatives, I provided an informational brochure to the participants explaining the purpose of the project, their requested involvement, risks and benefits of participation, confidentiality and the researcher's contact information. Participants were assured that their participation was voluntary, and that their identities, personal records, responses, and other information were kept confidential during and after their participation in the project (Grove et al., 2013). Anyone expressing the desire to withdraw from the project had their request honored. Also, protection of the human subject and confidentiality were maintained by not revealing participants' identities in presentations, reports, and publications. Participation in this project by completion of the surveys and educational program involved some risk of minor discomforts that can be encountered in daily life,

such as fatigue, stress or becoming upset. Being in this study did not pose any risk to the safety or well-being of the participants.

Data Analysis

The purpose of data analysis is to reduce, organize and provide meaning to the data (Grove et al., 2013). This process will be helpful in analyzing the data obtained from the formative and summative evaluation of the educational project. Stetler (2006) noted that a formative evaluation is a rigorous process of assessment utilized to refine a product (progress-focused) such as this educational program prior to implementation. The data obtained from Phase 1 of this project were assessed and analyzed to identify recommendations to refine the educational program for Phase 2.

In Phase 2 of the project, data analysis were conducted using data acquired from the participants' evaluation of the refined educational program. In their evaluation, the participants followed Brouwers' (2009) appraisal of guidelines for research and evaluation instrument (AGREE II). AGREE II was developed to assist in developing quality guidelines and educational programs (Brouwers, 2009). In assessing the content validity of this instrument, the National Collaborating Centre for Methods and Tools, (2011) noted that the validity properties were promising and acceptable to the AGREE Next Steps 2010 Consortium standards in assessing whether guidelines were of higher or lower quality. Reliability of the instrument were acceptable to the same consortium standards in that Chronbach alpha scores ranged from 0.64 to 0.89 of the six domains measured and inter-rater reliability was adequate (0.7) (National Collaborating Centre for Methods and Tools, 2011).

AGREE II provided guidelines for the participants to use in assessing the methodological rigor and transparency in which the educational program was developed in order for refinements to be made prior to implementation (Brouwers, 2009). The respondents utilized the instrument to assess the quality of the educational program along its specific domains of scope and purpose, stakeholder involvement, rigor of development, clarity of presentation, applicability, and editorial independence (Brouwers, 2009). The scores were collected and tabulated according to the instrument's guidelines. Each domain's score were calculated by summing the scores of the specific items within the domain and utilizing a formula to scale the total as a percentage of the maximal score. The higher the domain score indicated a strong support of the inclusion of that domain in the educational program and a lower score would indicate a need for refinement.

Project Evaluation Plan

According to Kettner, Moroney and Martin (2013), the main purpose of project evaluation is to provide feedback to policy makers and program planners on results, accomplishments, and outcomes of the program. This will help to increase awareness about the issue, attract volunteers, funding, and resources, to promote awareness of the efforts of volunteers and collaborators, to help lobby for local ordinances or program changes to address issues of concern and to provide accountability to the community, trustees, and funders (Hampton, 2011).

For this project, success will be evaluated after the two-phase evaluation process and the creation of a valid best practices-based educational program for the prevention of URFOs. A poster board will be prepared to share the best practices-based educational

program with stakeholders to share awareness. After refinement, the best practices-based educational program will be pilot tested in a few health care institutions. Hopefully, through implementation of this best practices-based educational program and subsequent follow up and monitoring there would be a decrease in URFOs and near misses in these institutions. This program then will be disseminated to other institutions for implementation, monitoring and research for refinement and advancement.

To evaluate my project I will utilize Avedis Donabedian's performance improvement model of structure (for example, having the right things), process (for example, doing things right) and outcome (for example, having the right things happen). Structure relates to the context in which care is delivered, including buildings, staff, financing, and equipment, process relates to the transactions between patients and providers in the delivery of healthcare and outcomes refer to the effects of healthcare on the health status of patients and populations (Mitchell et al., 1998). Performance measurement and monitoring tools will be developed to collect measurements, monitoring, and program evaluation data such as coverage, equity, process, effort (output data) , cost-efficiency, results and accomplishments (outcomes), cost-effectiveness and impact (Kettner et al., 2008). Tools will have to be developed to collect data and answer questions such as: (1) Did the project work as intended? For example were the formative and summative evaluation forms clear and captured the information needed? Do they need revision? Was the allotted time to complete them appropriate? Was there a need for more supplies? (2) What were the accomplishments or outcomes of the program? Was the returned formative information helpful in revising the educational plan and did the

summative evaluation tool assisted in validating the educational program? (3) What measurable impacts (outcomes) did the program achieve? and (4) Was the program cost-effective? A cost analysis will be determined to conduct such a program.

Summary

By utilization of a two-phased process, the educational program was evaluated in a formative and summative manner by stakeholders-operating room professionals for evaluation, refinement and validation of its content in order to produce a finalized comprehensive, best practices-based educational program for implementation. After completion of the validation process, and changes are made (after the DNP degree has been completed) the final revision and results will be disseminated via poster presentations at conferences, health care institutions' quality day, and journals such as the Association of perioperative Registered Journal and Operating Room Managers' Journal.

Project evaluation will be accomplished by developing and implementing other performance measurement tools related to coverage, equity, process, effort (output data) , cost-efficiency, results and accomplishments (outcomes), cost-effectiveness and impact (Kettner, Moroney & Martin, 2008).

The following section 4 will present the findings for the two-phased evaluation process for developing a best practices-based educational program for the prevention of URFOs.

Section 4: Findings, Discussion, and Implications

Introduction

Many surgical patients in the United States suffer needlessly from the unintentional retention of foreign objects (URFOs). This project was designed to produce a comprehensive, evidence-based, and best practices-educational program to prevent the unintentional retention of foreign objects (URFOs). This program was specifically designed to empower operating room nurses and operating room technicians (ORTs) to decrease or eliminate URFO occurrences. In this section, the findings of a two-staged evaluation process of the developed educational program are presented. A goal of this project was to validate the educational program by way of assessment and evaluation in two phases. Phase 1 used a group of operating room leaders, educators, registered nurses, and ORTs for analytic review; Phase 2 validated these preliminary findings with a group of operating room leaders and educators.

Summary of Findings

Phase 1: Formative Evaluation

In the first phase, the educational program and the formative evaluation form were distributed to 10 nursing professionals: two registered nurse operating room leaders, two registered nurse operating room educators, three operating room registered nurses and three ORTs. All 10 responses were returned within the 2-week deadline.

The first question on the evaluation form assessed the program content by asking, "Does the educational program address all the topics to be covered in preventing the unintentional retention of foreign objects?" Eighty percent of the respondents (n = 8; 2

leaders, 1 educator, 3 OR nurses and 2 ORTs) answered yes. Twenty percent (*n* = 2; 1 educator and 1 ORT) answered no, commenting that the Sponge Accounting System by Dr. Verna C. Gibbs did not address the counting of other supplies other than sponges. This observation was objectively true, as Dr. Gibbs did not address the counting of supplies other than laparotomy pads and raytex (4x4) in her video (HCNCC, n.d.). This observation led to the counting of other supplies being addressed in the class presentation material. There were no recommendations in regards to adding anything to the content of the educational program. Comments such as "it covered every topic," "comprehensive," "excellent content" and "excellent program" were noted in the comments/recommendation section.

The objectives of the educational program were evaluated in Question 2. In response to the primary objectives of using a standardized counting process, effective communication, appropriate documentation and assistive technologies, 100% of the respondents rated them 1 on the Likert scale, indicating that that they strongly agreed that the educational program covered those topics and that they were important concepts. In evaluating the content of the pretest and posttest questions (Appendix D), 100% of the respondents rated the content 1 on the Likert scale, indicating that they strongly agreed that the questions were appropriate. Thirty percent (*n* = 3; 1 leader, 1 educator and 1 nurse) of the respondents requested that a slight change be made to question number 9. The original question read, "Soft goods such as sponges, neurological patties and towels used in the surgical wound should be?" The requested change was that the words "and towels" be removed, which was done. In addressing the secondary objectives of the

program: addressing the difference between sentinel and never events and the teaching agenda and educational objectives being appropriate, 8 respondents (*n* = 8; 2 leaders, 1 educator, 2 registered nurses and 3 ORTs) scored 1 on the Likert scale, indicating that they strongly agreed, and two (1 educator and 1 registered nurse) scored 2, indicating that they are close to strongly agreeing.

