Anesthesia Procedural Guidelines for Neuro-Spine Surgeries

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ABSTRACT

BACKGROUND
Anesthesia providers are required to create anesthetic plans of care which are tailored to a multitude of specific surgical operations while also incorporating surgeon preferences and individual patient factors. Recent literature suggests that the implementation of an anesthesia procedural guideline for neuro-spine procedures may improve operating room efficiency, patient outcomes, and staff confidence.

OBJECTIVE
This quality improvement project developed and implemented an anesthesia guideline and compared retrospective data and post-intervention data to determine if the implementation of the guideline impacted a predetermined list of outcomes.

PICOT QUESTION
In patients aged 18-90 years old undergoing neuro-spine surgeries at a Midwestern hospital (P), does the development and implementation of evidence-based anesthesia guideline tools (I) reduce complication rates such as peripheral neuropathies by 5%, reduce the time from "in-room" to "incision" by 5%, reduce OR cost by 2%, decrease patient pain scores by 5%, and improve anesthesia staff confidence in performing these procedures (O) when compared to surgeries before the guidelines were created (C), as examined over a three month period (T)?

METHODS
The pre-implementation group consisted of 38 patients while the post-implementation group consisted of 34 patients. Demographic data were collected and analyzed, and no significant differences were identified between the two groups. Outcome data were statistically analyzed using paired, two-tailed *t*-tests; staff survey data were analyzed using chi-squared tests.

RESULTS
Efficiency markers (time from in-room to incision, in-room to turnover, case end to anesthesia end) showed some improvement, but there was no statistical significance in any category (p = .740; p = .841; p = .549). Mean postoperative pain scores did not show any improvement (p = .127). There was a reduction in pain scores in patients who received ketorolac, but it was not statistically significant (p = .449). The staff survey data showed no statistically significant changes in confidence when providing anesthesia for neuro-spine surgeries.

CONCLUSIONS
The "case end" to "anesthesia end" time was the only efficiency marker that did demonstrate a 5% decrease in mean time when analyzing all case types together, as was the initial goal. Although there were no statistically significant findings, the raw data of the staff survey suggests that the guideline may assist providers in caring for individuals undergoing neuro-spine procedures at the institution of study.

OBJECTIVE

To develop and implement an anesthesia guideline tool for neuro-spine procedures and compare pre- and post- intervention data to determine if there are improvements in anesthesia efficiency, post-operative pain, and anesthesia staff confidence.

METHODS

- Quality improvement initiative.
- Setting: Midsized, tertiary teaching hospital. 10 ORs. One OR dedicated to neurosurgeries.
- Sample:
  - Two groups:
    1. Patients who underwent neuro-spine surgeries in three months prior to intervention and three months after intervention.
       - Approximately 30 patients in each cohort.
    2. Staff anesthesia providers (approximately 20 individuals).
- Anesthesia guideline tool was developed with input from neurosurgery and anesthesia departments.
  - Information in the guideline included:
    - Best practice anesthetic management for neuro-spine surgeries.
    - Neurosurgeon preferences for surgeries
      - Positioning, hemodynamic parameters, anesthetic type when neuromonitoring is incorporated.
- Retrospective chart extraction of outcome data
  - Markers of OR efficiency: "in-room" to "turnover," "in-room" to "incision," "case end" to "anesthesia end."
  - Complications: Post-operative patient pain scores, incidence of peripheral neuropathies.
- Anesthesia staff survey
- Data Analysis:
  - Unpaired *t*-tests were used to analyze the means between the pre- and post-intervention groups.
  - Control and intervention groups were compared holistically.
    - Same procedure types were also analyzed individually.
  - Categorical data from of the surveys were examined and analyzed with *chi-square* tests.

RESULTS

Table 1

Patient Demographic Data

Age in years *M* (SD)		BMI *M* (SD)		Gender (%)		ASA Class (%)		Arterial Line Placed (%)		Presence of Neuromonitoring (%)		Intubation Attempts (%)	
Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
62.79 (15.07)	58.85 (16.14)	31.5 (5.42)	30.5 (4.49)	M = 55.3% F = 44.7%	M = 64.7% F = 35.3%	1 = 0% 2 = 23.7% 3 = 76.3% 4 = 0%	1 = 2.9% 2 = 41.2% 3 = 55.9% 4 = 0%	Y = 39.5% N = 60.5%	Y = 38.2% N = 61.8%	Y = 23.7% N = 76.3%	Y = 11.8% N = 88.2%	1 = 94.8% 2 = 2.6% 3 = 0% 4 = 2.6%	1 = 94.1% 2 = 5.9% 3 = 0% 4 = 0%

Note. Pre-intervention period = 38 patients. Post-intervention period = 34 patients. *M* = Mean. SD = Standard deviation. BMI = body mass index. ASA = American Society of Anesthesiologists. M = Male. F = Female. Y = Yes. N = No.

RESULTS

Table 2

Pre- Versus Post-guideline "In-Room" to "Turnover to Proceduralist" Time

	Pre-Guideline		Post-Guideline			
Neuro-spine surgery type	Number of surgeries	In-room to turnover to proceduralist time* *M* (SD)	Number of surgeries	In-room to turnover to proceduralist time* *M* (SD)	Difference	*p* value
All surgery types	38	14.71 (6.46)	34	15.03 (7.02)	+0.32	.841
Cervical	10	19 (6.34)	6	19.5 (5.32)	+0.5	.874
All posterior lumbar/thoracic surgeries	28	13.18 (5.88)	28	14.07 (7.04)	+0.89	.608
Lumbar fusions	6	17.66 (8.66)	10	16.1 (6.95)	-1.56	.696
Lumbar/thoracic discectomies and laminectomies	22	11.95 (4.39)	18	12.94 (7.45)	+0.99	.589

*Time measured in minutes. *M* = Mean. SD = Standard deviation.

Table 3

Pre- Versus Post-Guideline "In-room" to "Incision" Time

	Pre-Guideline		Post-Guideline			
Neuro-spine surgery type	Number of surgeries	In-room to incision time* *M* (SD)	Number of surgeries	In-room to incision time* *M* (SD)	Difference	*p* value
All surgery types	35	41.97 (14.85)	32	40.94 (9.82)	-1.03	.740
Cervical	7	62.57 (16.34)	5	52.2 (10.55)	-10.37	.243
All posterior lumbar/thoracic surgeries	28	36.82 (8.99)	27	38.85 (8.30)	+2.03	.388
Lumbar fusions	6	48.33 (7.43)	9	42.89 (8.78)	-5.44	.236
Lumbar/thoracic discectomies and laminectomies	22	33.68 (6.51)	18	36.83 (7.49)	+3.15	.162

*Time measured in minutes. *M* = Mean. SD = Standard deviation.

Table 4

Pre- Versus Post-Guideline "Case end" to "Anesthesia end" Time

	Pre-Guideline		Post-Guideline			
Neuro-spine surgery type	Number of surgeries	Case end to anesthesia end time* *M* (SD)	Number of surgeries	Case end to anesthesia end time* *M* (SD)	Difference	*p* value
All surgery types	36	13.44 (8.05)	33	12.42 (5.76)	-1.02	.549
Cervical	8	20.5 (10.14)	6	13.67 (5.50)	-6.83	.163
All posterior lumbar/thoracic surgeries	28	11.43 (6.19)	27	12.15 (5.89)	+0.72	.660
Lumbar fusions	6	14.33 (3.67)	10	14.6 (6.52)	+0.27	.930
Lumbar/thoracic discectomies and laminectomies	22	10.63 (6.56)	17	10.71 (5.44)	+0.08	.971

*Time measured in minutes. *M* = Mean. SD = Standard deviation.

