The Effect of an Education Module on the Knowledge Base of Student Registered Nurse Anesthetists (SRNAs) Regarding Evidence-Based Prevention of Surgical Site Infection (SSI) During Advanced Practice Nursing Education

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Faculty Disclosure

Faculty Name	**Valerie J. Diaz, DNP, CRNA, ARNP, USN, NC**
Conflict of Interest	**None**
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Goals & Objectives

Session Goal:

To demonstrate that advanced practice nursing education must provide active learning opportunities that integrate the best current evidence with clinical expertise and practice

Session Objectives:

1. Describe the effect of an education module on the knowledge base of Student Registered Nurse Anesthetists (SRNAs) regarding evidence-based prevention of surgical site infection (SSI)

1. Identify the effect of an education module on the self-directed learning ability of SRNAs

1. Illustrate the effect of an education module on the safety attitudes of SRNAs

Background knowledge

- Surgical site infections (SSIs) develop in 2 to 5 percent of the 30 million patients undergoing surgical procedures each year in the U.S. resulting in readmissions, increased medical cost, and increased morbidity and mortality.

- The Surgical Care Improvement Project (SCIP), a nationwide collaborative, promotes using evidence-based guidelines to minimize SSIs (Fry, 2008).

- Evidence-based practice guidelines offer a robust scientific foundation for clinical practice thereby achieving quality, efficiency, and safety (Timmermans & Mauck, 2005)

Summary of Literature

- SSIs account for 3 percent of all surgical mortality, increased readmissions, increased lengths of stay, and higher cost (Meeks et al., 2011).

- The financial burden of SSIs is sizable. Anderson & Sexton (2010), through an extensive epidemiologic review of surgical patient data revealed that postoperative lengths of stay extend 7-10 days while hospital charges range from $3,000 to $29,000 per patient with the SSI diagnosis (Anderson, 2011).

Summary of Literature

- The infection risk for primary hip and knee arthroplasty is approximately 1% and increases to 2-5% for arthroplasty revision (Van Houwelingen et al., 2012)

- Infection within the bones and joints is very difficult to treat and is associated with lifelong recurrence risk of 10% - 20%

Surgical Care Improvement Project

- The Surgical Care Improvement Project (SCIP) is committed to improving patient safety through promoting evidence-based interventions as the standard of care in order to minimize the incidence of surgical complications

- Preventative management of SSIs is largely based on using evidence-based guidelines that support a safe patient environment during the perioperative period.

Surgical Care Improvement Project

- Effective prevention of SSIs is achieved through implementation of prophylactic antibiotic guidelines and maintenance of normothermia (36.5–37.5 °C /97.7–99.5 °F) during the operative procedure (Bratzler & Hunt, 2006; Fry, 2008; Gagliardi, Fenech, Eskicioglu, Nathens, & McLeod, 2009; Uckay et al., in press).

- A consensus of surgeons suggests 30 minutes to one hour before incision as the ideal window for drug administration

Surgical Care Improvement Project guidelines for appropriate antibiotic selection
(Meeks et al. 2011)

Surgical Procedure	Appropriate Antibiotic
Cardiothoracic & Vascular Surgery	Cefazolin, cefuroxime, or Vancomycin. If β-lactam allergy: Vancomycin or clindamycin
Hysterectomy	Cefotetan, cefazolin, cefoxitin, cefuroxime, or ampicillin/sulbactam. If β-lactam allergy: clindamycin + gentamycin (or ciprofloxacin, or aztreonam); OR metronidazole + gentamycin (or ciprofloxacin) OR clindamycin monotherapy
Hip or knee arthroplasty	Cefazolin or cefuroxime. If β-lactam allergy: Vancomycin or clindamycin
Colon	Cefotetan, cefoxitin, cefazolin + metronidazole, or ampicillin/sulbactam. If β-lactam allergy: clindamycin + gentamycin (or ciprofloxacin, or aztreonam) OR metronidazole + gentamycin (or ciprofloxacin)

Applicability

- The Student Registered Nurse Anesthetist is accountable for prophylactic antibiotic administration and maintenance of normothermia during the intraoperative period.

- Centers for Medicare & Medicaid Services (CMS) closely monitors SCIP guideline compliance and incidence of SSIs.

- CMS is using performance outcomes as a benchmark of quality and patient safety.

The Importance

- In order to implement clinical practice guidelines to their fullest extent an understanding of the interdependence of practitioner attitudes, beliefs and behaviors must occur.

- Educational interventions to foster practitioner uptake and utilization of the evidence should occur during the pre-certification phase of development in order to ensure the greatest impact on anesthesia provider practice and adherence to evidence-based guidelines.

The Intervention

SRNAs participated in a self-directed education activity via a virtual learning environment. The educational activity was an evidence-based curriculum regarding SSIs and associated prevention guidelines. This curriculum was comprised of the following content:

1. The diagnosing criteria, risk factors, and epidemiology of surgical site infection

2. The clinical consequences of surgical site infection and impact on healthcare costs

3. The Surgical Care Improvement Project performance measures that target postoperative infection prevention.

The Intervention

3. The appropriate antibiotic timing and dosing for general, gynecologic, orthopedic and colorectal surgeries.

4. Intraoperative thermoregulation and its impact on surgical site infection.

The curriculum was delivered to the SRNAs as an audiovisual slide presentation.

Following participation in the educational activity the SRNA was able to increase knowledge and ability to apply knowledge to clinical scenarios.