In regards to item number 3 on the evaluation, *Please note below any topics or comments you think of that can enhance or change this educational program,* two respondents (*n* = 2; 1 leader and 1 educator) noted that the 60 minute educational session may be too short since a 30 minute video will be utilized in the educational program. At this point I am reluctant to extend the educational time beyond 60 minutes until a pilot project is conducted and feedback is obtained. A second comment noted by 4 respondents (*n* = 4; 1 leader, 1 educator, 2 ORTs) is that a live demonstration of how a safe counting process should be conducted will be helpful if included in the educational program. This recommendation will be implemented. A third comment noted by 3 respondents (*n* = 3; 1, nurse and 2 ORTs) was that crew resource management (CRM) and TeamSTEPPS education be emphasized during the program. This is an excellent comment that will be implemented and emphasized.

Finally, in regards to item number 4, overall evaluation and the question of, *Were you able to understand the educational program?* All 10 respondents noted yes. Comments noted were that the educational program was clear, logical, succinct, comprehensive and very good.

The findings of the formative evaluation were that the best practices-based educational program was clear, concise, logical and comprehensive in addressing safe counting practices. In addition to minor grammatical and flow of the contents, the recommended changes noted by the formative evaluation group were taken into account and made to the program prior to sending to the summative evaluation group.

Phase 2: Summative Evaluation

Six practicing operating room registered nurse professionals (n = 6; three leaders and three educators) who have been practicing for at least three years in the New York City boroughs of Queens and Brooklyn were chosen and provided with a project outline, the educational program and the AGREE II Instrument (Appendix F) to provide a summative evaluation. They were asked to read the project outline and the educational program and evaluate them on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) on (1) the six domains of the instrument: scope and purpose, stakeholder involvement, rigor of development, clarity and presentation, applicability, editorial independence and (2) to provide an overall assessment of the educational program via two global rating items – rate the quality of the educational program and would they recommend the program. This instrument addresses 23 items within six domains (Brouwers, 2009). This instrument was developed to reduce the variability in guidelines quality by assessing its developmental rigor and transparency (Brouwers et al., 2010). Presently, the instrument does not provide a minimum domain score to assess the differentiation between a poor quality and high quality domain of the guideline

(educational program) (Brouwers et al., 2010). All six registered nurse leaders (n = 3) and educators (n = 3) returned their evaluation within the 2-week deadline.

The instrument's Domain 1-scope and purpose addressed three items: the overall objective of the educational program, the health question by the educational program described and the population to whom the educational program pertained to is described. The scaled domain score was 97.2% indicating a high level of agreement. Domain 2 addressed three items also. They were: the stakeholder's involvement in regards to the group that developed the educational program, the views of the target population were taken into account and the target users of the educational program were clearly stated. The scaled domain score was 76.8% indicating a moderate level of agreement. Some of the comments noted by the respondents were that the stakeholders' group could have been expanded to include surgeons, anesthesiologists, certified registered anesthetists and house physicians. Also, they noted that views of the target population (patients) should have been taken into account.

In Domain 3 the rigor of development of the educational program was addressed by eight items. They were: the respondents evaluated whether systematic methods were used to search for evidence, the criteria for selecting the evidence were clearly described, the strengths and limitations of the body of evidence were described, methods for formulating the recommendations were described, health benefits have been considered in formulation of the recommendations, there were explicit links between recommendations and the supporting evidence, the program has been reviewed by experts and a procedure for updating the educational program was included. The scaled domain

score was 87%, indicating a high level of concurrence in that the program was assembled systematically with supporting evidence and rigor.

Domain 4 addressed three items: clarity and presentation, the educational program recommendations were evaluated for specificity, unambiguity and different options for managing URFOs and key recommendations. The scaled domain score was 97.2% indicating that there was a very high level of agreement by the respondents that all the criteria were met. In terms of Domain 5, the four items addressed were: applicability, the facilitators and barriers to the educational program implementation, advice and/or tools on how the recommendations can be implemented, resources for implementation and monitoring activities were assessed. A scaled domain score of 78.5% was achieved. This score could have been higher if the program had been implemented before and refined. Since it is a new project, potential organization barriers, costs and monitoring tools would have to be assessed and developed. In the final domain, Domain 6: Editorial Independence was validated through two items. The first was that the educational program was evaluated for funding bodies' views not having an influence on its content and secondly, conflicts of interest by the educational program developer having been recorded and addressed. The scaled domain score achieved was 55.5%. This scored was low because I failed to indicate any funding bodies (there were none) and any conflicts of interest (there were none).

All six respondents noted a comment in the general comment section of the AGREE II Instrument. They were: nice project, this is very important; this kind of program is long overdue; we need a standardized counting program; I work in a few

hospitals and have seen different counting practices that led to mistakes; the AGREE Instrument was thorough; you should include surgeons, anesthesiologists, house physicians and certified registered nurses in the project; well put together program… Dr. Gibbs video was very informative and educational; this educational program is assembled nicely; the views of the patients should be included; I will definitely use this program in my classes (HCNCC, n.d.).

The overall quality evaluation of the educational program was 85% indicating that it was of high quality. Sixty-seven percent of the respondents (n=4) would recommend the educational program for implementation and 33% (n=2) would recommend it for implementation with some minor modifications related to rewording of one question in the pretest and posttest. There were no recommended modifications in regards to the content of the educational program.

Discussion of Findings in the Context of Literature and Framework

The counting of certain surgical supplies and instruments has been a long standing practice conducted by operating room nurses and ORTs. However, practice variations continue to be one of the leading causes for the URFOs in surgical patients (Edel, 2012). The assessment, evaluation and validation of the educational program via a formative evaluation and summative evaluation has demonstrated that the developed educational program is comprehensive and based upon best practice. Implementing this program via a pilot project will assist in refining it for future implementation. This will assist in determining needed resources to conduct the program including funding, identifying facilitators and barriers to implementation, identifying and researching additional tools of

implementation, and developing monitoring and/or auditing tools. Implementing a best practice, highly reliable and standardized educational program can assist in decreasing the number of URFOs (The Joint Commission, 2013). This program hopes to accomplish this goal. The Logic model provide a framework for the implementation of the program in terms of developing monitoring/audit tools to monitor inputs, process, outputs, outcomes and impact of the program. The information gathered will be assessed and analyzed for future research activities. The impact of this program on social change is that the program would lead to an enhancement of knowledge for operating room nurses and ORTs which would lead to improve practice, provision of safe surgery and the prevention of URFOs.

Projects Strengths, Limitations, and Recommendations for Remediation of Limitations

Project Strengths

The development of a comprehensive, best practices-based educational program for operating room nurses and ORTs is a strength of the project. This is because it was reviewed, assessed and validated by a total of 16 stakeholders including perioperative leaders, educators, operating room nurses and ORTs. The educational program provide operating room leaders and educators with an evidence based program of instructions of how to train operating room nurses and ORTs to count supplies and instruments and prevent them from being retained in surgical patients.

A second strength of this project is that some of the evidence utilized in the development of the educational program were recommended by The Joint Commission

Sentinel Event Alert # 51 (2013). This renowned and respected regulatory agency's Alert elucidated an evidence based summary of all topics that should be covered in an education program.

A third strength of this project is that it utilized a 30 minute video narrated by renowned surgeon, educator and researcher Dr. Verna C. Gibbs to provide a graphic representation of how the counting of sponges (laparotomy pads and raytex) should be conducted. Utilization of the video will leave a lasting impression in the mind of operating room nurses and ORTs of how important it is to count in a standardized, consistent manner and prevent errors (HCNCC, n.d.).

Project Limitations

The first limitation of this project identified by one of the respondents from the summative group was as to why other operating room team members such as surgeons, anesthesiologists, house physicians and certified registered anesthetists were not included in the project. In this project I wanted to focus only on the counting process done by nursing staff since their focus is on the counting of supplies and instruments. However, this a valid comment that would be taken into account in future project updates.