Table 5

Pre- Versus Post-Guideline Mean Pain Score

	Pre-Guideline		Post-Guideline			
Neuro-spine surgery type	Number of surgeries	Pain Score* *M* (SD)	Number of surgeries	Pain Score* *M* (SD)	Difference	*p* value
All surgery types	38	2.21 (3.30)	32**	3.47 (3.51)	+1.26	.127
Cervical	10	3.3 (3.74)	6	5.67 (2.94)	+2.37	.209
All posterior lumbar/thoracic surgeries	28	1.82 (3.10)	26	2.96 (3.48)	+1.14	.209
Lumbar fusions	6	0.5 (1.22)	9	3.78 (3.67)	+3.28	.057
Lumbar/thoracic discectomies and laminectomies	22	2.18 (3.38)	17	2.53 (3.41)	+0.35	.753

*Pain scores were based on a 0-10 scale. Pain scores were collected from the first reported pain score assessed in the PACU.

**Two patients were not included because one went to the intensive care unit and the other did not receive a pain score until two hours after surgery. *M* = Mean. SD = Standard deviation.

Table 6

Pre- versus post-guideline staff survey

Question		1—4 (Unconfident)	5-6 (Neutral)	7-10 (Confident)	*p* value
How confident are you in providing anesthesia for patients undergoing spinal surgeries?	Pre-guideline	0	1	15	.85
	Post-guideline	0	0	5	
How efficient do you feel during induction and positioning of patients undergoing spinal surgeries?	Pre-guideline	0	3	13	.58
	Post-guideline	0	0	5	
How clear do you feel the communication is between neurosurgeons and anesthesia staff in the PREoperative period?	Pre-guideline	2	5	9	.19
	Post-guideline	0	0	5	
How clear do you feel the communication is between neurosurgeons and anesthesia staff in the INTRAoperative period?	Pre-guideline	3	3	10	.27
	Post-guideline	0	0	5	
How confident are you in the management of fluid/blood replacement during neuro-spine surgeries?	Pre-guideline	0	3	13	.58
	Post-guideline	0	0	5	
How confident are you in modifying a general anesthetic to accommodate SSEP and MEP monitoring?	Pre-guideline	0	0	16	1.0
	Post-guideline	0	0	5	

DISCUSSION

- No statistically significant changes were found after implementing the anesthesia guideline.
  - "In-room" to "turnover" time.
    - Potential subjective factors.
  - "In-room" to "incision" time.
    - Much of this time does not involve anesthesia.
  - "Case end" to "anesthesia end" time.
    - Patient factors; CRNA factors
- Cost savings
  - Not calculated due to no statistically significant change attributed to the efficiency markers.
- No complications found in either group.
  - Cannot be determined if the guideline provides any benefit in this area.
- Postoperative pain scores
  - Patients in the post-guideline group had higher pain scores but the change was not statistically significant.
  - Data could be impacted by lingering anesthesia effects in the PACU.

  Ketorolac
  - Differences in pain scores was examined with and without Ketorolac.
    37 patients without Ketorolac – average pain score = 3.08
    33 patients with Ketorolac – average pain score = 2.45
    Difference = 0.63 (p = .449)
- Staff Survey: Approximately 20 staff CRNAs.
  - 16 pre-surveys
  - Five post-surveys
  - Chi-square analysis utilized
- No statistically significant changes.
  - Trend of the pre-surveys indicated a gap in communication.
  - Post-surveys demonstrated some improvement in this measure.

CONCLUSIONS

- Although no statistically significant changes were found, the guideline provides current evidence-based practice measures and can assist CRNAs in delivering optimal care to patients undergoing neuro-spine surgery.
- A study on Ketorolac in the spinal surgery population could be beneficial for patients.
- Further development of the project and research into OR inefficiencies during neuro-spine surgeries could be beneficial as well.

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PROGRAMMED INTERMITTENT EPIDURAL BOLUS COMPARED TO CONTINUOUS EPIDURAL INFUSION: AN EVALUATION OF PATIENT OUTCOMES

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ABSTRACT

BACKGROUND

A programmed intermittent epidural bolus (PIEB) has started to replace the continuous epidural infusion (CEI). The PIEB is delivered at a higher pressure, the medication spreads to more dermatomes, preventing it from accumulating, and delivers analgesia with minor motor blockade.

PURPOSE

The aim of this study was to determine if PIEB would decrease the number of rescue boluses, reduce the duration of the second stage of labor, and increase patient coping scores compared to CEI.

METHODS

A retrospective chart review was conducted at a Midwestern tertiary medical center over six months. This case-control design had an intervention group receiving intermittent epidural bolus and a control group receiving a continuous epidural infusion. Data extraction of a randomized sample of 60 laboring women with epidurals was obtained, with 30 women in each group. A 1:1 case-control matching was performed based on age, gravida and para status, and American Society of Anesthesia physical classification (ASA) score. Primary outcomes were the number of rescue boluses, the duration of second stage of labor, and patient coping scores. Comparison results of the two groups was done by *t*-tests.

RESULTS

The intervention group had fewer rescue boluses (p = .03). No statistical difference was shown in the duration of second stage of labor (p = .63) and patient coping percentage (p = .31). The matching criteria of age (p = .73), gravida (p = .79) para (p = .89), and ASA scores (p = 1) were analyzed and showed no statistical significance (see Table 1). This confirms the two groups were matched appropriately to keep the groups equal and did not influence the outcomes data.

CONCLUSIONS

The study showed PIEB decreased the number of rescue boluses. Fewer rescue boluses in the patients with a PIEB can add value to the patient experience and reduces staff workload: both important factors during a pivotal time in the patient's life and during workforce shortages. With this significant outcome, it can be inferred that nurse anesthetists came back to the bedside less often when the epidural setting was PIEB rather than CEI. Furthermore, the duration of second stage of labor and patient coping scores showed no statistical significance between the two groups.

OBJECTIVES

- The epidural setting should reflect best practices.
- If programmed intermittent epidural bolus improves outcomes compared to continuous epidural infusion, then this setting should be universally applied to practice.

PRIMARY OUTCOMES

- Number of rescue boluses
- Duration of second stage of labor
- Coping percentage

PICOT

- The question used to guide this quality improvement project was: In pregnant women in labor aged 18-35 (P), does programmed intermittent epidural bolus with PCEA (I) decrease duration of the second stage of labor by 20 minutes, decrease pain measured by increased coping percentage by 15%, and decrease the number of CRNA rescue boluses by 20% (O), compared to continuous epidural infusion with PCEA (C) in a Midwestern tertiary hospital between September 2021 and April 2022 (T)?

