

Doctor of Nursing Practice Final Scholarly Project

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In partial fulfillment of the requirements for the degree Doctor of Nursing Practice

IMPLEMENTATION OF AN EDUCATIONAL SESSION TO IMPROVE COMPLIANCE OF
REPORTING MEDICATION ERRORS AND NEAR MISSES AMONG ANESTHESIA
PROVIDERS

2016

Executive Summary

There is currently no emphasis being placed on the significance of reporting medication errors, including near misses, for the anesthesia department in a Midwestern hospital system. Efforts to ensure patient safety depend upon collecting data related to actual medication errors, including near misses, so that educational or process improvement opportunities can be identified and implemented. The focus of this quality improvement project was to educate anesthesia providers about the importance of properly reporting all medication errors and near misses. The pre and post survey helped to provide data to determine whether anesthesia providers believe they are more apt to report medication errors and near misses after attending an educational session.

An online or face-to-face educational session was conducted for all anesthesia providers in the anesthesia department in a specific Midwestern hospital system. Results from the pre and post test showed statistically significant data (P – value < 0.05) that anesthesia providers believe reporting medication errors and near misses improves patient safety ($P = 0.043$), education about the process of reporting medication errors will increase compliance in self-reporting ($P = 0.018$), and that fear of punishment (78%), lack of knowledge on how to use the current reporting system (75%), and fear of litigation (73%) were the top 3 barriers that kept the anesthesia providers from reporting medication errors and near misses.

Introduction

Over the years, the most common cause of injury to hospitalized patients has been medication errors, which are often preventable (Bobb, Gleason, Husch, Feinglass, Yarnold, & Noskin, 2004). Most recently, a 2015 prospective observational study found “1 in 20

perioperative medication administrations, and every second operation, resulted in a medication error and/or an adverse drug event” (Nanji, Patel, Shaikh, Seger, & Bates, 2015, p. 31).

Medication errors remain difficult to detect due to the lack of standardization of error reporting. Many healthcare providers lack the knowledge of how, when, and why to report medication errors and therefore, they may not routinely report the errors. The process of reporting an error (actual or potential) is not well understood by most anesthesia providers as most regard completing the report form as a disciplinary action that can have punitive outcomes. Near miss events must also be reported if practice changes that foster safer patient care are to be validated and justified.

In a moderately sized anesthesia department consisting of anesthesiologists, certified registered nurse anesthetists (CRNAs), and student registered nurse anesthetists (SRNAs) in a Midwestern hospital, self-reported medication errors and near misses were documented infrequently to the pharmacy department (50 per month at the Midwestern hospital versus 200 at the sister hospital). According to studies reviewed in the literature, medication errors and near misses occur fairly often and therefore, the anesthesia department would expect more frequent reporting of these errors. In an article published by The Joint Commission, medication errors are noted to be “the most common cause of harm during the delivery of health care” (Vaida, Lamis, Smetzer, Kenward, & Cohen, 2014, p. 51). In an effort to improve compliance of reporting medication errors and near misses, this quality improvement project was designed and implemented over a four-month timespan. The findings identified significant knowledge deficits on how to use the current reporting system and categorize barriers to reporting. While the majority (92% of responses) agreed that reporting medication errors and near misses would

improve patient safety, and (85% of responses) agreed educating the anesthesia department about the process of reporting medication errors would increase reporting compliance.

Problem Statement

Currently, there is no emphasis being placed on the significance of reporting all medication errors, including near misses for the anesthesia department in a Midwestern hospital system. Therefore, the anesthesia providers are not reporting medication errors or near misses. To improve patient safety and reduce adverse events, anesthesia providers need a structured educational session regarding reasons why, when, and how to report a medication error or near miss. A non-punitive medication error/near-miss reporting system needs to be established that is specific to the anesthesia department.

Background and Significance of the Problem

Literature Review

Background

Medication errors occur in every operating room around the world resulting in increased healthcare costs of billions of dollars each year (Webster & Anderson, 2002). According to Cooper & Nossaman (2013), the most common medication issues in all perioperative areas are related to prescribing, omission, wrong-dose, and wrong-drug errors. In fact, harm from medication errors was observed to be three times higher in perioperative patients when compared to non-perioperative patients (Cooper & Nossaman, 2013). The studies that follow draw attention to what specific errors have occurred (and continue to occur) and why they often go unreported.

Medication error reporting has a rich history. In 1978, Cooper, Newbower, Long, and McPeck published a study of human factors in preventable anesthesia medication errors noting that syringe swaps are the most common error reported. A few years later, Craig and Wilson

(1981) retrospectively reviewed more than 8000 anesthesia incidents reports and concluded that human error is the most prevalent cause of error. Publications on error rates during anesthesia were non-existent for nearly a decade. Then in 1990, Chopra, Bovill, & Spierdijk conducted a retrospective analysis over a ten-year period of 113,700 anesthesia incident reports. Chopra et al. (1990) note failure to check equipment and medications, lack of vigilance, and carelessness of the anesthesia provider as the most frequent causes of error. The authors also noted that minor medication errors are most likely not detected due to the lack of reporting errors that do not produce any harm to patients. In 1991, Leape et al. published the results of the Harvard Medical Practice Study II. In this study, 30,195 hospitalizations are reviewed. The study shows that 3.7% of hospitalized patients have serious adverse events with the most frequent adverse events (19%) reported as medication errors. Out of these adverse events, 58% are deemed preventable with 50% of that number found to be due to negligent care (Leape et al., 1991). Wilson et al., (1995) report their findings from a review of 14,000 hospital admissions and note a 16.6% incidence of adverse events; medication errors being the fourth most frequent cause of adverse events, resulting in permanent disability in 17% and death in 8%. Of those reported incidences, 51% are considered to be preventable (Wilson et al., 1995). Merry & Peck (1995) conducted a survey of 66 New Zealand anesthetists and report that 89% state they had at least one medication error; 12.5% report that they caused harm to at least one patient through a medication error, and 83% fear legal ramifications. In response to these studies, the Robert Wood Johnson Foundation (RWJF) convened a multidisciplinary committee tasked with the development of a prevention, education, and research agenda for decreasing medication errors in healthcare (Cooper & Nossaman, 2013). The committee states that a significant part of reducing patient risk is to shift

the focus from individual providers to systems, as systems can be developed to help prevent errors from occurring (Cooper & Nossaman, 2013).

One year after the RJWF multidisciplinary committee was established, the release of the Institute of Medicine's (IOM) report (1999), "To Err Is Human", proved to be a pivotal moment for patient safety in the United States. Due to this report, the Quality of Health Care Committee of the IOM developed a comprehensive strategy (adopting performance standards, implementing safety systems, and identifying and learning from errors by developing a mandatory reporting system) by which government, healthcare providers, industry, and consumers could reduce preventable errors (Institute of Medicine [IOM], 1999). In 2005, Congress overwhelmingly passed the Patient Safety and Quality Improvement Act (PSQIA), which established a national voluntary error reporting system in which healthcare providers are given federal protections (intended to encourage voluntary reporting of errors) in exchange for error admissions (Howard et al., 2010). To date, the Agency for Healthcare Research and Quality (AHRQ) offers several free patient safety tools and resources to help healthcare organizations, providers, policymakers, and patients improve patient safety using a standardized method (Agency for Healthcare Research and Quality [AHRQ], 2014).

Unfortunately, all of these measures do not lead to a reduction in medication errors. Thus, in 2010, due to the number of harmful or potentially harmful medication errors occurring in operating room across the United States, the Anesthesia Patient Safety Foundation (APSF) gathered 100 stakeholders from several different backgrounds to create new strategies for improvement of medication safety in the operating room (Eichhorn, 2010). This group of stakeholders looked at specific information related to medication errors that follow and establish a model to reduce medication errors.

Reasons Medication Errors Occur

Several factors contribute to medication errors in anesthesia, including experience of the anesthesia provider, severity of comorbidities, and type of procedure (Cooper et al., 2012). Human factors are noted to be major contributors to errors in healthcare that can affect patient safety (Sevdalis, Hull, & Birnbach, 2012). Many other reasons for medication errors have been reported in the literature such as: look-alike and sound-alike drugs; confusing, inaccurate or incomplete drug labels and packaging; swapping of syringe labels; swapping of syringes and ampules; unlabeled syringes; and failure of drug dose calculation (Kothari et al., 2010). For these reasons, efforts to ensure safe clinical care depend upon capturing all information about near miss or actual medication errors.

Reporting Medication Errors

Reporting medication errors can help increase patient safety by identifying patient outcomes such as evidence of harm attributable to drug errors (Agency for Healthcare Research and Quality [AHRQ], 2013a). Another reason reporting medication errors or near misses is important is because the data may provide system outcomes that identify a breakdown in processes related to workload assessment, legibility of anesthetic records, and compliance with procedural rules (Merry et al., 2011). Quality assurance officers within the hospital or healthcare facility can process the data from error reports to determine targets for quality improvement initiatives (Peterfreund et al., 2011).