A second limitation of this project as noted by another summative group member was that this project focused only on the operating room. This is correct. Including other areas in the project would have been cumbersome in data collection. In future projects the focus will be upon the counting practices in other procedural areas such as cardiac catheterization laboratories, gastrointestinal laboratories, interventional radiology units, emergency departments and ambulatory surgical centers.

A third limitation of this project is that facilitators, barriers and costs to conduct the project has not been determined yet. Eventually, with the implementation of a pilot project these issues will be monitored and analyzed.

Analysis of Self as a Scholar, Practitioner and Project Developer

Since my introduction to operating room nursing over 35 years ago, my sensitivity has been heightened to the provision of safe care to patients undergoing surgical procedures. The safety of surgical patients takes on greater importance because while anesthetize, they are unable to verbalize their concerns and advocate for themselves. Thus, it is of major importance that the registered nurse's role as a patient advocate be truly operationalized. As an operating room nurse who has worked in many operating rooms I encountered many situations whereby items have been left unintentionally in surgical patients. As a nursing administrator, I have been involved in litigations whereby items were left in patients' abdomen after surgery due to the surgical teams' inconsistent counting practices. This has caused severe physical and emotional distress to the involved patients and high legal costs to the health care institutions involved. It is evident that this issue is a major problem in the health care system. Combined with my professional practice and literature review I have acquired a special interest on this topic due to the varying counting practices in health care institutions. Developing a comprehensive, best practices-based educational program to teach operating room nurses and ORTs how to prevent the unintentional retention of foreign objects across all health care institutions can lead to consistent practices that can provide safe care to surgical patients. With the completion of this project, I have accomplished

my goal of developing a comprehensive best practices-based educational program that can be piloted and disseminated across healthcare institutions in the United States to provide safe care to surgical patients. Utilizing this educational program, operating room leaders and educators can elevate the seriousness of the issue and enhance the knowledge and confidence of their nurses and ORTs and administrators. As such, this project is of great importance. My DNP studies, combined with administrative and clinical experience and conducting this project has elevated my desire as a scholar, practitioner and project developer to continue exploring evidence based practices, identifying gaps and conducting projects for implementation in order to provide improved health care to the population. My DNP studies combined with conducting this project have instilled confidence in my ability to conduct scholarly work. After completion of my DNP project, I plan to work on a project related to managing hypothermia in surgical patients.

Summary and Conclusion

The development of a comprehensive, best practices-based educational program for operating room registered nurses and ORTs is of major importance in protecting the health and safety of surgical patients. The educational program developed was comprehensive in addressing current practice trends. Utilizing this educational program, operating room leaders and educators can educate their staff in a standardized and consistent manner. Hopefully, the implementation of this program will demonstrate an enhancement of knowledge that will be practiced by operating room nurses and ORTs and ultimately lead to improved, safe patient care for surgical patients.

Section 5: Scholarly Product

Project Dissemination

Incidents of unintentional retention of foreign objects (URFOs) in surgical patients continue to escalate and have led to significantly increased costs to the U.S. health care system. In addition to this, patients' physical and emotional suffering from these items being left inside their bodies can be devastating and life changing. This DNP project was designed to develop a best practices-based educational program to educate operating room nurses and ORTs in the future. Utilizing a best practices-based educational program to enhance nursing staff knowledge is key to enhancing the safety of surgical patients. Educating staff on URFOs and related prevention strategies, and administering pretests and posttests can demonstrate the acquisition of knowledge by the learner, which may lead to improved clinical practice.

Translating research findings into clinical practices and subsequent dissemination of findings requires the education of practitioners and stakeholders (Ousley, Swarz, Milliken & Ellis, 2010). The dissemination of information is the sharing of knowledge of evidence based practices with others at conferences and in journals to name a few forums to encourage innovative ideas, improve clinical practice and advance the nursing profession (Walsh, 2010; White & Dudley-Brown, 2012). Dissemination of information can occur via the "three P's: posters, presentations, and papers" (White & Dudley-Brown, 2012, p. 245). The dissemination of evidence-based projects about the prevention of URFOs such as this one can change clinical practice and reduce their frequency.

The first means of disseminating this project will be via a poster presentation at my practicum site and my job. Refinements will be done and applications will be submitted to present a poster at the Association of periOperative Registered Nurses' Congress, Operating Room Manager's conference and other local and state conferences. The strengths of the poster format of dissemination are that: they are an excellent form of dissemination of evidence because they can be displayed for longer periods of time than other methods such as text, they are interactive in that they encourage scholarly discourse between colleagues and there is no time limit to the interactions (Hand, 2010, White & Dudley-Brown, 2012). Another strength of the poster board format of presentation is that the presented work can still be in progress as in my case (White & Dudley-Brown, 2012). I also plan on presenting a manuscript for publication in the Association of periOperative Registered Nurses' Journal. Through dissemination of this educational program, I hope that operating room leaders and educators will utilize it to educate their staff, improve their practice and decrease the URFOs.

After graduation, I plan on piloting this educational project at my place of employment. I plan on utilizing a quasi-experimental pretest-posttest design project to study its outcome. According to Terry (2012) this type of design allows an investigator to view and analyze the outcome before an intervention is applied and then afterwards. In this case, I plan to administer a pretest to the subjects before providing them with the educational program and then administering the posttest. The individual scores will be compared, analyzed and a statistical analysis with paired *t* test will be utilized to determine if there were any statistical differences in the scores.

Below is a description of the scholarly product:

Title: **Strategies to Prevent the Unintentional Retention of Foreign Objects in Surgical Patients.**

Leonard H. Ramdas, MA, NP, RN - BC, CNOR, DNP – Student

Walden University

Objective: To develop a best practices-based educational program through operating room leadership and peer review assessment and validation to enhance the knowledge of operating room nurses and operating room technicians in the prevention of the unintentional retention of foreign objects in surgical patients.

Background: The retention of foreign objects in surgical patients is a major healthcare issue that can lead to increased morbidity, mortality and healthcare costs to the population. The Centers for Medicare and Medicaid has curtailed reimbursements to health care institutions in which their patients' experience this issue. This project was completed in two boroughs of a major city in collaboration with a major metropolitan hospital center.

Method: A two – phased evaluation process was utilized to assess and develop the educational program. In Phase 1, a formative group provided feedback on the developed educational program, which led to a refined product. The refined product was evaluated in Phase 2 by a summative group utilizing the Appraisal of Guidelines for Research and Evaluation (AGREE II) Instrument.

Participants: Phase 1, formative evaluation of the educational program included 10 operating room nursing professionals (n = 10). Participants were two operating room registered nurse leaders, two registered nurse operating room educators, three operating room registered nurses and three operating room technicians. Phase 2, summative evaluation included three registered nurse operating room leaders and three registered nurse operating room educators (n = 6).

Results: The Phase 1, formative evaluation process provided valuable information that led to the revision of the educational program prior to evaluation and validation by the Phase 2, summative group. The Phase 2, summative group overall quality evaluation of the educational program was 85% indicating that it was of high quality. Sixty-seven percent of the respondents (n = 4) recommended the educational program for implementation without any changes and 33% (n = 2) recommended it for implementation with some minor modifications related to rewording of one question in the pretest and posttest. There were no recommended modifications in regards to the content of the educational program.

Conclusions: Based upon the two-phased evaluation process, the developed best practices-based educational program was deemed to be comprehensive and based upon best practice information. Implementing the educational program via a pilot study will provide valuable information for refinement prior to widespread implementation.

Keywords: Assistive technologies, first count, final count, no thing left behind, operating room nurses, operating room technicians, radio – opaque sponges, sentinel event, soft goods, surgical count, knowledge enhancement, unintentional retention of foreign objects.