METHODOLOGY

DESIGN

- Quality improvement analysis of an existing evidence-based practice change comparing PIEB vs CEI
- Retrospective chart review
- Case-control design had an intervention group of women receiving PIEB and a control group of women receiving a CEI
- 1:1 matching based on age, gravida/para, and ASA scores

SETTING

- Midwestern tertiary medical center in L&D department

SAMPLE

- 30 laboring women receiving PIEB
- 30 laboring women receiving CEI

RESULTS

- Table1:
  - Matching criteria of age (p = .73), gravida (p = .79) para (p = .89), and ASA scores (p = 1) were analyzed and showed no statistical significance
  - Confirms the two groups were matched appropriately to keep the groups equal and did not influence the outcomes data.
- Table 2:
  - No statistical significance in the other demographic characteristics analyzed such as first time epidural (p = 1), type of labor (p = 1), and type of epidural placement received between the two groups (p = 1)

TABLE 1

Matching Criteria for the CEI and PIEB Groups

Matching Criteria	Entire Sample *M* (SD)	CEI Group *M* (SD)	PIEB Group *M* (SD)	*p* value
Age	28 (4.4)	27.8 (4.9)	28.2 (3.9)	.73
Gravida	2.2 (1.5)	2.1 (1.3)	2.2 (1.6)	.79
Para	.8 (.9)	.7 (.9)	.8 (1)	.89

Matching Criteria	Entire Sample (%)	CEI Group (%)	PIEB Group (%)	*p* value
ASA Score				1
1	1.7	0	3.3	
2	88.3	90	86.7	
3	10	10	10	
4	0	0	0	
5	0	0	0	

TABLE 2

Comparison of Demographic Characteristics Between CEI and PIEB Groups

Characteristics	Entire Sample (%)	CEI Group (%)	PIEB Group (%)	*p* value
First Time Epidural	56.7	56.7	56.7	1
Type of Labor				1
Induced	60	60	60	
Spontaneous	40	40	40	
Type of Epidural				1
CSE Epidural	68.3	70	66.7	
Traditional Epidural	28.3	30	26.7	

Table 3:

- Neither the duration in the second stage of labor (p = .63), nor the coping percentage (χ^2 = 1.02, df = 1, p = .31) showed statistical significance
- Cervical dilation at the time of epidural placement did not show statistical significance between the two groups (p = .08)
- Number of rescue boluses did show statistical significance with PIEB group needed fewer rescue boluses compared to the CEI group (p = .03)
- Bolus dose and concentration had no statistical significance (p = 1).
- No statistical significance was found in patient's ability to cope with labor (χ^2 = 4.17, df = 2, p = .12)

TABLE 3

Comparison of Outcomes Between CEI and PIEB Groups

Outcomes	Entire Sample *M* (SD)	CEI Group *M* (SD)	PIEB Group *M* (SD)	*p* value
Duration of Second Stage of Labor (min)	50.4 (51.9)	53.7 (48.6)	47.1 (55.7)	.63
Number of Rescue Boluses[a]	.24 (0.5)	.36 (.6)	.10 (.3)	.03*
Rescue Bolus Dose (mL) [a]	4.1 (1.4)	3.7 (1.5)	5 (0)	1
Cervical Dilation (cm)	4.1 (1.5)	3.8 (4.1)	4.4 (1.5)	.08

Outcomes	Entire Sample (%)	CEI Group (%)	PIEB Group (%)	*p* value
Coping Percentage				.31
Coping	98.3	96.7	100	
Not Coping	1.7	3.3	0	
Rescue Bolus Concentration[a]				1
Lidocaine 1%	60	57.1	66.7	
Lidocaine 2%	40	42.9	33.3	

DISCUSSION

- Patients who had PIEB received fewer rescue boluses, and these results mirrored previous literature (Fidkowski et al., 2019; Lin et al., 2016; McKenzie et al., 2016)
- It can be inferred that nurse anesthetists came back to the bedside less often when the epidural setting was PIEB rather than CEI
- Fewer rescue boluses in the patients with a PIEB can add value to the patient experience and reduces staff workload: both important factors during a pivotal time in the patient's life and during workforce shortages
- Choosing PIEB may improve staff satisfaction by decreasing the number of call backs to patient bedsides and improving workflow

CONCLUSIONS

- A retrospective chart review was performed and patients that had a PIEB setting had fewer rescue boluses. The duration of second stage of labor and percentage of patients that reported they were effectively coping with labor did not show a statistically significant difference between the two groups. CRNAs can improve workforce labor with the change to PIEB. With fewer rescue boluses given to patients receiving PIEB during labor, these findings support a permanent practice change to PIEB at this organization.

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Pilot Preoperative Education Video for Pediatric Patients

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ABSTRACT

BACKGROUND

Anesthetic induction can cause fear and anxiety in pediatric patients. This can increase anxiety resulting in complications. A preoperative education video can help prepare a child for anesthetic induction. (Baghele et al., 2019; Caumo et al., 2020; Delaney et al., 2015; Fortier et al., 2009, Fronk & Billock, 2020; McEwen et al., 2007; Newell et al., 2020; Rice et al., 2008; Taha & El-Sayed, 2021)

OBJECTIVE

This project aimed to create a pilot preoperative education video to assess the feasibility of creating and implementing a professional video.

METHODS

A video was recorded using an iPad showing a child's experience through perioperative events such as the day surgery room, pre-holding room, the operating room, and the post-anesthesia care unit. A voice-over was used to explain each step. The video was shown to small groups of pediatric patients, parents, and staff. Data were collected utilizing Likert scale surveys and analyzed using descriptive statistics. Narrative comments were evaluated for themes.

RESULTS

Staff had positive reactions to the video, perceived it as accurate, informative, and appropriate for pediatric patients at this institution. Parents found the video the be easy to understand and helpful in preparing them for their child's surgery. Children found the video easy to understand.

CONCLUSIONS

According to positive feedback from staff and parents, it was found that a professional video is not only feasible, but necessary.

OBJECTIVES

The overall purpose of this project was to develop a pilot anesthesia educational video for parents and/or guardians and their children.

RESEARCH QUESTION

- Does parental and staff feedback (P) about a pilot education video (I) support the development of a professional pediatric patient educational video (O) at a Midwestern hospital?

METHODS

DESIGN

- Pilot video was filmed using an iPad and volunteer actors.

SETTING

- Midwestern-tertiary care hospital – perioperative areas
- Scenes included in the video were the entrance to the hospital, day surgery room, pre-holding room. A voice-over was utilized to describe each scene.

SAMPLE

- Staff: anesthesiologists, CRNAs, child life specialists, ENT surgeons, nurses (See Table 1)
- Pediatric patients and parents

DATA COLLECTION

- Staff, parents, and children had individualized anonymous post-viewing surveys

DATA ANALYSIS

- Descriptive statistics
- Narrative comments

RESULTS

- Barrier: low response rate from parents due to declining to stay after clinic appointment to view the video
- The project team changed the video offering from clinic appointment to the day surgery room, on the day of surgery. This increased response rate by 80% (*N* = 6)
- Parents believed the video helped them feel less anxious, better prepared, and more comfortable talking about their child's surgery. They found the information easy to understand
- Children found the video easy to understand while increasing comfort before surgery
- The majority of parents reported that the video would increase their child's preparedness for surgery

RESULTS

NARRATIVE COMMENTS ON STAFF SURVEYS

- "Excellent"
- "Great Idea"
- "Brilliant"
- "Outstanding and much needed. Children being familiarized with the day surgery process before experiencing it is a must. This project will hopefully prompt [healthcare institution] to create a better process for pediatric patients that ensures higher patient satisfaction from them and from their parents."