Classification of Medication Errors

There is no single definition of medication error that is universally agreed upon. Some articles refer to errors as slips, lapses, and mistakes (Wheeler & Wheeler, 2005), while others use active failure and latent conditions as the definition of medication errors (Kothari et al., 2010).

Still others categorize medication errors into no error, error-no harm, error-harm, and error-death (National Coordinating Council for Medication Error Reporting and Prevention [NCC MERP], 2001). Another issue in classifying medication errors occurs when terms are used interchangeably such as: prescription error, drug error, near miss, adverse drug event (ADE), and preventable ADE (Wheeler & Wheeler, 2005). Further reasons medication errors occur are noted to be: noncompliant labeling practices; empty but prelabeled syringes; unlabeled syringes, medication syringes labeled with drug name only (no concentration), poor communication; not reading drug labels; carelessness; haste and fatigue; overtime; odd working hours (Stratman & Wall, 2013, Kothari et al., 2010). The lack of a standardized medication error classification system makes comparing the results of studies on medication errors very difficult.

Reporting Systems

Healthcare organizations can decrease patient injuries by implementing technical changes, such as using electronic medical record systems and educating staff regarding awareness of patient safety risks (AHRQ, 2006). Reducing medication error and near miss occurrences may be due to the design and implementation of a non-punitive error reporting system along with a structured education process for anesthesia providers. A culture of blame and punishment should be replaced with one of vigilance and cooperation and employs the use of a standardized anonymous reporting system (Cooper & Nossaman, 2013). Incident reporting systems are in place in several healthcare facilities, but are not normally anonymous and tend to focus on individual blame versus system-based error (Webster & Anderson, 2002). The Institute for Safe Medication Practices (ISMP) established an anonymous voluntary practitioner, or consumer, error-reporting program to identify medication errors across the United States (ISMP, 2015). Similarly, the Anesthesia Quality Institute has an online anonymous reporting system

specifically for anesthesia providers. The Anesthesia Incident Reporting System (AIRS) collects information about errors submitted by anesthesia providers. This data is analyzed for the purpose of improving the quality of anesthesia care in the United States (Anesthesia Quality Institute, 2015). AIRS asks the anesthesia provider to classify the error into a group such as: blood, cardiac, medication, etc., but then further classifies the error to “Level of Harm to Patient” per an AHRQ Scale that categorizes errors as unsafe condition, near miss, no harm, temporary harm, permanent harm, etc. (Anesthesia Quality Institute, 2015, p. 3). While ISMP and AIRS are excellent resources for reporting medication errors, they are not helpful to individual healthcare facilities. Commercial anesthesia reporting systems are available for purchase by healthcare facilities, but often have to be customized to the electronic medical record the facility uses (Peterfreund et al., 2011). This can be both costly and time-consuming to implement into everyday practice. For more economical and better data collection, healthcare facilities can implement an error reporting system that has been created for the facility.

Barriers to Reporting Medication Errors

Anesthesia providers are known as leaders in patient safety strategies, yet very little research on barriers they perceive to reporting medication errors has been completed (Heard et al, 2012). Higher reporting rates are related to standardized reporting systems, defined safety culture, and non-punitive treatment of staff who report errors or near misses (Heard, Sanderson, & Thomas, 2012). Barriers at the individual level include poor understanding about what constitutes an error, concern over legal or credentialing consequences, personal shame, and fear of implicating others (Anesthesia Quality Institute, 2015). System barriers that lead to a lack of reporting include: time consuming, difficult to access, lack of anonymity, poorly designed system, lack of feedback and follow-up leading the individual to feel there is no perceived value

in reporting errors (Anesthesia Quality Institute, 2015). In a study by Cooper et al. (2012), there is a two-fold increase in the reporting practices by providers-in-training compared to experienced providers. However, a study completed by Llewellyn et al. (2009) notes a higher incidence of reporting in experienced providers.

Literature Review Summary

Medication errors account for billions of dollars spent annually for increased lengths of stay, harm to patients, lives lost and careers ended (Webster & Anderson, 2002). There is an increasing need for greater safety initiatives that focus on improving reporting practices and less on blaming individuals. Use of a standardized, non-punitive, anonymous, error reporting system will allow healthcare facilities to improve patient safety by learning from medication errors and near misses. A 2010 study noted that providing feedback to the staff increases the rate of reporting while perceptions that leadership does not act on the submitted reports decreases error reporting (Mahajan, 2010). Improving the reporting practices of anesthesia providers will provide data that can be used to improve patient safety.

Significance of the Problem

Errors can be classified or categorized to identify provider mistakes or provide near miss data. Anesthesia providers must document medication errors categorically. This categorization of error type allows differentiation of process error versus human error; as most often medication errors are due to process issues (Uribe, Schweikhart, Pathak, Dow, & Marsh, 2002). Determining categories of cause can lead to process improvements that focus on why the error occurred or almost occurred which are not based solely on individual provider actions, but rather on how the overall process of drug administration may be flawed.

Medication errors are a common occurrence during the delivery of anesthesia (Cooper, DiGiovanni, Schultz, Taylor, & Nossaman, 2012) and are reported to be the seventh most common cause of death in hospitalized patients (Kothari, Gupta, Sharma, & Kothari, 2010). Unfortunately, fear of humiliation, blame, and litigation prompts most anesthesia providers to avoid acknowledging that a medication error or a near miss occurred, especially if the patient is not harmed (Heard et al, 2012). Anesthesia providers must do a better job of reporting and tracking medication errors and identifying them as systems issues or individual practice issues. The information discovered on medication error reports could be used to educate all anesthesia providers (not only nurse anesthesia providers) on how to avoid them. The delivery of safe anesthesia depends on reporting all medication errors and near misses so that procedure or process changes can be made.

Project Implementation and Measures

Theoretical Framework

The theoretical framework guiding this project is the Plan-Do-Study-Act (PDSA) cycle set forth by Deming (Value Based Management, 2014). The PDSA is the basis for determining whether a change leads to an improvement for this Quality Improvement (QI) project. An organization will not improve without clearly identifying the source of focus. Thus, the aimed improvement plan needs to be time specific and measurable and identify the targeted patient population (Institute for Healthcare Improvement, 2015a).

The next step involves construction of an improvement team made up of individuals committed to the aim who implement (do) planned change, study results of change and act to adapt, reject or alter the change, leading to the implementation of a new PDSA cycle (Taylor et al., 2014).

Project Purpose

The purpose of this project is to educate CRNAs, anesthesiologists, and SRNAs about the benefits of reporting medication errors and near misses to improve patient safety. This project attempts to determine if anesthesia providers will be more likely to report medication errors and near misses after attending an educational session about the reasons to report and how to use the reporting system. Specific objectives include:

1. Determine the attitudes of reporting practices of CRNAs, anesthesiologists, and SRNAs.
2. Identify knowledge deficits and barriers among the CRNAs, anesthesiologists and SRNAs regarding use of the current reporting system, and reasons to report medication errors and near misses.
3. Determine if CRNAs, anesthesiologists and SRNAs believe education about the process of reporting medication errors and near misses is important.
4. Educate CRNAs, anesthesiologists, and SRNAs on the use of the current reporting system and assess if they are likely to register for the online course within the hospital system.

Efforts to ensure safe clinical care depend upon capturing information about near misses and medication errors. Leaders within the healthcare facilities can process this information to determine targets for quality improvement initiatives (Peterfreund et al., 2011). Anesthesia providers who actively encourage and support reporting of medication errors and near misses are essential to creating a culture of safety.

Methodological Approach

This quality improvement project focused on the knowledge of anesthesia providers (Anesthesiologists, CRNAs, SRNAs) regarding reasons to report medication errors/near misses and use of the current reporting system utilizing the PDSA cycle. The first step was to set an aim,

by answering the question: What is trying to be accomplished (Institute for Healthcare Improvement, 2015a)? The aim for this project was: Over a one-month period, educate anesthesia providers to the reasons why reporting medication errors and near misses are important and how to use the current reporting system. An improvement team with members who support the aim was critical (Institute for Healthcare Improvement, 2015b). The team members included a medication safety pharmacist, clinical outcomes manager, and the author. The team then proceeded to the cyclic steps of the PDSA cycle using the Institute for Healthcare Improvement's Plan-Do-Study-Act Worksheet (Appendix A).