INTRODUCTION

The Institute of Medicine's report, *To Err Is Human: Building a Safer Health System* in 2000, highlighted the issue of medical errors as major patient safety issues in health care institutions in the United States (Rupp et al., 2012). The report estimated that 44,000 to 98, 000 medical errors occur in American hospitals annually that result in significant patient injuries (Jun & Blaha, 2012). Despite the implementation of numerous safety initiatives and standards set by regulatory agencies and policies and procedures by health care institutions some of these medical errors continue to occur. One category of those errors is the unintentional retention of foreign objects (URFOs) in surgical patients. Unintentional retention of foreign objects refer to the leaving of an object such as a sponge, sharp, instrument or piece of equipment in a patient after surgery. These incidents occur in operating rooms, labor and delivery units and ambulatory surgical centers. Prevention of these incidents rests primarily with the counting practices of the operating room circulating nurse and operating room technician (ORT). This project focused on the prevention of URFOs in the operating room. The true incidence of URFOs are unknown because institutions are not reporting them consistently, their complexity and they can remain unrecognized and undetected in patients for months to years (Cima et al., 2007). However, learning from institutions that routinely perform post-procedure radiographs on all surgical patients, studies note that URFOs occur more frequently than is documented in the literature and occur in patients in which the final count was determined to be correct by the staff (Cima et al., 2007). The additional cost to care for a patient with an unintentional retained item inclusive of legal defense and insurance payments is estimated to be $166, 000.

BACKGROUND AND OBJECTIVE OF PROJECT

The unintentional retention of foreign objects in surgical patients is common and can have significant adverse effects on patients' health and healthcare costs. The Centers for Medicare and Medicaid have implemented regulations that deny payment to healthcare facilities in which the unintentional retention of foreign objects occur. This has placed a major burden on healthcare organization finances and their survivability.

The objective of this project was the development of a comprehensive, best practices-based educational program through operating room leadership and peer review assessment and validation to enhance the knowledge of operating room nurses and ORTs to assist in the prevention of URFOs in surgical patients. Prevention of URFOs can decrease patient morbidity, mortality, healthcare costs and enable the survival of healthcare institutions.

EDUCATIONAL PROGRAM EVALUATION

PROJECT METHOD

A literature review, the Centers for Medicare and Medicaid regulations and the Joint Commission's Sentinel Event Alert, Issue #51 (2013) on the unintentional retention of foreign

objects provided information on what needed to be included in the educational program to enhance the knowledge of operating room nurses and ORTs. The 20 question test was developed from educational programs evidence based literature and the use of the Association of periOperative Registered Nurses independent study guide based on perioperative standards and recommended practices (2013).

METHODOLOGY

PHASE 1 – FORMATIVE GROUP EVALUATION

Participants:

In this phase the developed educational program and a formative evaluation form were distributed to 10 (n = 10) nursing professionals to obtain their feedback in order to refine the program. The 10 nursing professionals were two registered nurse operating room leaders, two registered nurse operating room educators, three operating room registered nurses and three ORTs. The participants were requested to complete the survey at their earliest convenience and return them to the project coordinator. All 10 responses were returned within the two week deadline.

Formative Evaluation Form:

This form consisted of four questions/comment sections. The first question requested the participants to answer yes or no in regards to whether all the topics (contents) related to the educational program were covered to prevent URFOs. If they answered no, they can enter comments in the provided section. The second question utilized a Likert scale from 1-5 (1 strongly agreeing and 5 strongly disagreeing) to assess the primary and secondary objectives of the program. Section 3 allowed the participants to add any comments that might enhance or change the educational program and the final question was a yes and no one asking the participants if they understood the educational program completely and to provide comments.

PHASE 1 – FORMATIVE EVALUATION RESULTS

In answering the first question on the evaluation form in regards to its content, “Does the educational program address all the topics to be covered in preventing the unintentional retention of foreign objects?” Eighty percent of the respondents (*n* = 8; 2 leaders, 1 educator, 3 OR nurses and 2 ORTs) answered yes. Twenty percent (*n* = 2; 1 educator and 1 ORT) answered no and commented that the Sponge Accounting System by Dr. Verna C. Gibbs did not address the counting of other supplies other than sponges. There were no recommendations in regards to adding anything to the content of the educational program. Comments such as “it covered every topic”, “comprehensive,” “excellent content” and “excellent program” were noted in the comments/recommendation section.

The objectives of the educational program were evaluated in question 2. In response to the primary objectives of the use of a standardized counting process, effective communication, documentation and assistive technologies, 100% of the respondents rated them as 1 on the Likert scale indicating that they strongly agree that the educational program covered those topics and that they were important concepts. In evaluating the content of the pretest and posttest questions 100% of the respondents rated 1 on the Likert scale that they strongly agree that the questions were appropriate. Thirty percent (*n* = 3; 1 leader, 1 educator and 1 nurse) of the respondents

requested that a slight change be made to question number 9. The original question read as such, “Soft goods such as sponges, neurological patties and towels used in the surgical wound should be?” They requested that the words “and towels” be removed. In addressing the secondary objectives of the program: addressing the difference between sentinel and never events and the teaching agenda and educational objectives being appropriate, 80% of the respondents (n = 8; 2 leaders, 1 educator, 2 registered nurses and 3 ORTs) scored 1 on the Likert scale indicating that they strongly agree and 20% (n = 2; 1 educator and 1 registered nurse) scored 2 indicating that they are close to strongly agreeing.

In regards to item number 3 on the evaluation, “Please note below any topics or comments you think of that can enhance or change this educational program,” 20% of the respondents (n = 2; 1 leader and 1 educator) noted that the 60 minute educational session may be too short since a 30 minute video will be utilized in the educational program. At this point I am reluctant to extend the educational time beyond 60 minutes until a pilot project is conducted and feedback is obtained. A second comment noted by 40% of the respondents (n = 4, 1 leader, 1 educator, 2 ORTs) is that a live demonstration of how a safe counting process should be conducted will be helpful if included in the educational program. This recommendation will be implemented. A third comment noted by 30% of the respondents (n = 3; 1, nurse and 2 ORTs) was that crew resource management (CRM) and TeamSTEPPS education be emphasized during the program. This is an excellent comment that will be implemented and emphasized.

Finally, in regards to item number 4, overall evaluation and the question of, Were you able to understand the educational program? All 100% of the respondents noted yes. Comments noted were that the educational program was clear, logical, succinct, comprehensive and very good.

The findings of the formative evaluation were that the best practices-based educational program was clear, concise, logical and comprehensive in addressing safe counting practices. In addition to minor grammatical and flow of the contents, the recommended changes noted by the formative evaluation group were taken into account and made to the program prior to sending to the summative evaluation group.

Table 1

Phase 1 - Formative Group Data/Results

Item	Answers and Explanations
1. Does the educational program address all the topics to be covered in preventing the unintentional retention of foreign objects	**80% (*n* = 8) - YES; 20% (*n* = 2) - NO** The Sponge Accounting System by Dr. Verna C. Gibbs did not address the counting of other supplies other than sponges. (Counting of other supplies will be addressed during the didactic presentation). Other comments for the educational program were "it covered every topic", "comprehensive," "excellent content" and "excellent program."
2. Primary objectives: Educational program included a standardized counting process, effective communication, documentation and assistive technologies.	**100% (n = 10) – Strongly Agree.**
Content of the pretest and posttest questions.	**100% (n = 10) – Strongly Agree. 30% (n = 3; 1 leader, 1 educator and 1 nurse)** of the respondents requested that a slight change be made to question number 9 – Remove the word "towel."
Secondary objectives: Educational program covered the difference between sentinel and never events, the teaching agenda and educational objectives being appropriate.	**80% (n = 8; 2 leaders, 1 educator, 2 registered nurses and 3 ORTs) – Strongly Agree. 20% (n = 2; 1 educator and 1 registered nurse)** scored 2 indicating that they were close to strongly agreeing.
3. Topics or comments that can enhance or change this educational program.	**20% (n = 2; 1 leader and 1 educator)** noted that the 60-minute educational session may be too short since a 30-minute video will be utilized in the educational program. (At this point the project coordinator is reluctant to extend the educational time beyond 60 minutes until a pilot project is implemented and feedback is obtained). A second comment noted by **40% of the respondents (n=4, 1 leader, 1 educator, 2 ORTs)** was that a live demonstration of how a safe counting process should be conducted will be helpful if included in the educational program. This recommendation will be

	implemented. A third comment noted by 30% of the respondents (n = 3; 1, nurse and 2 ORTs) was that crew resource management (CRM) and TeamSTEPPS education be emphasized during the program. This is an excellent comment that will be implemented and emphasized.
4. Overall Evaluation - Were you able to understand the educational program?	**100% (n = 10) – YES** Comments noted were: that the educational program was clear, logical, succinct, comprehensive and very good.