TABLE 1: Staff Demographic Data

Job Title	Percentage
Surgeon / Physician Assistant	6.7%
Registered nurse/ Surgical assistant/ Scrub technician	20.0%
Anesthesiologist/ CRNA/ Anesthesia technician	60.0%
Child life specialist	13.3 %
Total	100.0%
Years	
0-5	26.7%
6-10	40.0%
11-15	6.7%
> 15	26.7%
Total	100.0%

N = 15

TABLE 2: Staff Likert Scale Results

	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Survey Question	Count	%	Count	%	Count	%	Count	%	Count	%
Q1: Accuracy	0	0	0	0	0	0	7	46.7	8	53.3
Q2: Language	0	0	0	0	1	6.7	7	46.7	7	46.7
Q3: Preparedness	0	0	0	0	0	0	4	26.7	11	73.3
Q4: Patient-centered care	0	0	0	0	0	0	7	46.7	8	53.3
Q5: Offer video in future	0	0	0	0	0	0	4	26.7	11	73.3

N = 15

DISCUSSION

- Based on positive feedback from staff and parents (see Table 2), a new, professional video for pediatric preoperative education is supported
- A professional video could be placed on the patient's portal to allow them to view at their own convenience

STRENGTHS

- Accessibility of video format allowed to be offered at various times.

LIMITATIONS

- Low response rate of parents
- Potential delay in sustainability

CONCLUSIONS

The purpose of this pilot project was to create a new preoperative education video. This aimed to determine the feasibility of creating a larger scale video to implement into practice. The purpose of the video was to decrease preoperative anxiety for the pediatric population, enabling a smooth anesthetic induction and fewer complications. The updated video included a peer-led tour of the facilities and relevant explanations of events the patient may experience on the day of their procedure. The results of this project were in support of a professional video. This can ultimately result in decreased cost of care, shorter length of stay, and improved outcomes for patients.

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MAYO CLINIC

Dexmedetomidine Improves Outcomes for Laparoscopic Cholecystectomy

Password: dexmedetomidine

Administering Dexmedetomidine During Laparoscopic Cholecystectomy Improves Postoperative Outcomes

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INTRODUCTION

- Opioids are important in medicine, though their use can lead to multiple negative effects
- Misuse can have detrimental impacts on the economy and population health
- Dexmedetomidine can decrease opioid consumption and postoperative pain scores while also decreasing postoperative nausea and vomiting (PONV) associated with opioids and general anesthesia

OBJECTIVE

- To evaluate a midwestern institution's use of dexmedetomidine in laparoscopic cholecystectomies and compare the findings to those noted in current literature

METHODS

- Retrospective study, data extracted from 76 patients undergoing laparoscopic cholecystectomy
- There was an even split of 38 patients in both the intervention group, who received dexmedetomidine, and the control group who did not
- Exclusion criteria included pregnancy, chronic opioids consumption, emergent procedures, or those who had received a cumulative dose of less than 0.2 mcg/kg

RESULTS

- Demographic data found in Tables 1 and 2
- Intervention data found in Table 3
- A p-value $\leq$ 0.05 indicates statistical significance

TABLE 1: AGE & WEIGHT

Table 1. Age and weight outcomes for intervention versus control groups

	Age		Weight (kg)	
	Intervention	Control	Intervention	Control
Mean (SD)	45.3 (18.1)	57.1 (15.6)	97.8 (23.9)	92.2 (17.2)
Minimum	18	28	59	53.4
Maximum	85	87	177	130
***p*-value**	0.003		0.24	

Notes: SD = Standard deviation

TABLE 2: GENDER & ASA

Table 2. Gender and ASA outcomes for intervention versus control groups

	Gender	ASA
X^2	1.75	3.60
df	1	3
***p*-value**	0.19	0.31

Notes: X^2 = Chi-Squared test, df = degrees of freedom

TABLE 3: INTERVENTION OUTCOMES

Table 3. Intervention outcomes table for intervention versus control groups

	Cumulative OMEs (mg)	Pain Scores (1-10)	PONV Experienced (%)	Minutes to Extubation	PACU LOS (min)
Intervention	75.6	3.0	7.9	2.4	59.8
Control	80.3	3.5	26.3	2.8	57.6
***p*-value**	0.17	0.40	0.03	0.72	0.69

Notes: LOS = length of stay

CONCLUSION

- This institution could utilize dexmedetomidine differently to decrease opioid consumption
- PONV significantly decreased
- All other intervention data points not significant
- Could this institution utilize dexmedetomidine as part of an ERAS protocol?

ACKNOWLEDGEMENTS

- Thanks to Jessica Peterson, CRNA, PhD and Dr. Patrick Gore, MD for their contribution and support to this project
- Scan the QR code to read our doctorate paper, PowerPoint and references. Password: dexmedetomidine

Evaluating a Multidisciplinary Simulation for Operating Room Personnel

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ABSTRACT

BACKGROUND
A myriad of personnel is required to staff an operating room (OR), each contributing a specific set of knowledge and skills to ensure safe delivery of care during surgery. Without proper professional development and knowledge, gaps in care can occur which increase the potential for patients to experience adverse events. Simulation has been shown to improve team dynamics, interpersonal communication, and prioritization skills (Hibberson et al., 2021).

OBJECTIVE
This program evaluation project explored the current multidisciplinary simulation implemented at a midsized, Midwestern hospital. The goal is to seek evaluation and methods to improve the simulation experience for participants to produce greater knowledge development on simulation topics, communication, and teamwork. In addition, this project aims to improve team performance in response to emergency situations.

METHODS
Pre- and post-simulation surveys were sent out to participants two weeks before and two weeks after simulation, respectively. Surveys contained questions pertaining to participant demographics, perceived knowledge and confidence related to the simulation topic, and knowledge-based questions to assess actual knowledge of the simulation topic. A critical indicator and debrief checklist was utilized to assess performance-based metrics for participants during the simulation and questions to guide debrief and allow participants the opportunity to provide feedback to the multidisciplinary simulation team.

RESULTS
An overall improvement in knowledge occurred following the simulation experience. Difficulty index scores for multiple choice questions demonstrated an increase in knowledge for simulation participants related to the simulation topic. Items completed on the critical indicator checklist demonstrated proficient performance in response to the simulation. Debrief results displayed mixed reviews regarding the current simulation program and recommendations for alterations in the simulation were provided by participants.

CONCLUSIONS
Simulation has been proven to be a beneficial component for continuing education of the multidisciplinary operating room team. While the current simulation program established provided an increase in knowledge and performance on the simulation topic, room for improvement exists. The large size of groups involved provided mixed reviews as participants enjoyed the simulation leadership but desired for an increase in the hands-on nature of simulation.

PICO

For

(P) multidisciplinary operating room personnel at a midsize midwestern hospital

(I)does implementation of a standardized method for evaluating the effectiveness of a multidisciplinary simulation program

(C) compared to no standardized evaluation method

(O) improve staff knowledge and performance for emergencies in the operating room as indicated by a difficulty index score from 40% for pre- to 70% for post-simulation knowledge surveys and completing at least 85% of indicators on a standardized critical indicator and debrief checklist?

METHODS

- **Theory**: NLN Jeffries Simulation Theory (Jeffries et al., 2015)
- **Sample:** Convenience from all OR personnel
- **Evaluation:**
  - Pre- and post-simulation surveys
    - Gather participant demographic data
    - Compare results to determine knowledge improvement
  - Critical indicator and debrief checklist
    - Monitor completion of all simulation aspects
    - Guide for debrief after simulation with response space
  - **Simulation topic:** Undiagnosed Pheochromocytoma

SIMULATION DAY EVALUATION

- See Figure 2 for the Critical Indicator Checklist with results
  - Majority of indicators received 100% completion
  - Evaluations with indicators not completed were missing data
    - Both evaluators were in same OR, however 3rd evaluator in that OR marked as completed generating an inter-rater discrepancy
- Debrief consisted of three questions with top emerging theme reported
  - See Table 2 for the key theme for each question and participant quotes to supporting
  - Question 1: What went well during the simulation?
  - Question 2: What were things during simulation that you felt could have been done better?
  - Question 3: How do you feel your team communicated during this simulation to the effect of emergency response?