The project utilized a pretest/posttest format to gather qualitative and quantitative data specifically noting if anesthesia providers believed they are more likely to increase their reporting practices after the educational session. Demographic information provides qualitative data, while the pretest/posttest data provides the quantitative data. An educational session was conducted between the pretest and posttest. All anesthesia providers (experienced and in-training) were educated to the benefits of reporting medication errors and near misses; including definitions of different types of medication errors/near misses, in education sessions conducted during an anesthesia department meeting, during class time, and via an online format. A voice-over PowerPoint presentation was delivered via email to all anesthesia providers who were unable to participate in the formal educational sessions.

Sample

A convenience sample of experienced and inexperienced anesthesia providers (Anesthesiologists, CRNAs, SRNAs) in an urban Midwestern hospital anesthesia department was used. The anesthesia department currently has 23 CRNAs, 37 anesthesiologists and 35 SRNAs. Experienced anesthesia providers are defined as those who have passed boards and are

certified and licensed to provide anesthesia and inexperienced providers are defined as those in training, i.e., SRNAs (Cooper et al., 2012). Inclusion criteria include CRNAs or anesthesiologists employed at the urban Midwest hospital, student nurse anesthetists assigned to their clinical experience at the urban Midwest hospital. The anesthesia providers were recruited via email invitation, face-to-face, or personal invitation during a staff meeting.

Project Tool

One of the most frequently used tools for quality improvement projects is the Plan-Do-Study-Act (PDSA) cycle (U. S. Department of Health and Human Services, 2011). During the “plan” phase, an organization determines the current problem and how to alleviate that problem by working through a specific set of questions (Taylor et al., 2014). The “do” phase tests the change, while the “study” phase outlines the tasks for the “act” phase (U. S. Department of Health and Human Services, 2011). The PDSA is “the scientific method, used for action-oriented” learning (Institute for Healthcare Improvement, 2015c, para. 1) (Appendix A).

In 2014, Taylor et al. published an article entitled “Systematic review of the application of the plan-do-study-act method to improve quality in healthcare”. The authors determined that “no formal criteria for evaluating the application or reporting of PDSA cycles currently exist” (Taylor et al., 2014, p. 291). The authors also note that a more thorough understanding of the use of the PDSA cycle is essential to draw reliable conclusions about the effectiveness of the method (Taylor et al., 2014, p. 290).

Data Collection

Quantitative and qualitative data collection is helpful when conducting a quality improvement project. The quantitative data will be used to determine areas for improvement, while qualitative data will provide data about patterns, associations between systems, and

provide framework for needed improvements (U. S. Department of Health and Human Services, 2011). Data was collected using a voluntary, anonymous, self-report method via Survey Monkey that included a detailed informed consent. Informed consent was clearly defined on page one of the survey. By proceeding with the survey, participants acknowledged consent. A survey is a convenient data collection tool for the sample population (anesthesia providers in an urban Midwest hospital) because all providers have access to computers and are familiar with how to use a computer as noted by the daily use of electronic medical records. The survey began with demographic data: age, gender, type of anesthesia provider, and years of experience. The pretest immediately followed with questions adapted from a study by Cooper et al., (2012) (Appendix B). The pretest consisted of questions that elicited both qualitative and quantitative data from Likert scale responses and open-ended questions. Two experts in the field, the Medication Safety pharmacist, and the Patient Safety Outcomes manager established content validity for the pretest and posttest.

Data was entered into an Excel spreadsheet with Likert scale response categories assigned a numerical value (i.e., strongly agree is 5, agree is 4, neutral is 3, disagree is 2, and strongly disagree is 1) (Hall, n.d.). The range of responses is shown in pie charts and bar charts that display the number and percentage of anesthesia providers who express agreement, disagreement, etc., with each question in the pretest. Descriptive statistics are used to summarize the Likert scale (ordinal) statistics. A t-test was used to analyze the differences among group means (Glantz, 2012).

A two proportions test was run on the binary data. There were three questions involving binary data and none were statistically significant ($P - \text{value} < 0.05$) with a 95% confidence interval. If an 80% confidence interval was chosen instead of 95%, statistical significance is

achieved ($P - \text{value} < 0.20$) in all binary data. There is not a large enough sample size to use the 95% confidence interval. This quality improvement project could potentially be used as a pilot study for data exploration and to find data patterns that will be used for a larger study with a larger sample size.

A two-sample t-test comparing averages between the pretest and posttest was used for all Likert data. In a two-sample t-test, the “t” distribution assumes the underlying data is normally distributed. Items noted to be statistically significant at a 95% CI ($P - \text{value} < 0.05$) were: likely to register for the online course on how to use the healthcare facilities event reporting system (0.004), education about the process of reporting medication errors will increase compliance (0.018), having a medication safety pharmacist is important (at an 80% CI, $P - \text{value} < 0.20$, 0.055), having a medication safety committee is important (0.024) and reporting medication errors and near misses improves patient safety (0.043).

Descriptive statistics were used for demographic data as well as for two questions on the pretest and posttest where participants were asked to select a specific number of answers from several choices. The most common group who responded to the pretest and posttest was the SRNA groups, ages 25-34. When asked about barriers that keep the participants from reporting medication errors or near misses, fear of punishment, fear of litigation, and shame were the most frequent responses.

Timeline

Establishing the aim of the project was the first step of the QI project. This began immediately after approval of the quality improvement proposal, as well as institutional review board (IRB) approval from Otterbein University and the urban Midwestern Hospital. According to the Institute for Healthcare Improvement’s PDSA Worksheet for Testing Change, once the

aim is established, the second step is to find the right individuals to include on the team for the project (Institute for Healthcare Improvement [IHI], 2014). Once the team was determined, the PDSA cycle began. The following was the timeline for this quality improvement project:

- Developed the aim statement: August, 2015
- Team selection: Immediately after approval of aim statement (July, 2015)
- Established measures for improvement. Measures tell a team whether the changes they are making actually lead to improvement (IHI, 2015d, para.1) (July, 2015)
- Began PDSA cycle (IHI, 2015c) (August-December, 2015)
 - Step 1 – Plan (plan the objectives, plan to test the change)
 - Step 2 – Do (Carry out the test, document problems)
 - Step 3 – Study (analyze data, compare to team predictions, summarize)
 - Step 4 – Act (refine the change, based on what was learned from the test)

Budget

The budget required minimal expenses, as all resources were available at the urban Midwest hospital at no cost. Costs were budgeted to hire a statistician to analyze the data, and for the purchase of statistical computer software; however, no costs were incurred for either. An incentive of \$100 gift card was offered to participants who completed the pre and post survey. While the project leader's time is measurable for reimbursement, this is not a cost that was actualized.

Limitations

One limitation to this quality improvement project was the small sample size. The sample size was not large enough to determine statistical significance due to the small incidence of actual medication errors (Cooper et al., 2012). If the Confidence Interval moved from 95% to

80%, statistical significance was achieved in 3 out of 4 binary data sets. Another limitation may be the culture of the anesthesia department not to report errors for fear of punishment, shame, and fear of litigation. Anesthesia providers may continue to fear self-reporting even after attending an educational session and therefore, would be a strong limitation noted for this project. Many providers believe that if a medication error did not bring harm to the patient, it does not need to be reported (Nwasor, Sule, & Mshelia, 2014). A third limitation is the cumbersome reporting system used by the urban Midwest hospital. Educating the anesthesia providers on the proper use of the reporting system may not be effective due to the lack of ease in using the program. Finally, the last limitation was the fact that the majority of respondents were SRNAs who could be easily influenced by the leader of this QI project since she is faculty with their anesthesia program. SRNAs also do not have as much experience as CRNAs and anesthesiologists in the field of anesthesia and they could be biased not to report for fear of getting in trouble with their Program Director.

The main deviation from what was planned to what occurred was the delivery of the educational session. There was a lot more difficulty getting the CRNAs and anesthesiologists in a group meeting to deliver the hour-long educational session. The decision was made to create a voice-over presentation that could be delivered electronically so all CRNAs and anesthesiologists were able to access the information included in the educational session.

Analysis and Outcome Evaluation

Through data analysis of the survey, results showed that the anesthesia providers believe reporting medication errors and near misses are important (Tables 1-3, Figures 1-3). Knowledge deficits related to how to use the current reporting system, and barriers to reporting were easily identified in the results (Tables 4, 6, Figures 4, 6). The complexity of the current reporting

system discourages most providers from reporting errors and near misses, and yet the anesthesia providers believe reporting errors will improve patient safety (Tables 5,7, Figures 5,7). Less than 40% of the anesthesia providers had ever had formal training on how to use the current reporting system, and less than 30% of anesthesia provides said they had read the anesthesia department's policy on reporting medication errors. The majority of anesthesia providers agreed or strongly agreed that the development of a formal education course about how to report a medication error is important, and that education about the process of reporting medication errors would increase reporting compliance (Tables 9, 10, Figures 9, 10). The anesthesia providers were instructed on how to use the current reporting system, and educated about the various reasons why reporting is important, however, many still agreed they are likely to register for the online course "Entering and Event in Midas + Event Reporting System" (Table 11, Figure 11).