PHASE 2 – SUMMATIVE GROUP EVALUATION AND VALIDATION

Participants:

Six practicing operating room registered nurse professionals (n = 6; three leaders and three educators) were provided with the project outline, the educational program and the AGREE II Instrument to provide a summative evaluation. The participants were requested to complete the survey at their earliest convenience and return them to the project coordinator. All 6 responses were returned within the two week deadline.

Summative Evaluation Instrument:

The participants were asked to read the project outline and the educational program and evaluate them on the AGREE II Instrument utilizing a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) on (1) the six domains of the instrument: scope and purpose, stakeholder involvement, rigor of development, clarity and presentation, applicability, editorial independence and (2) to provide an overall assessment of the educational program via two global rating items – rate the quality of the educational program and would they recommend the program. Twenty- three items were addressed within the six domains (Brouwers, 2009). This instrument was developed to reduce the variability in guidelines quality by assessing its developmental rigor and transparency (Brouwers et al., 2010). Presently, the instrument does not provide a minimum domain score to assess the differentiation between a poor quality and high quality domain of the guideline (educational program) (Brouwers et al., 2010).

PHASE 2 – SUMMATIVE EVALUATION RESULTS

Domain 1- scope and purpose addressed three items: the overall objective of the educational program, the health question by the educational program described and the population to whom the educational program pertained to is described. The scaled domain score was 97.2% indicating a high level of agreement.

Domain 2, the stakeholders' involvement addressed three items: in regards to the group that developed the educational program, the views of the target population were taken into account and the target users of the educational program were clearly stated. The scaled domain score was 76.8% indicating a moderate level of agreement. Some of the comments noted by the respondents were that the stakeholders' group could have been expanded to include surgeons,

anesthesiologists, certified registered anesthetists and house physicians. Also, they noted that views of the target population (patients) should have been taken into account.

Domain 3, the rigor of development addressed eight items: whether systematic methods were used to search for evidence, the criteria for selecting the evidence were clearly described, the strengths and limitations of the body of evidence described, methods for formulating the recommendations were described, health benefits have been considered in formulation of the recommendations, there were explicit links between recommendations and the supporting evidence, the program has been reviewed by experts and a procedure for updating the educational program. The scaled domain score was 87% indicating a high level of concurrence in that the program was assembled systematically with supporting evidence and rigor.

Domain 4 addressed clarity and presentation and included three items: the educational program recommendations were evaluated for specificity, unambiguity, different options for managing URFOs and key recommendations were easily identifiable. The scaled domain score was 97.2% indicating that there was a very high level of agreement by the respondents that all the criteria were met.

Domain 5 addressed applicability addressed four items: the facilitators and barriers to the educational program implementation, advice and/or tools on how the recommendations can be implemented, resources for implementation and monitoring activities were assessed. A scaled domain score of 78.5% was achieved. This score could have been higher if the program had been implemented before and refined. Since it is a new project, potential organization barriers, costs and monitoring tools would have to be assessed and developed.

Domain 6 addressed editorial independence and included two items: the educational program was evaluated for funding bodies' views not having an influence on its content and conflicts of interest by the educational program coordinator having been recorded and addressed. The scaled domain score was 55.5%. This scored was low because the program coordinator failed to indicate any funding bodies (there were none) and any conflicts of interest (there were none).

All six respondents noted a comment in the general comment section of the AGREE II Instrument. They were: nice project, this is very important; this kind of program is long overdue; we need a standardized counting program; I work in a few hospitals and have seen different counting practices that led to mistakes; the AGREE Instrument was thorough; you should include surgeons, anesthesiologists, house physicians and certified registered nurses in the project; well put together program… Dr. Gibbs video was very informative and educational; this educational program is assembled nicely; the views of the patients should be included; I will definitely use this program in my classes.

The overall quality evaluation of the educational program was 85% indicating that it was of high quality. Sixty-seven percent of the respondents (n = 4) would recommend the educational program for implementation and 33% (n = 2) would recommend it for implementation with some minor modifications related to rewording of one question (# 9) in the pre and posttest. There were no recommended modifications in regards to the content of the educational program.

Table 2

Phase 2 – Summative Group - Agree II Data/Results

AGREE II Domains	Score
Domain 1: Scope and Purpose	97.2%
Domain 2: Stakeholder Involvement	76.8%
Domain 3: Rigor of Development	87%
Domain 4: Clarity and Presentation	97.2%
Domain 5: Application	78.5%
Domain 6: Editorial Independence	55.5%
Overall Guideline Assessment (Quality)	85%
Recommendation of the educational program for implementation	Yes - Without modifications 67% Yes – With minor modifications to one question (#9) in the pre/post test – 33%

DISCUSSION

The phase one formative evaluation group produced a refined educational program for evaluation and validation by the phase two summative group. In the phase two, summative evaluation, a low score of 55.5 % was obtained for *Domain 6 – Editorial Independence* because the program coordinator did not indicate any funding bodies (there were none) and any conflicts of interest (there were none). This did not have an impact on the quality of the program. In the future projects this will be included. However, the overall recommendations by both groups and validation by the phase two group produced a comprehensive, best practices-based educational program for implementation. Below is the recommended educational program for implementation.

Educational Program/Teaching Curriculum

1. Introduction:
    a. Definition of unintentional retention of foreign objects (URFOs).
    b. Regulatory bodies involved – CMS, TJC.
    c. Difference between sentinel events and never events.

i. Sentinel events – Patient safety events that affects a patient negatively and results in death, permanent harm, temporary harm and medical intervention is required to sustain life (The Joint Commission, 2014).

ii. Never events – Avoidable medical errors that occur in health care institutions that are not reimbursed for by CMS.

2. Current counting practices.
3. Problems with current practices – varying counting procedures used by different staff and institutions.
4. Discussion of safe counting practices and strategies and interventions to prevent counting errors.

a. Explanation of the SPONGE ACCOUNTING SYSTEM – 30 minute video by Dr. Verna C. Gibbs. Retrieved from http://www. hospitalcouncil.net/post/surgical-safety-preventing-retained-surgical-items

b. When counting should be done - initial counting, before closing a cavity within a cavity, before wound closure begins, at skin closure or end of procedure and at the time a scrub or circulating nurse relief.

c. After the procedure begins, counting should start on the sterile field, proceed to the back table and then to the kick bucket.

d. Counting of other supplies-needles, blades, bovie tips, neurological patties, instruments.

e. Effective communication skills - crew resource management (CRM) training and TeamSTEPPS.

f. Documenting appropriately on the white board in the operating rooms and in the patients' medical record.

g. Use of assistive technological advances to assist in the counting process - bar coding, radiopaque sponges, radio-frequency tags in sponges and the use of radio frequency identification detection systems.

h. Live demonstration of a safe counting practice.

Teaching Agenda

1. Introduction (10 minutes).
2. Administration of Pretest (20 minutes).
3. Educational session (60 minutes).
4. Administration of posttest.(20 minutes)
5. Evaluation of Education Program. (10 minutes)

Total time = 120 minutes (2 hours).

Educational Objectives

At the conclusion of the educational program operating room nurses and technicians will be able to:

1. Verbalize the difference between a sentinel and never event.
2. Verbalize a standardized counting process.
3. Verbalize effective communication skills utilizing crew resource management (CRM) and TeamSTEPPS.
4. Verbalize appropriate documentation.
5. Verbalize appropriate use of assistive technologies.

Pretest and Posttest

Number: _____ Date: _____

Please answer the following questions by circling the answer that you think is correct for each question. There is only one correct answer to each question.

1. According to the Joint Commission, a sentinel event is defined as an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof.

a. true.
b. false.

(Answer – a)

2. The unintentional retention of foreign objects in surgical patients can be classified as being:
a. preventable occurrences.
b. never events.
c. sentinel events.
d. a and c only.
e. all of the above.

(Answer - e)

3. Risk factors for the unintentional retention of foreign objects in surgical patients include:
a. emergency procedures.
b. unplanned change in operation.
c. decreased body mass index.
d. a and b only.
e. all of the above.

(Answer – e)

4. Most common items left in patients after surgical procedures are:
a. instruments.
b. sharps.
c. sponges.
d. needles.
e. towels.