PRE- AND POST-SIMULATION SURVEYS

- See Table 1 for demographic data of participants
- Perceived knowledge and confidence rated using Likert scale 1 (*minimal*) to 10 (*high*)
  - Knowledge
    - Pre-simulation: 9/67 reported high
    - Post-simulation: 25/31 reported high
    - $p > .001$
  - Confidence
    - Pre-simulation: 9/67 reported high
    - Post-simulation: 20/31 reported high
    - $p > .001$

TABLE 1: Pre- and Post-Simulation Survey Demographics

Demographics	Pre-Simulation Responses *n* (%)	Post-Simulation Responses *n* (%)
Job title/position		
Surgical staff	10 (15)	2 (6)
Support staff	36 (54)	13 (42)
Anesthesia staff	16 (24)	12 (39)
Other	5 (7)	4 (13)
Years in current position		
0-4 years	22 (33)	14 (45)
5-10 years	24 (36)	12 (39)
11-15 years	8 (12)	2 (6)
16+ years	13 (19)	3 (10)
Prior participation in a pheochromocytoma emergency		
Yes	6 (9)	3 (10)
No	60 (91)[a]	28 (90)

Note [a] One participant failed to answer this question

FIGURE 2

	Expected Actions	Yes	No	Blank	% of Groups Completed
	Communication				
1	Anesthesia communicates patient's deteriorating clinical status to surgeon and circulating nurse	14	1	0	93%
2	Names used to provide direct communication between team members	15	0	0	100%
3	Promptly calls for help	4	1	0	93%
4	Closed-loop communication occurred throughout simulation	13	0	2	100%[a]
	Teamwork				
5	Team leader established	13	0	2	100%[a]
6	Clear roles established by team leader	13	0	2	100%[a]
7	Demonstrates professional respect during emergency response	15	0	0	100%
	Event Specific				
8	Recognition of pheochromocytoma signs/symptoms (HTN, tachycardia or bradycardia, diaphoresis)	15	0	0	100%
9	Recognizes need for arterial line and lab draw (ABG, electrolytes)	15	0	0	100%
10	Promptly recognizes ventricular fibrillation and calls code	15	0	0	100%
11	ACLS algorithm is followed	15	0	0	100%
12	Critical care is consulted for post-cardiac arrest care	15	0	0	100%
13	Considers need for post-arrest cardiology consult	15	0	0	100%

Note [a] Percentages calculated after removing missing data

- Knowledge-based questions: See Figure 1 for difficulty index scores results
  - Question 1: What is a pheochromocytoma?
  - Question 2: What are some signs/symptoms of a pheochromocytoma?
  - Question 3: What lab test is needed to diagnose a pheochromocytoma?
  - Question 4: What are potential triggers for pheochromocytoma manifestations?
  - Question 5: If a cardiac arrest arises, where is the necessary code cart located (within your primary work unit)?
  - Question 6: What discipline should be consulted after a cardiac arrest from hypertensive emergency?

FIGURE 1

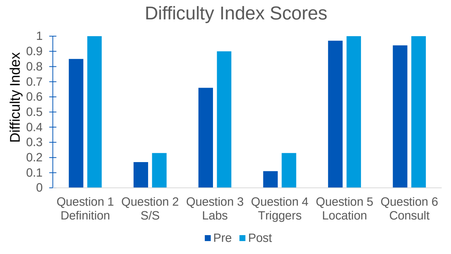

TABLE 2: Debrief Key Themes

Question	Key Theme	Comments
1	High-quality communication	"Open communication/discussion and brainstorming" "Great job by Alex leading, which led to very good, active engagement & conversations"
2	Participant engagement	"More participation-voicing interventions" "Performing an actual simulation as opposed to just talking through things"
3	Good communication	"Very good. We discussed the best way to communicate and gave suggestions" Dissenting view: "not much communication. Have more hands-on activity and role-playing to simulate real communication"

DISCUSSION

- Short term knowledge improvement occurred
  - Recommendation for 6-month post-simulation survey to assess long-term knowledge improvement
- Strengths
  - High participation from multiple disciplines
  - High stakeholder buy-in
- Limitations
  - Variations in survey questions and surveys unpaired causing inability to compare direct participant improvement individually
  - Data transfer errors from REDCap to Excel for data analysis
  - No education on how to complete critical indicator checklist causing inadequate data collection by observers

CONCLUSIONS

- Simulation is useful for OR personnel when properly implemented
  - Improvements occur in staff knowledge of simulation topic
  - Improvements in communication and teamwork occurred
- Mixed reviews on simulation group size
  - Enjoyed simulation being led by multidisciplinary simulation team
  - Desire for more hands-on simulation experience
- Room for improvement in simulation program currently established
  - Multidisciplinary simulation team adopting survey and checklist templates
  - Results will be used to further refine simulation program

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Cost Analysis Following the Implementation of a Nursing-led Ultrasound-guided Peripherally Inserted Intravenous Catheter Program

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Chairperson: Dr. Kathleen M. Elertson, DNP, APNP, CPNP-PC, FNP-BC

UNIVERSITY OF WISCONSIN OSHKOSH
College of Nursing
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Abstract

Purpose:
This quality improvement project evaluated effectiveness of introducing a nursing-led ultrasound-guided peripheral intravenous (USGPIV) program. The project aimed to provide insight into the value of training in a nurse-led USGPIV program.
Design:
Quality improvement project implementing USGPIV program at a rural community hospital. Assessment of RN confidence in using US for IV access in patients with difficult venous access (DVA) while exploring potential cost-savings associated with decreasing anesthesia services related to US use for DVA.
Method:
An ultrasound guided peripheral IV insertion training was implemented with nursing staff. Confidence and utilization ere evaluated at two- and eight-weeks post implementation. Evaluation on overall effectiveness and value related to implementation of nurse-USGPIV program shared with administrative leaders.
Conclusion:
Results were not statistically significant. Participants reported greater confidence in caring for patient with DVA and increased use of USGPIV. The increase in RN use of USGPIV insertion may help decrease frequency of call-in for anesthesia services outside the Surgical department and expenses related to USGPIV access.

Review of Literature

- Rural health communities across the country rely upon around-the-clock-care from anesthesia providers on-call for various in OR and out of the OR services, a workload that in some rural communities can contribute to anesthesia burnout (Cohen, et al. 2021).
- Use of ultrasound by nurses has shown to increase efficiency by decreasing delays in treatment, decreasing frustration for the nurses attempting IV access, and decreasing patient discomfort from undergoing multiple IV attempts (Reeves et al., 2017).
- Patients with difficult venous access (DVA) are more likely to receive an unnecessary central line just for the sake of needing IV access which can put the patient at higher risk for CLABSI along with the risk associated with undergoing a more invasive procedure for intravenous access.
- Reeves et al. (2017), and Morata et al. (2017), align in their findings, in that nurse led USGPIV program can help decrease central line use.
- In reviewing the literature, no documentation looks specifically at the cost associated with anesthesia services related to USGPIV starts, however multiple studies discuss the cost effectiveness in other areas.