Project Objective 1: Determine the attitudes of reporting practices of CRNAs, anesthesiologists, and SRNAs.

- *Have you ever reported a medication error yourself using the hospital online reporting system? (Table 1, Figure 1)*

Table 1			
Two Proportions Test (binary data)			
Pre-Post	X	N	Sample P
Pre	9	55	0.163636
Post	5	43	0.116279
95% CI for Difference		(-0.0895330, 0.184248)	
T – Test of difference		0	
P – Value = 0.572			

Note: Not statistically significant at 95% CI ($P < 0.05$), or at 80% CI ($P < 0.20$)

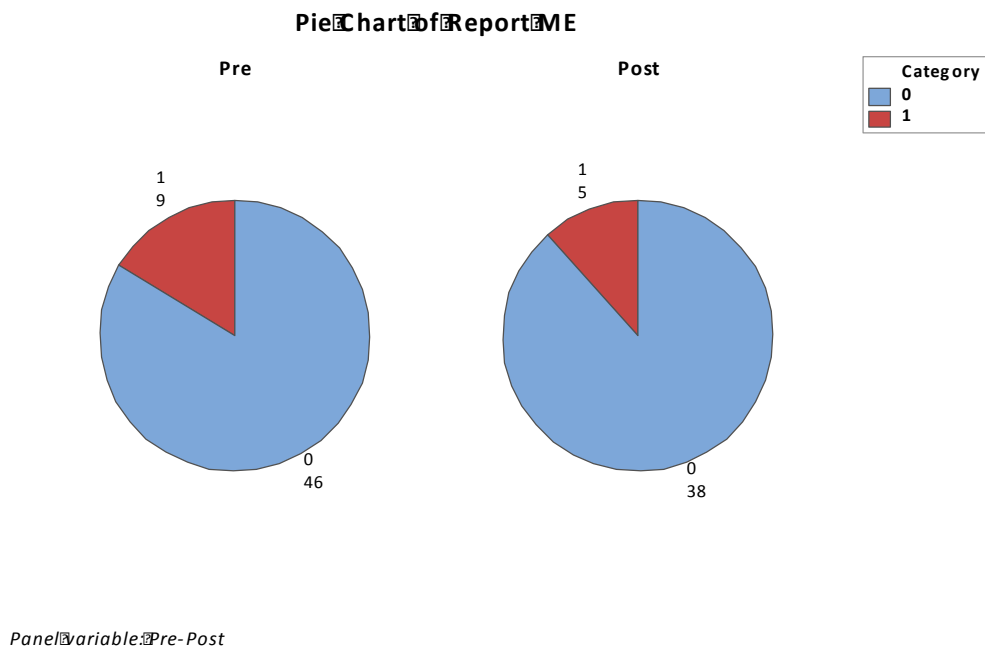


Figure 1.

- Have you ever reported a near miss medication error using the hospital online reporting system? (Table 2, Figure 2)

Table 2			
Two Proportions Test (binary data)			
Pre-Post	X	N	Sample P
Pre	8	55	0.145455
Post	1	43	0.023256
95% CI for Difference		(0.0187058, 0.225692)	
T – Test of difference		0	
P – Value = 0.073			

Note: Not statistically significant at 95% CI ($P < 0.05$) but is significant at 80% CI ($P < 0.20$)

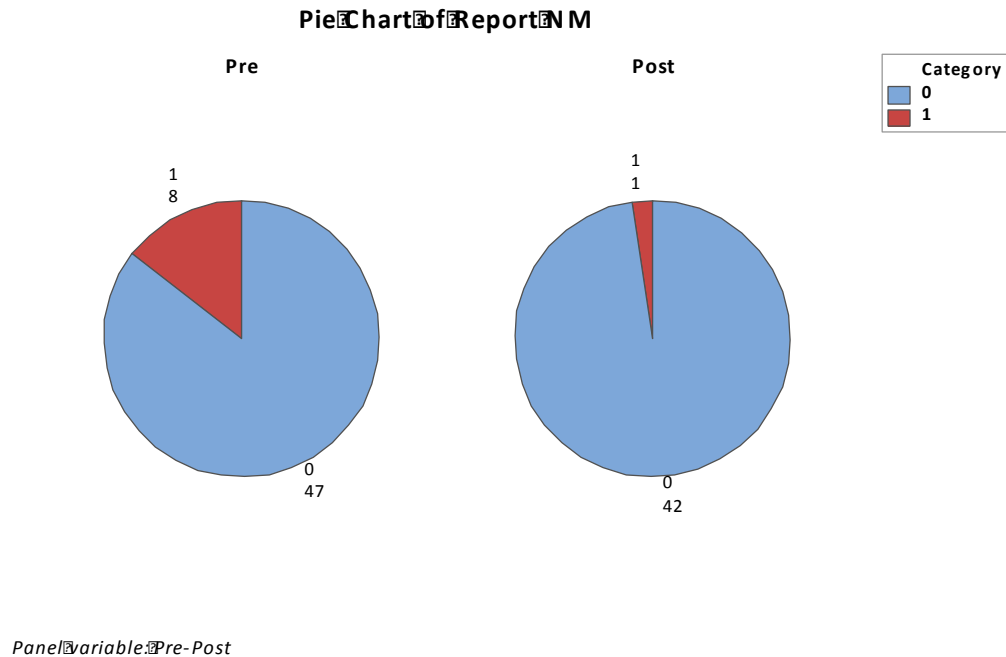


Figure 2.

- *Reporting a medication error is important even if the patient was not harmed? (Table 3, Figure 3)*

Table 3				
Two-Sample T – Test				
Pre-Post	N	Mean	Standard Dev.	SE Mean
Pre	54	4.167	0.885	0.12
Post	43	4.326	0.680	0.10
95% CI for difference		(-0.457, 0.157)		
T –Test of difference		0		

P – value = 0.320

Note: Not statistically significant at 95% CI (P - < 0.05) or 80% CI (P - < 0.20)

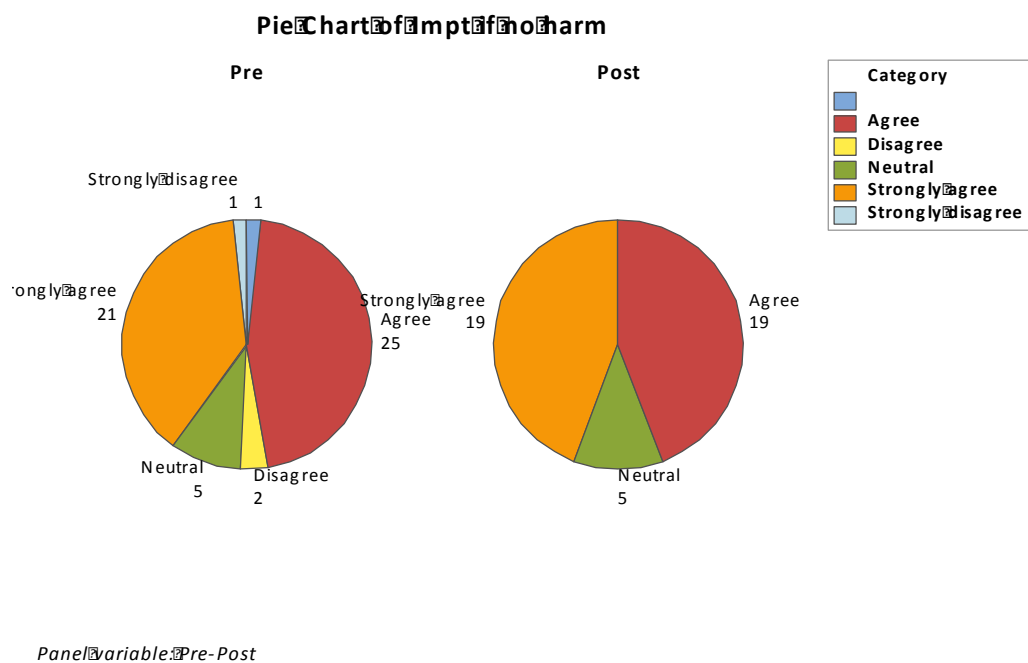


Figure 3.

Project Objective 2: Identify knowledge deficits and barriers among the CRNAs, anesthesiologists and SRNAs regarding use of current reporting system, and reasons to report medication errors and near misses.

- *Have you ever had formal training (read article, attended session, read study guide, etc.) on the use of the current reporting system (Unusual Occurrence Report (UOR))?* (Table 4, Figure 4).