(Answer – c)

5. First or initial counts by the circulator and scrub person are:
a. performed because the Centers for Medicare and Medicaid mandates them.
b. performed because they establish a baseline for subsequent counts on all procedures.

c. performed because The Joint Commission mandates it.
d. performed to identify manufacturer's packaging errors.
e. b and d only

(Answer – e)

6. When the circulator and scrub person are performing counts:
   a. conversations not related to patient care should be continued.
   b. unnecessary activity and distractions should be curtailed.
   c. loud music should be playing.
   d. timeout should be done.
   e. all of the above.

(Answer – b)

7. Performing counts after the procedure begins should start with:
   a. the sterile field, progress to the mayo stand, back table and then kick bucket.
   b. the kick bucket, back table, mayo stand and then sterile field.
   c. the back table, sterile field, kick bucket, and then mayo stand.
   d. none of the above.
   e. all of the above.

(Answer – a)

8. The RN circulator facilitates the counting process by:
   a. initiating the count.
   b. performing the count procedure in concert with the perioperative team.
   c. document count reconciliation activities.
   d. report count discrepancies.
   e. all of the above.

(Answer – e)

9. Soft goods such as sponges and neurological patties used in the surgical wound should be:
   a. radioactive.
   b. radiopaque.
   c. white background and with a blue or green radiopaque line.
   d. b and c only.
   e. all of the above

(Answer – b)

10. Counting of instruments should be done on procedures in which:
   a. there is a likelihood that instruments can be retained in the wound.
   b. two fingers can fit in the wound.
   c. a medium size fist can fit in the wound.

d. on all procedures.
e. all of the above.

(Answer – a)

11. Reasons for using a pocketed bag system as advocated for in the SPONGE ACCOUNTING SYSTEM are:
    a. reduce errors caused by sponges sticking together.
    b. assist in visualizing sponges by all surgical team members when counting.
    c. easily aid in the disposal of the radiopaque sponges and prevent carryover to the next procedure.
    d. a and c only
    e. all of the above.

(Answer – e)

12. The pocketed bag system as advocated for in the SPONGE ACCOUNTING SYSTEM should be loaded from the top and horizontally.
    a. true.
    b. false.

(Answer – b)

13. Accounting for all soft goods, needles, sharps and instruments during a surgical procedure is the responsibility of:
    a. the circulating nurse.
    b. the anesthesia provider.
    c. the surgeon.
    d. the scrub person.
    e. all of the above

(Answer – e)

14. Surgical counts should be performed:
    a. at the start of a procedure.
    b. at the closing of an organ within an organ.
    c. before closure of the skin.
    d. at the closure of the skin.
    e. all of the above.

(Answer – e)

15. When counting sponges the SPONGE ACCOUNTING SYSTEM emphasizes the “see, separate, and say” methodology.
    a. true.
    b. false.

(Answer – a)

16. Which of the following can assist in the correct sponge and instrument count.
    a. radiopaque sponges.
    b. radio-frequency tags and identification systems.
    c. barcoding.
    d. using a white board.
    e. all of the above.

    (Answer – e)

17. The use of a white board can aid the counting process to display the count and enhance team awareness.
    a. true.
    b. false.

    (Answer – a)

18. Team training based upon crew resource management and TeamSTEPPS principles are effective in promoting assertiveness and overcoming hierarchical barriers to communication in the operating room.
    a. true.
    b. false.

    (Answer – a)

19. Documenting, tracking and investigating incorrect counts are ways to improve counting practices.
    a. true.
    b. false.

    (Answer – a)

20. Intra-operative radiographs should:
    a. be performed when the surgical count is incorrect.
    b. should be interpreted by a radiologist prior to patient transfer from the operating room.
    c. should be done on all cases.
    d. a and b only .
    e. all of the above.

    (Answer – d)

CONCLUSION

Preventing morbidity, mortality and decreasing health care costs are the primary goals of health care. The developed evidence - based educational program for the education of operating room nurses and ORTs to prevent URFOs in operating rooms can assist in this endeavor. The

educational program developed was comprehensive in addressing current practice trends. Utilizing this educational program, operating room leaders and educators can educate their staff in a standardized and consistent manner. Piloting of this program is the next step in the process. Positive results from the pilot implementation will hopefully demonstrate an enhancement of knowledge by operating room nurses and ORTs and ultimately lead to improved, safe patient care for surgical patients. Widespread dissemination of the program will follow.

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Appendix A: Educational Program/Teaching Curriculum

1. Introduction:
    a. Definition of unintentional retention of foreign objects (URFOs).
    b. Regulatory bodies involved – CMS, TJC.
    c. Difference between sentinel events and never events.
        i. Sentinel events – Patient safety events that affects a patient negatively and results in death, permanent harm, temporary harm and medical intervention is required to sustain life (The Joint Commission, 2014).
        ii. Never events – Avoidable medical errors that occur in health care institutions that are not reimbursed for by CMS
2. Current counting practices.
3. Problems with current practices – varying counting procedures used by different staff and institutions.
4. Discussion of safe counting practices and strategies and interventions to prevent counting errors.
    a. Explanation of the SPONGE ACCOUNTING SYSTEM – 30 minute video by Dr. Verna C. Gibbs. Retrieved from: http://www.hospitalcouncil.net/post/surgical-safety-preventing-retained-surgical-items
    b. When counting should be done - initial counting, before closing a cavity within a cavity, before wound closure begins, at skin closure or end of procedure and at the time a scrub or circulating nurse relief.

c. After the procedure begins, counting should start on the sterile field, proceed to the back table and then to the kick bucket.

d. Counting of other supplies-needles, blades, bovie tips, neurological patties, instruments.

e. Effective communication skills - crew resource management (CRM) training and TeamSTEPPS

f. Documenting appropriately on the white board in the operating rooms and in the patients' medical record.

g. Use of assistive technological advances to assist in the counting process - barcoding, radiopaque sponges, radio-frequency tags in sponges and the use of radio frequency identification detection systems.

h. Live demonstration of a safe counting practice.

Appendix B:

Teaching Agenda

1. Introduction (10 minutes).
2. Administration of Pre-test (20 minutes).
3. Educational session (60 minutes).
4. Administration of Post-test.(20 minutes)
5. Evaluation of Education Program. (10 minutes)

Total time = 120 minutes (2 hours).

Appendix C: Educational Objectives

At the conclusion of the educational program operating room nurses and technicians will be able to:

1. Verbalize the difference between a sentinel and never event.
2. Verbalize a standardized counting process.
3. Verbalize effective communication skills utilizing crew resource management (CRM) and TeamSTEPPS.
4. Verbalize appropriate documentation
5. Verbalize appropriate use of assistive technologies.

Appendix D: Pretest and Posttest

Number: _____ Date: _____

Please answer the following questions by circling the answer that you think is correct for each question. There is only one correct answer to each question.

1. According to the Joint Commission, a sentinel event is defined as an unexpected occurrence involving death or serious physical or psychological injury, or the risk thereof.

a. true.
b. false.

(Answer – a)

2. The unintentional retention of foreign objects in surgical patients can be classified as being:

a. preventable occurrences.
b. never events.
c. sentinel events.
d. a and c only.
e. all of the above.

(Answer - e)

3. Risk factors for the unintentional retention of foreign objects in surgical patients include:

a. emergency procedures.
b. unplanned change in operation.
c. decreased body mass index.
d. a and b only.
e. all of the above.

(Answer – e)

4. Most common items left in patients after surgical procedures are:

a. instruments.
b. sharps.
c. sponges.
d. needles.
e. towels.

(Answer – c)

5. First or initial counts by the circulator and scrub person are:

a. performed because the Centers for Medicare and Medicaid mandates them.
b. performed because they establish a baseline for subsequent counts on all procedures.
c. performed because The Joint Commission mandates it.
d. performed to identify manufacturer's packaging errors.
e. b and d only

(Answer – e)

6. When the circulator and scrub person are performing counts:

a. conversations not related to patient care should be continued.
b. unnecessary activity and distractions should be curtailed.
c. loud music should be playing.
d. timeout should be done.
e. all of the above.