Curriculum Learning Objectives

1. Define the diagnosing criteria, risk factors, and epidemiology of surgical site infection

2. Examine the clinical consequences of surgical site infection and impact on healthcare costs

3. Identify the Surgical Care Improvement Project performance measures that target postoperative infection prevention.

4. Illustrate the appropriate antibiotic timing and dosing for general, gynecologic, orthopedic and colorectal surgeries.

5. Describe intraoperative thermoregulation and its impact on surgical site infection

Method of Evaluation

- Quasi-Experiment using a pretest-posttest design

- Convenient sample of SRNAs enrolled at Florida International University.

- Online survey software product was used to create and deliver the pretest and posttest surveys to all participants.

- Pretest survey assessed baseline knowledge of evidence-based prevention of surgical site infections.

- Survey measured self-directed Learning abilities and safety attitudes via a Self-Directed Learning Instrument (SDLI) and Safety Attitudes Questionnaire (SAQ) embedded within the survey

Method of Evaluation

Pretest/posttest survey

– 17 Multiple Choice Knowledge Questions

– Clinical scenarios were utilized to measure SRNAs ability to synthesize information and make clinical decisions in accordance with EB guidelines for antibiotic selection, administration, and thermoregulation

– SDLI using Likert scale

– SAQ using Likert scale

SDLI (Cheng et al, 2010)

1. I know what I need to learn
2. Regardless of the results or effectiveness of my learning, I still like learning.
3. I strongly hope to constantly improve and excel in my learning.
4. I enjoy finding answers to questions.
5. I will not give up learning because I face some difficulties.
6. I can connect new knowledge with my own personal experiences
7. I understand the strengths and weaknesses of my learning.

Safety Attitudes Questionnaire (SAQ)

(Sexton et al., 2006)

- I would feel safe being treated here as a patient

- Medical errors (any mistake in the delivery of care) are handled appropriately in this hospital

- I receive appropriate feedback about my performance

- Briefing OR personnel before a surgical procedure is important for patient safety

- Personnel frequently disregard rules or guidelines that are established for the OR

Analysis

Questions 1-17 were multiple-choice questions that assessed direct knowledge of SSI prevention guidelines.

Overall knowledge was reported as a percentage correct on a 100-point scale for each respondent.

The pretest and posttest performances were compared using a one-way analysis of variance (ANOVA) to determine differences between group means.

Analysis

SDLI data was solely used descriptively to make inferences about the pretest and posttest groups & their self-directed learning abilities

Analysis

Safety Attitude Questionnaire utilized a Likert-scale

- Mean score and % agreement calculated
    - The percent agreement comprised all respondents who "agree slightly" or "agree strongly" and was reflected as a positive number.
- One-way ANOVA compared means of pre- & posttest groups

Results

Forty-two respondents initiated the pretest survey and thirty-four answered all questions reflecting an 81% pretest completion rate for all who initiated an attempt

Results

Twenty-six respondents initiated the posttest and eighteen answered all of the questions reflecting a 69.2% posttest completion rate for all who initiated an attempt

Results

Knowledge pretest mean of 62.7 and a median score of 68.6

Posttest mean was 62.9 and the median (P_{50}= 65.2)

One-way ANOVA compared differences in pretest and posttest group means.

Analysis produced no statistically significant result (F_o= 0, $p < 1.0$; F_{crit}= 2.78).

Results

Safety attitudes and climate were measured using the Safety Attitudes Questionnaire.

The 5-point Likert scale was used for all items however, Q22_4 and Q22_11 were reversed scored

Interpretation

- When each learning objective was considered individually statistical significance indicated that the curriculum positively impacted SRNA knowledge.

- Posttest performance for each learning objective improved suggesting that SRNAs increased knowledge and ability to apply the knowledge to clinical scenarios

Interpretation

- SDLI mean scores were 3.9 or greater for all of the learning domains, suggesting that SRNAs have self-directed learning habits

- The curriculum delivery required a degree of self-learning ability

Interpretation

- Safety attitudes data is useful for determining workplace climate.

- In the context of this study the education content and its delivery did not significantly impact the practitioner's attitude in the perioperative setting.

Interpretation

- SRNAs are seasoned registered nurses whose safety behaviors and attitudes have evolved with their nursing careers as reflected in the positive mean scores.

- Entrenched behaviors and attitudes may not be easily influenced by the learning experience offered by this study.

Limitations

- Attrition or experimental mortality
  - Pretest response rate of 34.7% diminished by approximately 50% to 18% response during the posttest phase.

- Posttest response rate was far lower than anticipated. As a result posttest sample size limits generalizability of the study findings

Limitations

Validity of Q1-17 were not tested

- Without knowing validity of the questions it can not be said with complete certainty that the learning objectives were achieved

Pilot study

- Reliability unknown

- Suggests replication to determine result consistency

Conclusion

- In order to provide evidenced-based care advance practice nurses must bridge the gap between research utilization and clinical practice.

- Bridging the gap involves a learning process that draws upon attitudes, beliefs, and behaviors of nurses that are interdependent.

- Educational/clinical experiences during the advanced practice-training phase will foster practitioner utilization of the evidence to ensure maximal impact on practice and adherence to EB guidelines.

Conclusion

- Advanced practice nursing education must provide active learning opportunities that integrate the best current evidence with clinical experience to produce practitioners who deliver patient-centered evidence-based care.

Questions