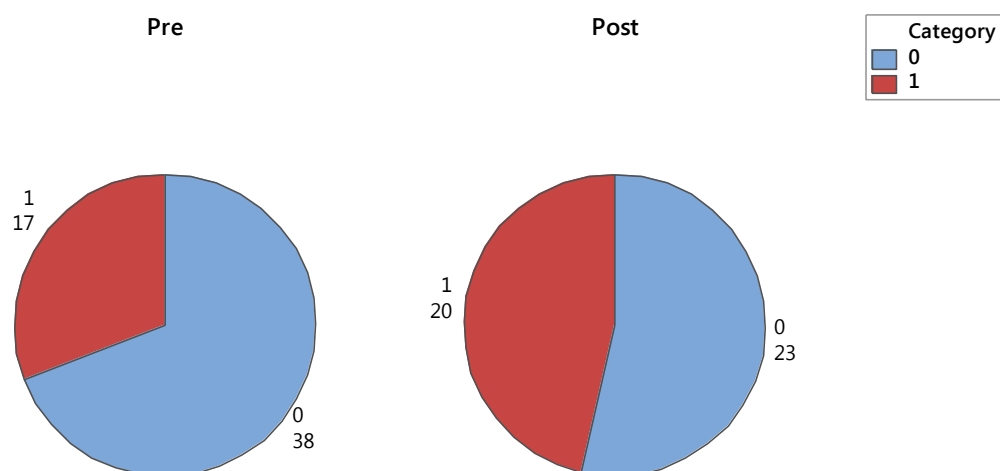
Table 4

Two Proportions Test (binary data)

Pre-Post	X	N	Sample P
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Pre	17	55	0.309091
Post	20	43	0.465116
95% CI for Difference	(-0.348745, 0366945)		
T – Test of difference	0		
P – Value = 0.143			
Note: Not statistically significant at 95% CI (P - < 0.05), but is significant at 80% CI (P - < 0.20)			

Pie Chart of Training UOR



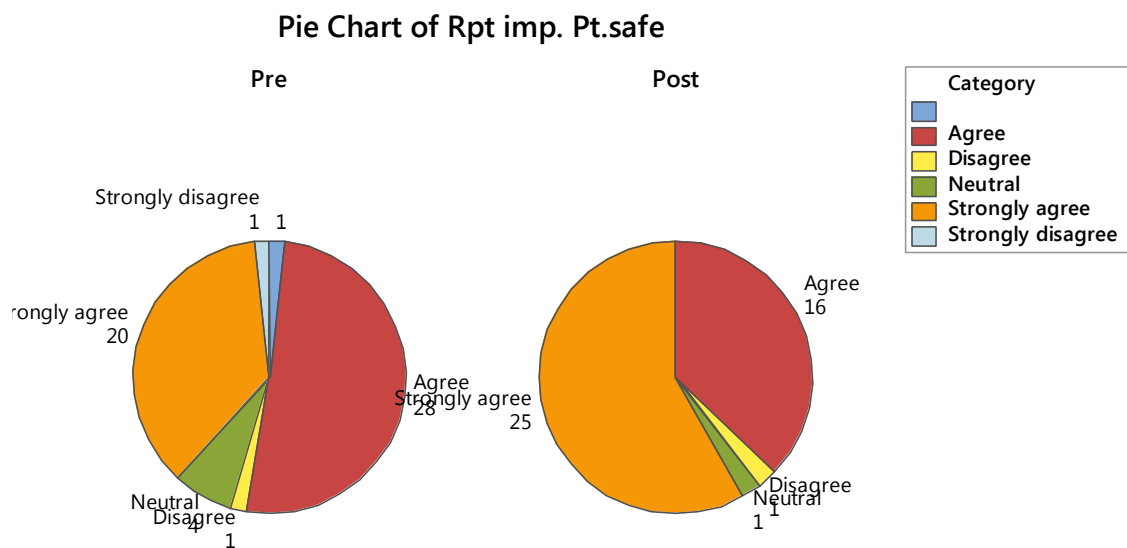
Panel variable: Pre-Post

Figure 4.

- *Reporting medication errors and near misses will improve patient safety? (Table 5, Figure 5)*

Table 5				
Two-Sample T – Test				
Pre-Post	N	Mean	Standard Dev.	SE Mean

Pre	54	4.204	0.810	0.11
Post	43	4.512	0.668	0.10
95% CI for difference		(-0.606, 0.010)		
T –Test of difference		0		
P – value = 0.043				
Note: Statistically significant at 95% CI (P - < 0.05)				



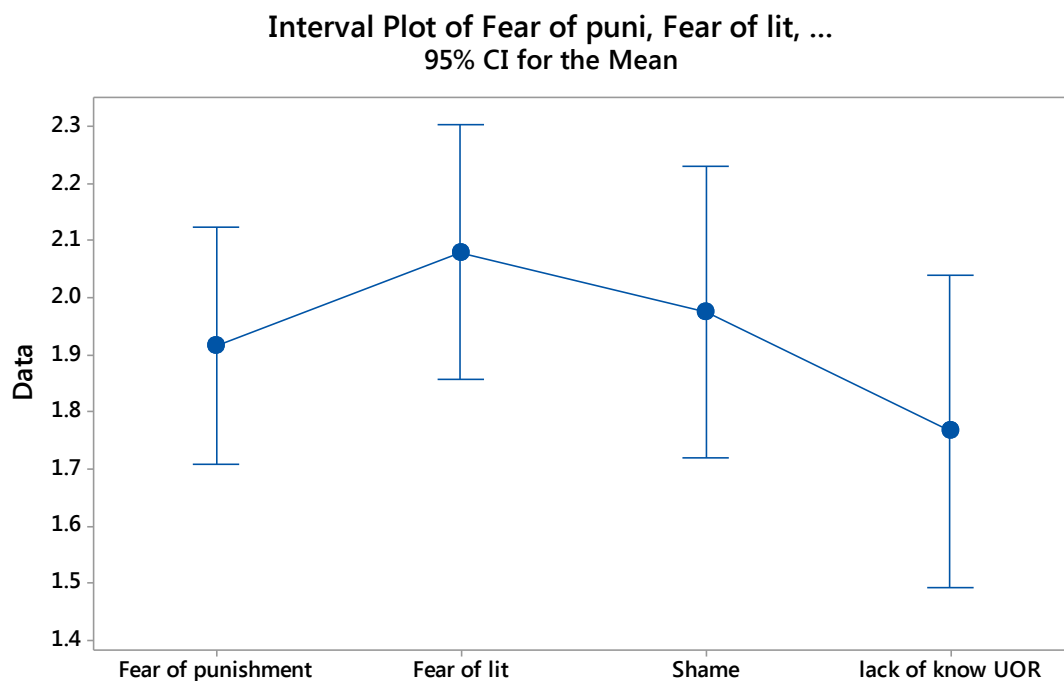
Panel variable: Pre-Post

Figure 5.

- What barriers keep you from reporting medication errors or near misses? (Table 6, Figure 6)

Table 6
T – Test
Means

Factor	N	Mean	Standard Dev.	95% CI
Fear of Punishment	59	1.9153	0.7494	1.7072, 2.1233
Fear of Litigation	51	2.078	0.821	1.855, 2.302
Shame	39	1.974	0.873	1.719, 2.230
Lack of Knowledge on how to use the current reporting system	34	1.765	0.819	1.419, 2.039
Pooled Standard Deviation = .809699				

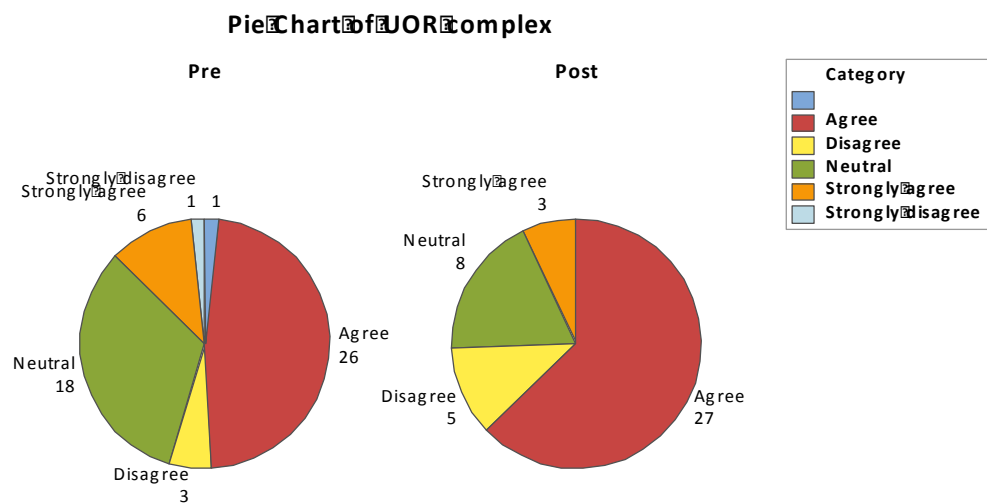


The pooled standard deviation is used to calculate the intervals.