(Answer – b)

7. Performing counts after the procedure begins should start with:

a. the sterile field, progress to the mayo stand, back table and then kick bucket.
b. the kick bucket, back table, mayo stand and then sterile field.
c. the back table, sterile field, kick bucket, and then mayo stand.
d. none of the above.
e. all of the above.

(Answer – a)

8. The RN circulator facilitates the counting process by:

a. initiating the count.
b. performing the count procedure in concert with the perioperative team.

c. document count reconciliation activities.
d. report count discrepancies.
e. all of the above.

(Answer – e)

9. Soft goods such as sponges, neurological patties and towels used in the surgical wound should
be:

a. radioactive.
b. radiopaque.
c. white background and with a blue or green radiopaque line.
d. b and c only.
e. all of the above

(Answer – b)

10. Counting of instruments should be done on procedures in which:

a. there is a likelihood that instruments can be retained in the wound.
b. two fingers can fit in the wound.
c. a medium size fist can fit in the wound.
d. on all procedures.
e. all of the above.

(Answer – a)

11. Reasons for using a pocketed bag system as advocated for in the SPONGE ACCOUNTING SYSTEM are:

a. reduce errors caused by sponges sticking together.
b. assist in visualizing sponges by all surgical team members when counting.
c. easily aid in the disposal of the radiopaque sponges and prevent carryover to the next procedure.
d. a and c only
e. all of the above.

(Answer – e)

12. The pocketed bag system as advocated for in the SPONGE ACCOUNTING SYSTEM should be loaded from the top and horizontally.

a. true
b. false

(Answer – b)

13. Accounting for all soft goods, needles, sharps and instruments during a surgical procedure is the responsibility of:

a. the circulating nurse.
b. the anesthesia provider.
c. the surgeon.
d. the scrub person.
e. all of the above

(Answer – e)

14. Surgical counts should be performed:

a. at the start of a procedure.
b. at the closing of an organ within an organ.
c. before closure of the skin.
d. at the closure of the skin.
e. all of the above.

(Answer – e)

15. When counting sponges the SPONGE ACCOUNTING SYSTEM emphasizes the "see, separate, and say" methodology.

a. true.
b. false.

(Answer – a)

16. Which of the following can assist in the correct sponge and instrument count.

a. radio-opaque sponges.
b. radio-frequency tags and identification systems.
c. barcoding.
d. using a white board.
e. all of the above.

(Answer – e)

17. The use of a white board can aid the counting process to display the count and enhance team awareness.

a. true.
b. false.

(Answer – a)

18. Team training based upon crew resource management and TeamSTEPPS principles are effective in promoting assertiveness and overcoming hierarchical barriers to communication in the operating room.

a. true.
b. false.

(Answer – a)

19. Documenting, tracking and investigating incorrect counts are ways to improve counting practices.

a. true.
b. false.

(Answer – a)

20. Intra-operative radiographs should:

a. be performed when the surgical count is incorrect.
b. should be interpreted by a radiologist prior to patient transfer from the operating room .
c. should be done on all cases.
d. a and b only .
e. all of the above.

(Answer – d)

Appendix E: Formative Evaluation Form

1. Content of Educational Program.

A. Does the educational program address all the topics to be covered in preventing the unintentional retention of foreign objects? Yes □ No □

If No, please add your comments/recommendations.

_____

_____

_____

_____

_____

2. Objectives of the Educational Program.

	Strongly Agree				**Strongly Disagree**
	1	**2**	**3**	**4**	**5**
Primary objectives:					
A. Address a standardized counting process.	□	□	□	□	□
B. Address effective communication – CRM and TeamSTEPPS	□	□	□	□	□
C. Address appropriate documentation.	□	□	□	□	□
D. Address the use of assistive technologies.	□	□	□	□	□
E. Pretest and Posttest questions appropriate?	□	□	□	□	□
Secondary objectives:					
A. Address the difference between sentinel and never events.	□	□	□	□	□
B. Agenda appropriate?	□	□	□	□	□
C. Educational objectives appropriate?	□	□	□	□	□

3. Please note below any topics or comments you think of that can enhance or change this educational program.

_____

_____

_____

4. Overall Evaluation.
A. Were you able to understand the educational program? Yes □ No □ If No, then what areas were difficult to understand? How would you change them to make them more understandable?

Thank you for your assistance in the completion of this evaluation.

Appendix F: Summative Evaluation Form

AGREE II Instrument

DOMAIN 1: SCOPE AND PURPOSE

Item 1

The overall objective (s) of the educational program is (are) specifically described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 2

The health question (s) covered by the educational program is (are) specifically described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 3

The population (OR Nursing Staff) to whom the educational program is meant to apply is specifically described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

DOMAIN 2: STAKEHOLDER INVOLVEMENT

Item 4

The educational program development group includes individuals from all relevant professional groups.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 5

The views and preferences of the target population (patients, public, etc.) have been sought.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 6

The target users of the guideline are clearly defined.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

DOMAIN 3: RIGOR OF DEVELOPMENT

Item 7

Systematic methods were used to search for evidence.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 8

The criteria for selecting the evidence are clearly described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 9

The strengths and limitations of the body of evidence are clearly described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 10

The methods for formulating the recommendations are clearly described.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 11

The health benefits, side effects, and risks have been considered in formulating the recommendations.

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

Item 12

There is an explicit link between the recommendations and the supporting evidence.

1	2	3	4	5	6	7

Strongly Disagree						Strongly Agree

Item 13

The educational program has been externally reviewed by experts prior to its publication.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Item 14

A procedure for updating the guideline is provided.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

DOMAIN 4: CLARITY OF PRESENTATION

Item 15

The recommendations are specific and unambiguous.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Item 16

The different options for management of the condition or health issue are clearly presented.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Item 17

Key recommendations are easily identifiable.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

DOMAIN 5: APPLICABILITY

Item 18

The guideline describes facilitators and barriers to its application.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Item 19

The guideline provides advice and/or tools on how the recommendations can be put into practice.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Item 20

The potential resource implications of applying the recommendations have been considered.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Item 21

The guideline presents monitoring and/or auditing criteria.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

DOMAIN 6: EDITORIAL INDEPENDENCE

Item 22

The views of the funding body have not influenced the content of the guideline.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

Item 23

Competing interests of guideline development group members have been recorded and addressed.

1 Strongly Disagree	2	3	4	5	6	7 Strongly Agree

GENERAL COMMENTS

OVERALL GUIDELINE ASSESSMENT

1. Rate the overall quality of the educational program.

1	2	3	4	5	6	7
Lowest possible quality						Highest possible quality

2. I would recommend this educational program for use.

Yes	
Yes, modifications	
No	

Comments/Notes:

Appendix G: Formative Evaluation Data

Operating Room Leaders' Responses

Statistics.

Number of evaluations distributed: 2
Number of evaluations returned: 2

1. Content of educational program.

Does the educational program address all the topics to be covered in preventing the unintentional retention of foreign objects?

Yes: 2 (100%)

No: 0 (0%)

If No, please add your comments/recommendations.

Comment by Leader 1: "It covered every topic."

Comment by Leader 2: "Comprehensive program."

2. Objectives of educational program.

1 Strongly Agree	2	3	4	5 Strongly Disagree

Primary Objectives	#	%	#	%	#	%	#	%	#	%
A. Address a standardized counting process.	2	100	0	0	0	0	0	0	0	0
B. Address effective communication – CRM and TeamSTEPPS	2	100	0	0	0	0	0	0	0	0
C. Address appropriate documentation.	2	100	0	0	0	0	0	0	0	0
D. Address the use of assistive technologies.	2	100	0	0	0	0	0	0	0	0
E. Pretest and Posttest questions appropriate?	2	100	0	0	0	0	0	0	0	0
Secondary Objectives										
A. Address the difference between sentinel and never events.	2	100	0	0	0	0	0	0	0	0

B. Agenda appropriate?	2	100	0	0	0	0	0	0	0	0
C. Educational objectives appropriate?	2	100	0	0	0	0	0	0	0	0

3. Comments to enhance or change educational program.

Please note below any topics or comments you think of that can enhance or change this educational program.

Leader 1: “Real counting demonstration will be helpful.”

Leader 2: “Education session may be too short due to showing of the 30 minute video.”

4. Overall evaluation.

Were you able to understand the educational program?