PICOT Question

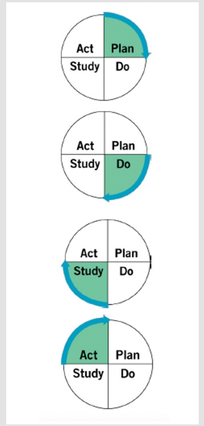
Among hospital USGPIV cannulations, will the introduction of a nurse-led education program regarding ultrasound guided IV catheter insertion compared to the current mode of care, report decreased use of anesthesia services regarding ultrasound guided peripheral IV cannulations two months after implementation of the program?

Methods

- An USGPIV educational module was provided to RN volunteers from multiple units at the project site.
- A post test was utilized at two and eight weeks to assess learner utilization of skills, confidence and report of utilization.
- Data regarding confidence and use of US for IV access between two weeks and eight weeks post implementation of the education module were evaluated through unpaired t-test analysis with statistical significance determined by a P-value < 0.05.
- Cost analysis of the education module included analysis of call-in pay for Certified Registered Nurse Anesthesiologist (CRNA) with hourly estimated at $111.21 and Physician Anesthesiologist at $196.57 (US Bureau of Labor Statistics, 2021) compared to routine hospital charges.

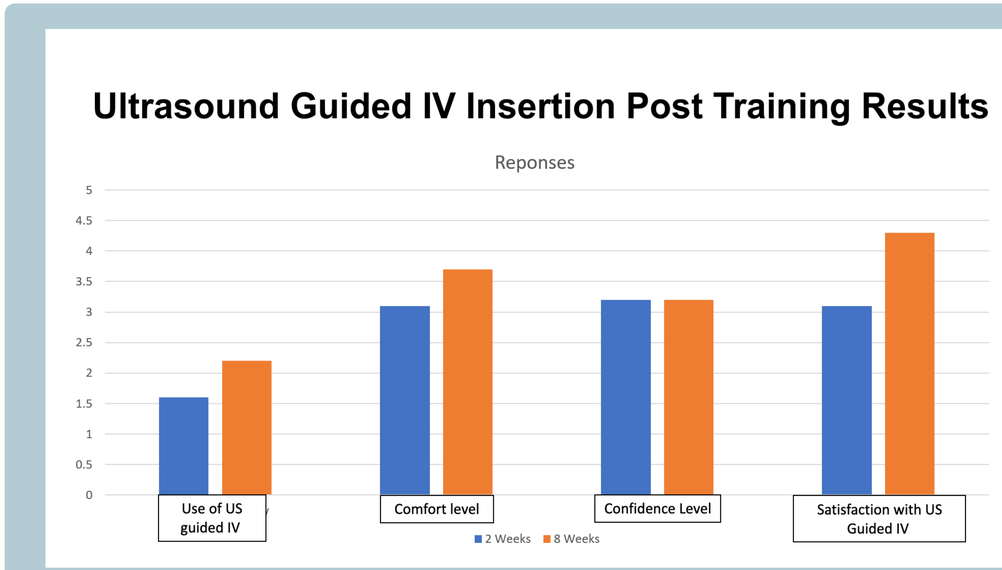
Theoretical Model

Following the Institute for Healthcare Improvement Model, the Plan Do Study Act (PDSA) model will be utilized.
PLAN: Volunteer nurses will be offered an USGPIV education module
DO: Train RN staff on USGPIV insertion
STUDY: Evaluate data pre and post implementation of project.
ACT: After cost-analysis has been completed, the institution can choose to continue the USGPIV program, make necessary changes to improve the program and repeat the cycle if desired.



Results

- Analysis of post implementation survey response to evaluate impact of the education module at two- and eight- weeks. Unpaired *t-test value* of 0.81929, *p-value* of 0.24936 were not significant at p <.05
- Participants reported increased confidence, comfort and satisfaction in use of US for difficult IV access.



Implications for Practice

- Although the results were not statistically significant, the project demonstrated success.
- Training and response to the new skill is valuable to the organization.
- The training and subsequent skill improvement has improved patient experience and decreased wait times for vascular access.
- Training increased satisfaction among nursing staff related to difficult intravenous access.
- Ultrasound guided IV access is a valuable resource in clinical practice.
- The value analysis of a USGPIV program can be evaluated in multiple ways, dependent on organizational factors.

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Acknowledgements

- The USGPIV education module was created in partnership with Kimberly Huth, RN, BSN, RRNA

Benefits of a Positive Mindset on the Mental Health and Well-Being of Student Registered Nurse Anesthetists

University of Wisconsin-Oshkosh College of Nursing
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Chairperson: Dr. Timothy Wren, DNP

Abstract

Purpose: The goal of this quality improvement project was to identify if providing wellness interventions to University of Wisconsin Oshkosh Student Registered Nurse Anesthetists (SRNAs) would reduce stress levels and improve overall well-being.

Design: This QI project implemented in UWO SRNA Cohorts 2024 and 2025 incorporated a learning module highlighting the benefits of positive psychology and a hands-on wellness activity where students built an emotions portfolio.

Methodology: The Perceived Stress Scale (PSS) and Warwick-Edinburg Mental Well-being Scale (WEMWBS) were used to determine levels of stress and overall well-being. The anonymous surveys were taken pre intervention and at 1- and 3-months post.

Conclusion: Results suggested no statistically significant decrease in level of stress or significant improvement in mental well-being.

PICOT Question

Among current University of Wisconsin Oshkosh Student Registered Nurse Anesthetists (P), does providing positive psychology wellness interventions (I) in comparison to no wellness interventions (C) result in decreased reports of stress and anxiety and an overall increase in well-being (O) during their time in anesthesia school (T)?

Introduction & Background

- Graduate students, particularly those enrolled in Nurse Anesthesia Programs, face considerable amounts of stress during their course of study. While research regarding the mental health and well-being of medical students is prevalent, it lacks for SRNAs.
- Poorly controlled psychological distress may have impending consequences such as poor mental quality of life, suicidal thoughts, burnout, fatigue, and other physiological symptoms.
- A wellness culture is crucial to decrease burnout and enhance well-being of clinicians and learners. If clinicians and learners are supported and encouraged to take care of themselves, it results in improved healthcare quality and safe patient care.
- Improved well-being is associated with better self regulation and coping mechanisms, better work performance, more satisfying relationships, stronger immune systems, better physical health, greater self control, lower levels of burnout, fewer sleeping problems, reduced cardiovascular mortality, and longer life expectancy

Review of Literature

- While healthy levels of stress and anxiety may foster motivation in SRNAs, prolonged and poorly controlled psychological distress can have impending consequences such as poor mental quality of life, suicidal thoughts, burnout, fatigue, and other physiological symptoms (Mesisca & Mainwaring, 2021).
- Mentally unfit students experience greater decline in health, may have issues with complex tasks, poor academic performance, and decreased productivity (Chipas et. al., 2012).
- A well-known cross-sectional study by Chipas et al. (2012) consisted of 1,282 participants. Analysis revealed 47.3% of SRNAs reported being depressed at some point during the program and 21.2% had suicidal ideation.
- Substance abuse and misuse remains a common theme in the SRNA population to inappropriately cope with the compounding stressors of anesthesia school (Chipas et al., 2012).
- To create a system of change, individual wellness and resiliency skills need to be taught during training and become part of the organizations culture, allowing for seamless implementation of these skills over time (Coffey et al., 2017).
- When clinicians and learners are supported and encouraged to take care of themselves, it results in improved healthcare quality and safe patient care (Melnyk, 2020).
- It is of high importance to increase awareness of student distress, facilitating open discussion and limiting the negative views of mental health and reiterate the need for wellness interventions in graduate programs (Mesisca & Mainwaring, 2021).