Figure 6.

- The complexity of the reporting system discourages providers from reporting. (Table 7, Figure 7)

Table 7				
Two-Sample T – Test				
Pre-Post	N	Mean	Standard Dev.	SE Mean
Pre	54	3.611	0.834	0.11
Post	43	3.651	0.783	0.12
95% CI for difference		(-0.367, 0.287)		
T –Test of difference		0		
P – value = 0.808				
Note: Not statistically significant at 95% CI (P - < 0.05) or 80% CI (P - < 0.20)				



Panel variable: Pre-Post

Figure 7.

Project Objective 3: Determine if CRNAs, anesthesiologists and SRNAs believe education about the process of reporting medication errors and near misses is important.

- *Have you read the anesthesia department's policy on reporting medication errors?*

(Table 8, Figure 8)

Table 8			
Two Proportions Test (binary data)			
Pre-Post	X	N	Sample P
Pre	12	55	0.218182
Post	15	43	0.348837
95% CI for Difference		(-0.310118, 0.0488069)	
T – Test of difference		0	
P – Value = 0.176			
Note: Not statistically significant at 95% CI (P - < 0.05), but is significant at 80% CI (P - < 0.20)			

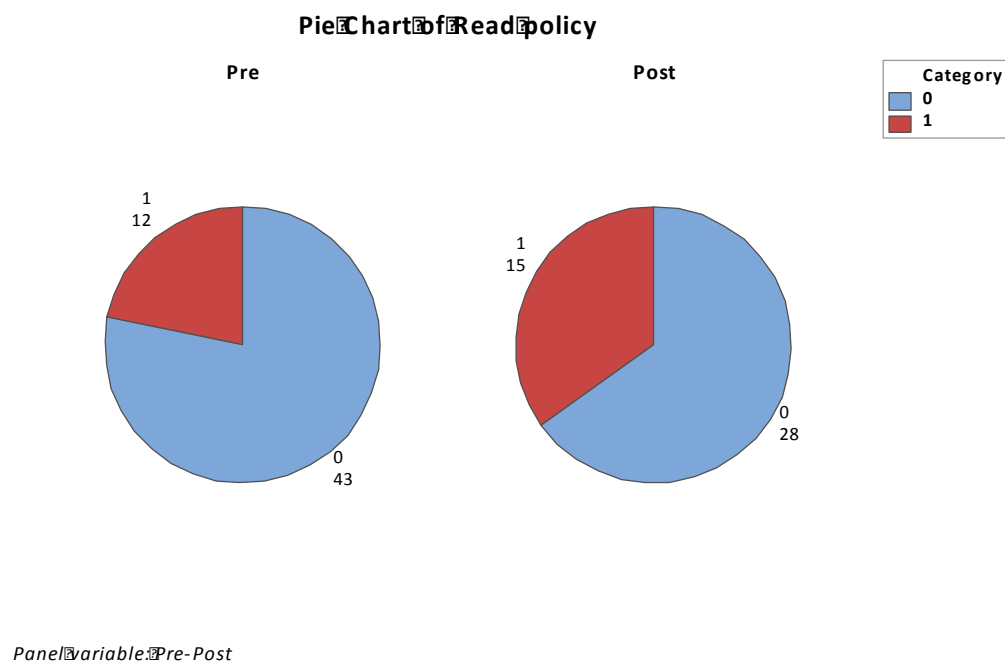


Figure 8.

- *The development of a formal education course about how to report a medication error is important? (Table 9, Figure 9)*

Table 9				
Two-Sample T – Test				
Pre-Post	N	Mean	Standard Dev.	SE Mean
Pre	54	4.019	0.921	0.13
Post	43	4.302	0.674	0.10
95% CI for difference		(-0.606, 0.038)		
T –Test of difference		0		
P – value = 0.083				
Note: Not statistically significant at 95% CI (P - < 0.05) but is significant at 80% CI (P - < 0.20)				

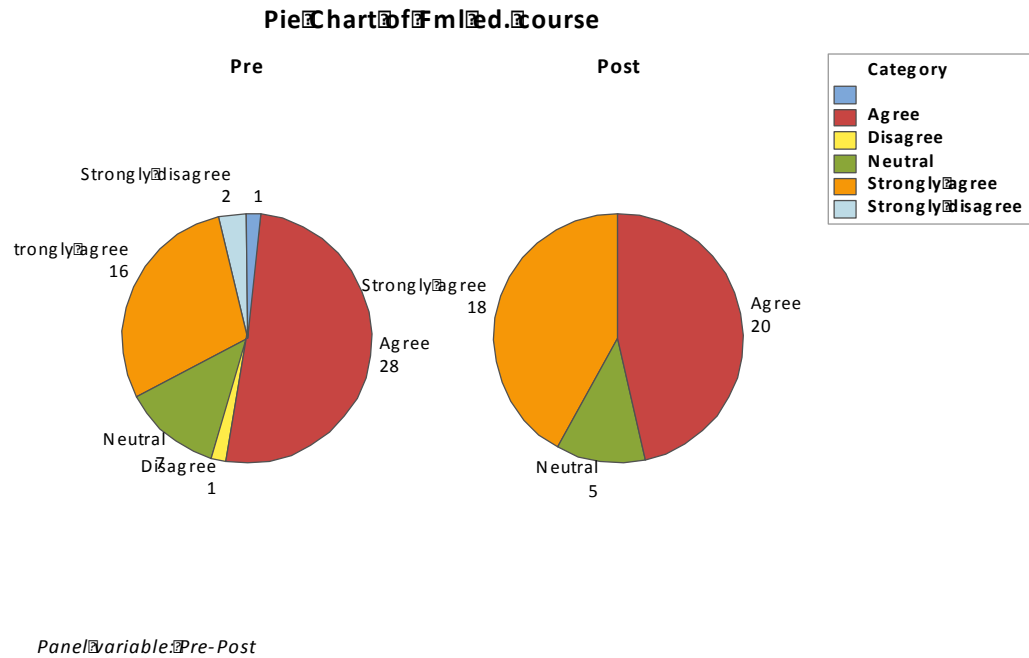


Figure 9.

- *Education about the process of reporting medication errors would increase reporting compliance? (Table 9, Figure 9).*

Table 10				
Two-Sample T – Test				
Pre-Post	N	Mean	Standard Dev.	SE Mean
Pre	54	3.722	0.960	0.13
Post	43	4.163	0.843	0.13
95% CI for difference		(-0.805, -0.077)		
T –Test of difference		0		
P – value = 0.018				
Note: Statistically significant at 95% CI (P - < 0.05)				

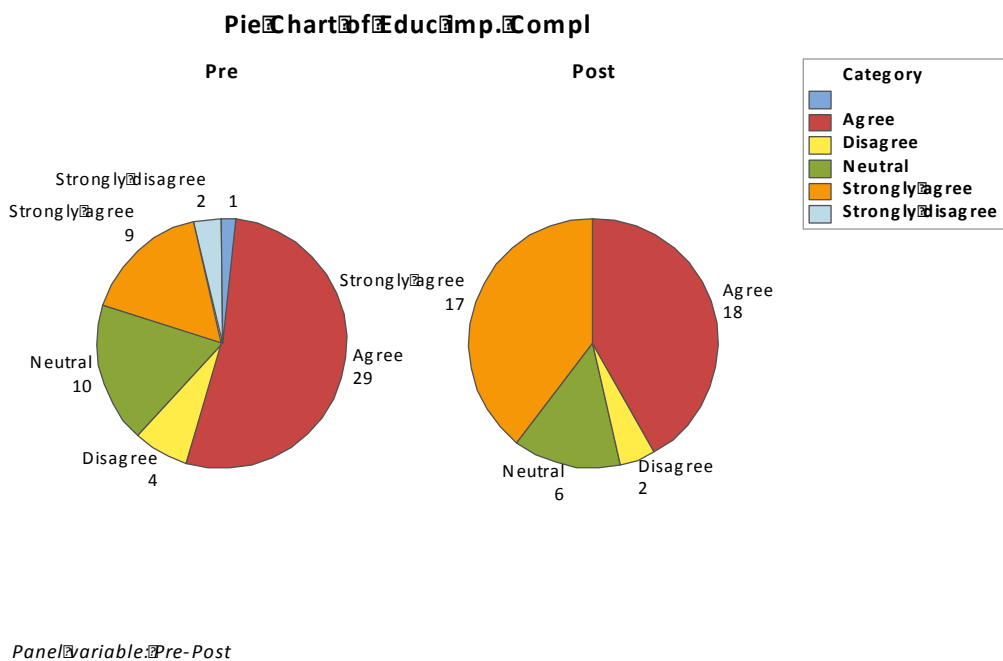


Figure 10.