Yes: 2 (100%)

No: 0 (0%)

If No, then what areas were difficult to understand?
None

How would you change them to make them more understandable?

None.

Comments.

Leader 1: “Program is clear.”

Leader 2: “Well put together.”

Appendix H: Summative Evaluation Data

AGREE II Instrument Data

DOMAIN 1: SCOPE AND PURPOSE				
Appraisers	Item 1	Item 2	Item 3	Total
OR RN Leader 1	7	7	7	21
OR RN Leader 2	7	7	7	21
OR RN Leader 3	7	7	7	21
OR RN Educator 1	6	6	6	18
OR RN Educator 2	7	7	7	21
OR RN Educator 3	7	7	7	21
Total	41	41	41	123

Maximum possible score = 7 (strongly agree) x 3 (items) x 6 (appraisers) = 126
Minimum possible score = 1 (strongly disagree) x 3 (items) x 6 (appraisers) 18

Scaled Domain Score: $\frac{\text{obtained score – minimum possible score}}{\text{maximum possible score – minimum possible score}}$

$$\frac{123 - 18}{126 - 18} \times 100 = \frac{105}{108} \times 100 = 97.2\%$$

Scaled Domain Score: 97%

DOMAIN 2: STAKEHOLDER INVOLVEMENT				
Appraisers	Item 4	Item 5	Item 6	Total
OR RN Leader 1	5	5	7	17
OR RN Leader 2	5	4	7	16
OR RN Leader 3	4	4	7	15
OR RN Educator 1	6	5	7	18
OR RN Educator 2	6	4	7	17
OR RN Educator 3	6	5	7	18
Total	32	27	42	101

Maximum possible score = 7 (strongly agree) x 3 (items) x 6 (appraisers) = 126
Minimum possible score = 1 (strongly disagree) x 3 (items) x 6 (appraisers) 18

Scaled Domain Score: $\frac{\text{obtained score – minimum possible score}}{\text{maximum possible score – minimum possible score}}$

$$\frac{101 - 18}{126 - 18} \times 100 = \frac{83}{108} \times 100 = 77\%$$

Scaled Domain Score: 77%

DOMAIN 3: RIGOR OF DEVELOPMENT

Appraisers	Item 7	Item 8	Item 9	Item 10	Item 11	Item 12	Item 13	Item 14	Total
OR RN Leader 1	7	5	4	7	7	6	7	6	49
OR RN Leader 2	6	6	6	7	7	7	7	5	51
OR RN Leader 3	7	6	6	6	6	7	7	6	51
OR RN Educator 1	5	6	6	7	7	7	6	5	49
OR RN Educator 2	6	5	6	6	7	7	7	5	49
OR RN Educator 3	7	7	5	6	7	6	6	6	50
Total	38	35	33	39	41	40	40	33	299

Maximum possible score = 7 (strongly agree) x 8 (items) x 6 (appraisers) = 336
Minimum possible score = 1 (strongly disagree) x 8 (items) x 6 (appraisers) = 48

Scaled Domain Score: $\frac{\text{obtained score} - \text{minimum possible score}}{\text{maximum possible score} - \text{minimum possible score}}$

$$\frac{299 - 48}{336 - 48} \times 100 = \frac{251}{288} \times 100 = 87\%$$

Scaled Domain Score: 87 %

DOMAIN 4: CLARITY OF PRESENTATION

Appraisers	Item 15	Item 16	Item 17	Total
OR RN Leader 1	7	6	7	20
OR RN Leader 2	7	7	7	21
OR RN Leader 3	7	7	7	21
OR RN Educator 1	7	6	7	20
OR RN Educator 2	7	7	7	21
OR RN Educator 3	7	6	7	20
Total	42	39	42	123

Maximum possible score = 7 (strongly agree) x 3 (items) x 6 (appraisers) = 126
Minimum possible score = 1 (strongly disagree) x 3 (items) x 6 (appraisers) = 18

Scaled Domain Score: obtained score – minimum possible score
_____
maximum possible score – minimum possible score

$$\frac{123 - 18}{126 - 18} \times 100 = \frac{105}{108} \times 100 = 97\%$$

Scaled Domain Score: 97%

DOMAIN 5: APPLICABILITY					
Appraisers	Item 18	Item 19	Item 20	Item 21	Total
OR RN Leader 1	5	6	6	4	21
OR RN Leader 2	5	7	7	5	24
OR RN Leader 3	6	7	6	5	24
OR RN Educator 1	6	7	6	5	24
OR RN Educator 2	4	6	6	4	20
OR RN Educator 3	5	7	7	5	24
Total	31	40	38	28	137

Maximum possible score = 7 (strongly agree) x 4 (items) x 6 (appraisers) = 168
Minimum possible score = 1 (strongly disagree) x 4 (items) x 6 (appraisers) 24

Scaled Domain Score: obtained score – minimum possible score
_____
maximum possible score – minimum possible score

$$\frac{137 - 24}{168 - 24} \times 100 = \frac{113}{144} \times 100 = 79\%$$

Scaled Domain Score: 79 %

DOMAIN 6: EDITORIAL INDEPENDENCE			
Appraisers	Item 22	Item 23	Total
OR RN Leader 1	4	4	8
OR RN Leader 2	4	5	9
OR RN Leader 3	4	4	8

OR RN Educator 1	5	4	9
OR RN Educator 2	5	5	10
OR RN Educator 3	4	4	8
Total	26	26	52

Maximum possible score = 7 (strongly agree) x 2 (items) x 6 (appraisers) = 84
Minimum possible score = 1 (strongly disagree) x 2 (items) x 6 (appraisers) = 12

Scaled Domain Score: obtained score – minimum possible score

_____

maximum possible score – minimum possible score

$$\frac{52 - 12}{84 - 12} \times 100 = \frac{40}{72} \times 100 = 55\%$$

Scaled Domain Score: 55 %

GENERAL COMMENTS	
OR RN Leader 1	Nice project.
OR RN Leader 2	This kind of program is long overdue. We need a standardized counting program. I work in a few hospitals and have seen different counting practices that led to mistakes.
OR RN Leader 3	The AGREE Instrument was thorough. You should include surgeons, anesthesiologists, house physicians and certified registered nurses in the project.
OR RN Educator 1	Well put together program. Dr. Gibbs video was very informative and educational.
OR RN Educator 2	This educational program is assembled nicely. The views of the patients should be included.
OR RN Educator 3	I will definitely use this program in my classes.

OVERALL GUIDELINE ASSESSMENT		
Appraisers	Overall Quality	Total
OR RN Leader 1	6	6
OR RN Leader 2	7	7
OR RN Leader 3	6	6
OR RN Educator 1	6	6
OR RN Educator 2	5	5
OR RN Educator 3	6	6
Total	36	36

Total percentage of overall quality: 85%.			
Recommendation of this educational program for use:			
Appraisers	Yes	Yes with modifications	No
OR RN Leader 1	1	0	0
OR RN Leader 2	1	0	0
OR RN Leader 3	0	1	0
OR RN Educator 1	1	0	0
OR RN Educator 2	0	1	0
OR RN Educator 3	1	0	0
Total	4	2	0

Appendix I: AORN Permission Letter

AORN
Association of periOperative Registered Nurses
2170 South Parker Road, Suite 300 Denver, CO 80231-5711 (303) 755-6300 or (303) 755-6304 http://www.aorn.org/

April 8, 2015

Leonard H. Ramdas, RN, doctoral candidate
Walden University
100 Washington Avenue South, Suite 900
Minneapolis, Minnesota 55401
lramdas@aol.com

Dear Mr Ramdas:

Thank you for requesting permission to use questions from the AORN *Independent Study Guide Based on Perioperative Standards and Recommended Practices,* 2013 edition, in a doctoral (DNP) project.
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Thank you again for your interest in AORN content.

Sincerely,
Zac Wiggy
Associate Editor, AORN

Appendix J: Permission Email - Dr. Verna C. Gibbs

Permission e-mail from Dr. Verna C. Gibbs to use her video, No Thing Left Behind. The material is on the website for educational purposes. You can show the video. Good luck in your efforts.

Verna C.
Gibbs M.D.
Director, NoThing Left
Behind®
415-260-4025
www.nothingleftbehind.org

Appendix K: Permission to Reprint AGREE II Instrument

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