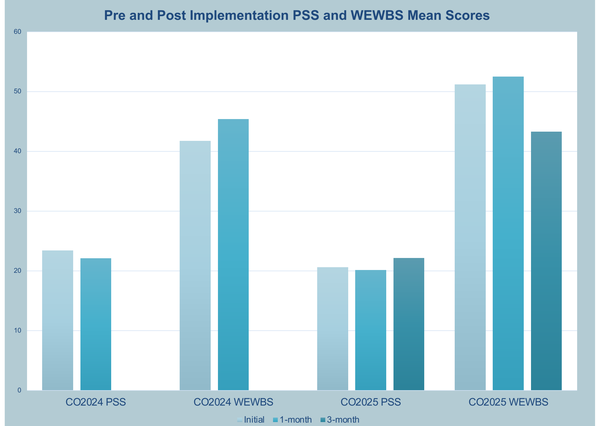
Theoretical Model

The PERMA theory of well-being, developed by Dr. Martin Seligman, operates as the theoretical model for this DNP project. Seligman's well-being theory is composed of five key foundations: positive emotion, engagement, meaning, positive relationships and accomplishment. Positive psychology wellness interventions impact these five elements and allow the student to experience improved well-being.

Methodology

- Sample population included UWO SRNA Cohort 2024 (n = 18) and Cohort 2025 (n = 17).
- The intervention consisted of a PowerPoint presentation highlighting the practice and benefits of positive psychology followed by a hands-on wellness intervention where students created a wellness portfolio.
- The 14-item likert style Warwick Edinburg Mental Wellbeing Scale was taken by participants pre-intervention and 1-and-3 months post to identify overall well-being. (scale range 14-70, higher scores correlating with increased well-being
- The 10-item Perceived Stress Scale was taken by participants pre-intervention and 1-and-3 months post to identify levels of stress. (scale range 0-40, higher scores correlating with increased stress

Results



- CO2024 showed a decrease in stress level from pre-intervention (M = 23.39) to 1-month post (M = 22.08), but results were not statistically significant (p = 0.208).
- CO2024 overall well-being improved from pre-intervention (M = 41.72) to 1-month post (M = 45.38), but results were not statistically significant (p = 0.077).
- There was limited participation from CO2024 at 3-months post therefore not data is available.
- CO2025 showed a slight decrease in level of stress from pre-intervention (M = 20.59) to 1-month post (M = 20.15), but results were not significant (p = 0.765). There was an increased level of stress at 3-months post (M = 22.13), but the increase was not significant (p = 0.217).
- CO2025 showed improved well-being from pre-intervention (M = 51.19) to 1-month post (M = 52.50), but results were not significant (p = 0.667). There was a significant decrease in overall well-being at 3 months post (M = 43.27, p = 0.002).

Implications for Practice

- Recommend further research that focuses on interventions that mitigate the stress associated with anesthesia training and overall improves the well-being of SRNAs.
- Adapting anesthesia program curriculum to include positive psychology and other wellness interventions that support SRNAs during their training.
- Self-care is mandated by the American Nurses Association as part of provision 5 in the Code of Ethics for Nurses and is now a domain in the New Essentials.
- Self-care can decrease stress and improve well-being which promotes safe and higher quality care

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Measuring the Efficacy of an Educational Module for Registered Nurses on Ultrasound Guidance for Insertion of Peripheral Intravenous Catheters

University of Wisconsin–Oshkosh College of Nursing
Kimberly J. Huth, BSN, RN, RRNA
Chairperson: Dr. Timothy Wren, DNP

Abstract

Purpose: The goal of this Quality Improvement (QI) Project was to evaluate the effectiveness of an evidence-based ultrasound guided (USG) peripheral Intravenous Catheterization (PIVC) educational module using a blended education model on registered nurses'(RNs) comprehension and performance of this skill.

Design: This QI project implemented at MMC Beaver Dam Hospital incorporated a didactic, foundational knowledge portion, partnered with an interactive educational hands-on curriculum facilitated with the practice of phantom limbs and immediate instructor feedback.

Methodology: An anonymous pre and post module 5-point Likert Scale Assessment was utilized to compare the impact of this educational module using a blended educational model on RN's comprehension and evaluation of the implemented education.

Conclusion: Analysis of pre and post Likert Assessment scale data revealed a statistically significant impact in increasing the RNs' knowledge and ability to use USG for PIVC insertion.

Introduction & Background

- Insertion of PIVC is the most routine invasive procedure required in 80% of all hospital admissions (Salinas et al., 2021).
- Failure to successfully insert PIVC results in delay of treatment, patient dissatisfaction, and use of unnecessary resources and time (Salinas et al., 2021).
- An analysis of over 1,000 CVC insertions at a Level 1 trauma center yielded 43% due to lack of PIVC access (Reeves et al., 2017).
- Up to 30% of hospital admissions qualify as difficult PIVC placements (Duran-Gehring, 2016).
- The average attempts for a difficult PIVC insertion by a RN is greater than five (Salinas et al., 2021).
- PIVC attempts should not exceed 2 tries by 1 RN per the *2019 Infusion Nursing Standards of Practice* (Nickel, 2019).
- Benefits of implementing this QI educational module include decreasing time to patient treatment, preventing the need for invasive lines and their associated side effects, and preserving anesthesia provider time and resources (Salinas et al., 2021).

PICOT Question

Among registered nurses working in a rural hospital **(P)**, what is the result of participation in a comprehensive educational module on evidence-based ultrasound guided intravenous catheter insertion **(I)** compared to lack of existing education **(C)**, on affecting this populations' comprehension and performance of IV insertion **(O)** following conclusion of the educational module **(T)**?

Project Framework

- Kurt Lewin's Change Process Theory: *Unfreezing, Moving, Refreezing,* provided the foundational framework of this project by incorporating both social behavior and change when implementing a system process change (Lewin, 1947).

(Wojciechowski et al., 2016)

Review of the Literature

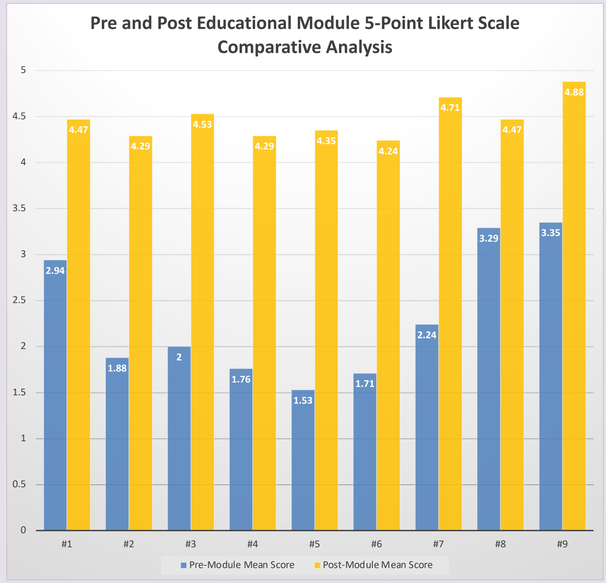
- A lack of education provided to RNs using USG to place difficult PIVCs exists in nursing curriculum (Kaganovskaya & Wuerz, 2021).
- Professional nursing organizations (Association for Vascular Access and American Association of Critical Care Nurses) are providing teaching for nurses (Kaganovskaya & Wuerz, 2021)
- A systematic review revealed competency of USG for PIVC insertion following combination of didactic and hands-on competency training (Loon et al., 2019).
- Following education on the use of USG, studies have shown a 72% increase in PIVC successful insertion rates (Kaganovskaya & Wuerz, 2021).
- A 50% decrease of PIVC attempts following a QI USG training program was observed (Salinas et al., 2021).
- A systematic review conducted by Salinas et al. (2021) yielded a 20% increase in patient satisfaction score as a direct result of USG for PIVC.