Project Objective 4: Educate CRNAs, anesthesiologists, and SRNAs on the use of the current reporting system and assess if they are likely to register for the online course within the hospital system.

- You are likely to register for the online OhioHealth course “Entering an Event in Midas + Event Reporting System”. (Table 11, Figure 11)

Table 11				
Two-Sample T – Test				
Pre-Post	N	Mean	Standard Dev.	SE Mean
Pre	54	3.04	1.22	0.17
Post	43	3.3698	0.964	0.15

95% CI for difference	(-1.104, -0.216)	
T –Test of difference	0	
P – value = 0.004		
Note: Statistically significant at 95% CI (P - < 0.05)		

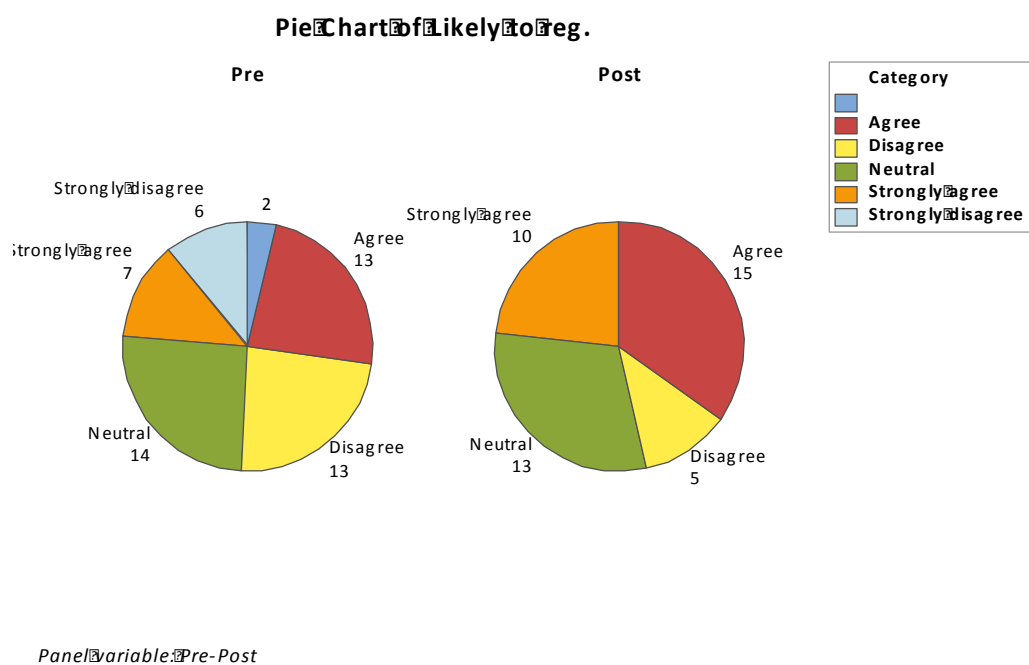


Figure 11.

Conclusions and Recommendations

The current reporting system used at the Midwestern Hospital does not deter anesthesia providers from reporting medication errors and near misses. Although a significant amount of anesthesia providers agreed the development of a formal education course about how to report a medication error was important; the actual implementation of an educational session did not improve reporting of such errors. In actuality, fewer providers admitted to reporting after the

educational session had occurred. Many providers understood the value of reporting medication errors to improve patient safety, yet did not see the value if reporting errors if the patient was not harmed. Barrier to reporting (fear of punishment, fear of litigation, and shame) are largely culture based. Promoting a culture change in the anesthesia department would be a logical focus for future projects. Changing the culture of the anesthesia department to foster an environment of self-reporting is going to take time and further education. Managing the disconnect from anesthesia providers seeing the value of reporting medication errors and near misses to actually improving the number of reported errors is a focus area for future educational opportunities.

Limitations to using the outcomes from this QI project to other settings are few. All nursing departments and medical units utilize self-reporting modalities within the healthcare facility or hospital system. Much of this study could be adapted to the specific needs of the departments and units. The crossover to non-healthcare departments would be more difficult, but determining the effectiveness of educational sessions, no matter the content, would be valuable.

Summary

The experience of implementing an educational session about the importance of reporting medication errors and near misses has been priceless. Interdepartmental relationships have been formed with many department leaders and top executives within OhioHealth. Realizing that one individual can effect change within an entire department is powerful. While the data analysis does not deliver the results predicted, it allowed the author to see where to focus attention for future projects including: culture change within the anesthesia department. This ties in nicely with a new initiative at OhioHealth called Team Stepps. Team Stepps primarily focuses on the attitudes and beliefs each department has as a whole. Implementing change based on the information gathered during focus groups for Team Stepps can lead to effective change in the

culture of the department. The author will continue to push forward with educational opportunities to present data on the importance of reporting medication errors and near-misses to the anesthesia department. This is an ongoing process, and the author will work to change the current culture of the anesthesia department from one of ‘blame and shame’, to a ‘just’ culture.

There has been a noticeable change in attitudes and reporting practices of the SRNAs. In the past, self-reporting of medication errors and near-misses was rare for SRNAs due to fear of punishment. Now, SRNAs are the first ones to self-report medication errors and near-misses. The nurse anesthesia program has implemented a Root Cause Analysis for all patient safety events including medication errors and near misses. The student who reported the event delivers a brief 10-15 minutes presentation of the events that led up to the safety event in a non-confrontational, confidential, and no-shame environment. The students see the value in others learning from their mistakes so they are not repeated in their own practices. Many times, the student was the only individual to document the error, not their preceptor. Educating the CRNAs of the future, to the benefits of self-report errors will hopefully impact future anesthesia departments in seeing the importance of reporting medication errors and near-misses.

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Appendix A

PDSA Worksheet for Testing Change-Institute for Healthcare Improvement

Aim: (overall goal) *Every goal will require multiple smaller tests of change*

Describe the first (or next) test of change:	Person responsible	When to be done	Where to be done

Plan

List the tasks needed to set up this test of change	Person responsible	When to be done	Where to be done

Predict what will happen when the test is carried out	Measures to determine if prediction succeeds

Do Describe what actually happened when the test was run

Study Describe the measured results and how they compared to the predictions

Act Describe what modifications to the plan will be made for the next cycle from what you learned

Appendix B

Survey (Pretest/Posttest)

Adapted from (Cooper, DiGiovanni, Schultz, Taylor, & Nossaman, 2012)

Demographics:	
Age:	<input type="checkbox"/> 25-30 <input type="checkbox"/> 30-35 <input type="checkbox"/> 40-45 <input type="checkbox"/> 50-55 <input type="checkbox"/> 55-60 <input type="checkbox"/> 65-70 <input type="checkbox"/> >70
Gender:	<input type="checkbox"/> Male <input type="checkbox"/> Female
Type of anesthesia provider:	<input type="checkbox"/> MD <input type="checkbox"/> DO <input type="checkbox"/> CRNA <input type="checkbox"/> SRNA
Years of experience as a certified anesthesia provider:	<input type="checkbox"/> N/A <input type="checkbox"/> 1-5 <input type="checkbox"/> 5-10 <input type="checkbox"/> 10-15 <input type="checkbox"/> 15-20 <input type="checkbox"/> 20-25 <input type="checkbox"/> >25
How often do you provide anesthesia services out of the operating room, i.e., Radiation Oncology, Endoscopy, etc.	<input type="checkbox"/> Less than once a week <input type="checkbox"/> 1-5 cases per week <input type="checkbox"/> 5-10 cases per week <input type="checkbox"/> >10 cases per week

Pretest/Posttest

Question	YES	NO
1. Have you ever reported a medication error yourself using the hospital online reporting system?		
2. Have you ever reported a near-miss medication error using the hospital online reporting system?		
3. Have you ever had formal training (read article, attended session, read study guide, etc.) on the use of the current reporting system (Unusual Occurrence Report - UOR)?		
4. Have you read the anesthesia department's policy on reporting medication errors?		

Please mark the number that best represents your agreement with the statement.

Rate on a scale of 1 to 5:

1 = Strongly disagree

2 = Disagree

3 = Neutral

4 = Agree

5 = Strongly agree

	1	2	3	4	5
5. Reporting a medication error is important even if the patient was not harmed.					
6. Once the UOR has been submitted, a formal process is needed for follow-up.					
7. The development of a formal education course about how to report a medication error is important.					
8. I am likely to register for the online OhioHealth course "Entering an Event in Midas + Event Reporting System."					
9. Education about the process of reporting medication errors will increase reporting compliance.					
10. The complexity of the reporting system (UOR) discourages providers from reporting.					
11. Our facility should have a medication safety pharmacist.					
12. Our facility should have a medication safety committee that meets monthly.					
13. Reporting medication errors and near misses will improve patient safety.					
14. Anonymity is important in my decision to report a medication error.					
15. Reporting medication errors will lead to disciplinary action.					
16. The <i>Medication Error Classification System</i> used to grade the severity of medication errors is important.					
17. The Pharmacy Dep't should collect data on medication errors and near misses for the Anesthesia Dep't department.					

18. If you have ever reported a medication error, what type of error occurred? (please mark all that apply)	<input type="checkbox"/> Incorrect Dose <input type="checkbox"/> Drug not administered or administered late (omission) <input type="checkbox"/> Extra dose of intended drug given (Repetition) <input type="checkbox"/> Incorrect drug administered instead of intended drug (Substitution) <input type="checkbox"/> Drug administered which was not intended at that time or at any stage (Insertion) <input type="checkbox"/> Incorrect concentration, amount, or rate of infusion of the desired drug administered (Incorrect Dose) <input type="checkbox"/> Administered intravenous instead of intramuscular; use of a multi-dose vial on more than one patient (Incorrect Route/Inappropriate Drug Administration) <input type="checkbox"/> Other, please elaborate_____
19. What barriers keep you from reporting medication errors or near misses? List in order the priority of your top three choices, i.e., #1, #2, #3.	____Fear of punishment by manager ____Fear of litigation ____Shame ____Lack of knowledge on how to use the current reporting system ____Current reporting system too complex ____Lack of anonymity ____Too time consuming ____Not valuable ____Unnecessary ____Does not lead to practice changes ____Lack of feedback

	___Other: Please describe_____
--	--------------------------------

Appendix C

Informed Consent – OhioHealth Grant Medical Center

August 19, 2015

Kacy Ballard, MSN, CRNA
Assistant Program Director CRNA
111 South Grant Avenue
Columbus, OH 43215

RE: ***Implementation of an Educational Program to Improve Compliance of Reporting Medication Errors and Near Misses among Anesthesia Providers in an Urban Midwestern Hospital***

Dear Ms. Ballard:

The Office of Regulatory Compliance has reviewed the materials for your project entitled ***Implementation of an Educational Program to Improve Compliance of Reporting Medication Errors and Near Misses Among Anesthesia Providers in an Urban Midwestern Hospital*** Based on the submitted information, the project is being deemed as a Quality Improvement (QI)/Educational Research project by the Institutional Review Board Research vs. QI Sub Committee. In addition, the activities are not considered human subjects research, as defined in 45CFR part 46 (see below); therefore does not meet the requirements for OhioHealth Institutional Review Board review nor oversight.

“Human subject” means a living individual about whom an investigator conducting research obtains: (1) Data through intervention or interaction with the individual or (2) Identifiable private information.”

“Research” means a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge.

The proposed project indicates the goal of the project is to educate Certified Registered Nurse Anesthetists (CRNAs), anesthesiologists, and student registered nurse anesthetists (SRNAs) about the benefits of reporting medication errors and near misses to improve patient safety. The project involves voluntary and anonymous surveys of the participants. No patient data will be collected or analyzed.

It is noted that you have not completed the educational sessions at this time. **Please submit a copy of the final version of the educational sessions to the IRB office for their files.**

This approval includes the following:

- Otterbein IRB Application – **submit a copy of the Otterbein IRB Determination Letter to the OhioHealth IRB office for their files**
- Appendix A – Project Tool
- Appendix B – Survey
- Appendix C – Informed Consent

Any information and data obtained from these activities are not intended to contribute to generalizable knowledge and the evaluation is not designed to contribute to generalizable information.

If you become aware of any changes to this data collection or the primary intent, please contact our office to determine whether the changes affect the review status of this activity.

Page 2
Ballard –QI Project for Reporting Medication Errors

Thank you very much for notifying our office about this activity. We are always happy to assist with any questions you have concerning research activities.

Sincerely,

Trina Williams, BS
Regulatory Compliance Manager
OhioHealth Office of Regulatory Compliance
3545 Olentangy River Road
RMH North Medical Office Building
Suite 328
Columbus, OH 43214

Appendix D

IRB Approval – Otterbein University

INSTITUTIONAL REVIEW BOARD
RESEARCH INVOLVING HUMAN SUBJECTS
OTTERBEIN UNIVERSITY

☒ Original Review
☐ Continuing Review
☐ Five-Year Review
☐ Amendment

ACTION OF THE INSTITUTIONAL REVIEW BOARD

With regard to the employment of human subjects in the proposed research:

HS # 15/16-03

Ball, Ballard & Haverkamp: Implementation of an Educational Program ...

THE INSTITUTIONAL REVIEW BOARD HAS TAKEN THE FOLLOWING ACTION:

<input checked="" type="checkbox"/> Approved	<input type="checkbox"/> Disapproved
<input type="checkbox"/> Approved with Stipulations*	<input type="checkbox"/> Waiver of Written Consent Granted
<input type="checkbox"/> Deferred	

*Stipulations stated by the IRB have been met by the investigator and, therefore, the protocol is APPROVED.

It is the responsibility of the principal investigator to retain a copy of each signed consent form for at least four (4) years beyond the termination of the subject's participation in the proposed activity. Should the principal investigator leave the college, signed consent forms are to be transferred to the Institutional Review Board for the required retention period. This application has been approved for the period of one year. You are reminded that you must promptly report any problems to the IRB, and that no procedural changes may be made without prior review and approval. You are also reminded that the identity of the research participants must be kept confidential.

Date: 18 August 2015

Signed: 
Chairperson

OC HS Form AF

Appendix E

Informed Consent

Consent to Participate in a Survey

Project Lead

The survey will be conducted by Kacy Ballard, CRNA, MSN(DNP Student)

Invitation to Participate and Purpose

I would like to thank you for your voluntary participation in this survey. I am excited that this survey may produce knowledge to aid in process improvements, improve patient safety, and reduce costs associated with medication errors.

I am inviting you to participate in a survey, which assesses knowledge of anesthesia providers about the importance of reporting medication errors and near misses and use of the hospital's current error reporting system. Errors can be classified or categorized to identify provider errors or the need for process improvements. Unfortunately, fear of humiliation, blame, and litigation prompts most anesthesia providers to avoid acknowledging that a medication error or a near miss occurred, especially if the patient was not harmed. The process of reporting and error (actual or potential) is not well understood by most anesthesia providers as most regard completing the form as a disciplinary action that can have punitive outcomes. This survey will query the anesthesia providers regarding their knowledge about the importance of reporting medication errors and near misses and use of the hospital's current reporting system.

Voluntary Participation

Participation in the survey is completely voluntary. You may withdraw consent to participate at any time during the entire process. If you choose to withdraw at any time, the information supplied by you will be removed from the data and findings of the survey.

Methods/Procedures

The methods of data collection will be conducted as follows: a survey of anesthesia providers in an urban Midwest hospital in the state of Ohio will be conducted pre and post educational session. Any information linking a specific anesthesia provider to the corresponding survey results will be removed. No identifiable participant information will be shared.

Confidentiality

Your responses and participation in this survey will be completely confidential. If you are willing to participate in the survey, you will not be identified by name or any other identifiable marker. Publications and reports from this survey will not contain any names or identifying information and will be reported in aggregate. The use of anonymous direct quotes may be used to bring clarity to the context of the findings when reporting the study. You will be given the opportunity at anytime up to the reporting of the results to remove any stated material as a direct quote from the survey by contacting the survey advisor or project leader. Persons from the Otterbein Institutional Review Board and project team members may look at data from this survey for quality assurance and regulatory functions.

Risks and Inconveniences

The project leader does not anticipate any physical risks to participants. You will be asked to keep the information private and confidential.

Benefits

The potential benefit of this study is that your knowledge and experiences may lead to process improvements and improved data collection of medication errors and near misses thereby improving patient safety. By agreeing to participate, you will receive continuing education credit by attending the educational session.

In Case of Injury

Otterbein University's policy is not to compensate or provide medical treatment to persons who participate in surveys. If you feel you have been injured as a result of this survey, please contact Robert Kraft, Chair of the Otterbein Institutional Review Board at 614-823-1473, or email at rkraft@otterbein.edu.

Questions

If at any time you have any questions about the survey, you can contact the advisor for the project, Kay Ball, PhD, RN at 614-975-4972, or email kball@otterbein.edu or the student on the quality improvement project, Kacy Ballard,

CRNA, MSN kballard@otterbein.edu.