Methodology

- Application for Determination of Human Subjects was declared exempt by Marshfield IRB and UW-Oshkosh IRB.
- Sample population: 17 RNs from PACU, ICU, Medical-Surgical, and ED inclusive of all experience, age, ethnicity, genders, and working shifts.

- A 9-question, 5-point Likert scale assessment was administered prior to the educational module.
- The educational module began with a foundational didactic portion via PowerPoint presentation.
- An interactive, hands-on curriculum followed with the use of phantom limbs and preceptor feedback, ending with competency skill analysis
- A debriefing segment provided for questions and feedback.
- An identical post module Likert Scale Assessment concluded for comparative analysis of its effects.

Results



- Unanimous significant p-value of <0.001 was yielded for each of the nine Likert Scale assessments on the 5-point scale.
- Pre and post comparison of mean scores revealed an average 2.17 point increase per each Likert Scale assessment.
- Greatest increase in mean comparative score was 2.82 points associated with identifying/demonstrating in-plane and out-of-plane needle techniques.
- The null hypothesis with significance value of p<0.05 was rejected.
- Conclusion of data results: A statistically significant difference in nurses' subjective comprehension and performance of IV insertion using USG exists upon measuring the efficacy of implementation of this educational module.
- Continued support for the effectiveness of this blended educational module to provide USG to RNs to improve the success rates for PIVC insertion.
- A PACU nurse was appointed by the facility as an internal USG champion to be a resource for nurses and track continued use of USG for PIVC insertion.

Implications for Practice

- PICOT Question Answered: Statistically significant efficacy occurred when using a blended educational model to provide USG training to RNs.
- Conclusions: Blended educational model is an effective tool in providing education to RNs as demonstrated through the skill of using USG for PIVC insertion.
- This project provides the means to incorporate this education into RN orientation at the facility, demonstrating *refreezing step* of continued education and standard of care of Project Framework full circle.
- Recommendations: Continued integration of blended education to incorporate USG training into RN curriculum.
- Educational tool can be applied to many avenues and nursing skills to facilitate continued RN education and expansion of the nursing field.

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Bridging the Gap: Advancing Operating Room Nurses' Understanding of Anesthesia Cues Guiding Safe Patient Management Under General Anesthesia

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Chairperson: Dr. Kathleen Wren, PhD, CRNA

Abstract

Purpose:
This quality improvement project was designed to evaluate the effectiveness of an educational module describing the continuum of depth of sedation and basic anesthesia equipment, assessing changes in perioperative nurses' knowledge and awareness of intraoperative anesthesia events.

Design:
The educational module was presented to operating room (OR) nursing staff at two different hospitals. Pre- and post-test surveys modeled after a five-point Likert-derived questionnaire were used to evaluate the effectiveness of the education module and the nurses' knowledge change.

Method:
Ordinal data was collected during the hour-long educational session. Pre- and post-test surveys were completed and then analyzed by constructing frequency distributions of the nurses' self-reports. The pre- and post-test comparison evaluated for change in the nurses' ability to understand basic anesthesia information and identify anesthesia equipment.

Conclusion: Project results suggested that education regarding the stages of anesthesia and basic anesthesia equipment improved the nurses' self-reports of knowledge and awareness of anesthesia cues in the OR environment.

Review of Literature

- The OR nurse's scope of practice in relation to intraoperative anesthesia cares is not clearly defined in the literature.
- Jeon et al. (2020) identify an existing education gap regarding anesthesia nursing within general nursing curriculum that transcends to a practice gap in the OR.
- The OR registered nurse (RN) is typically expected to assist the anesthesia provider, warranting a basic understanding of anesthesia equipment and materials necessary for the planned surgery and anesthetic type (Lemos et al., 2017; Neyens et al., 2019).
- The perioperative RN shares accountability for patient safety; contributing informed assistance in anesthesia care optimizes patient safety and multidisciplinary care coordination (Neyens et al., 2019).
- Anesthesia induction and emergence warrant paramount vigilance from the OR nurse while the anesthesia provider secures the patient's airway (Lemos et al., 2017).
- If the continuum of depth of sedation is not appropriately navigated by OR staff, the patient is subject to amplified risk of adverse events (Jeon et al., 2020; Lemos & Poveda, 2020).

Theoretical Model

The Plan-Do-Study-Act (PDSA) cycle served as an improvement model framework to first identify the OR nursing anesthesia education gap, then involve related team members (OR leadership and RNs), establish measures to assess the educational intervention, and ultimately test the effectiveness of the education.

PICOT Question

Among operating room (OR) nursing staff (P), how does an educational module explaining the continuum of depth of sedation and basic general anesthesia equipment (I), compared to current practice of no targeted anesthesia education (C), affect OR nurses' comprehension of intraoperative anesthesia interventions (O) immediately after the educational session (T)?

Project Setting

- Two urban medical centers in the Midwestern United States
- Previously, the OR staff had no formal anesthesia education integrated in their staff development efforts.

Methodology

OR nurse participants completed a pre-test survey regarding basic intraoperative anesthesia events and equipment, then participated in the general anesthesia educational intervention.

Presented via PowerPoint, the education module provided an overview of safe patient progression through the four stages of anesthesia according to the continuum of depth of sedation and an introductory demonstration of basic anesthesia equipment. Opportunities for RN collaboration in intraoperative anesthesia cares were discussed.

The post-test was provided to perioperative nurse participants. The post-test included the same questions as the pre-test to comparatively measure the education's impact.

Participant Demographics

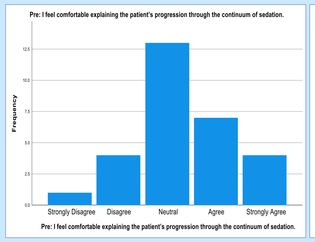
The OR nursing staff present for the education module presentation were employed by the participating urban medical centers. Participant demographics were de-identified and the nurses' highest attained level of nursing education was recorded. Of the 29 total OR nurse participants, 9 had obtained an associate degree, 19 had a bachelor degree, and 1 had a master's degree.

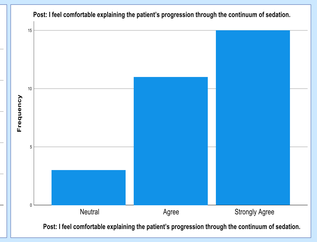
Results

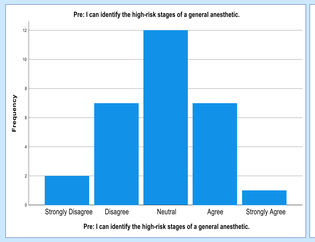
- Total OR nurse participants N = 29
- Pre- and post-test surveys were compared by constructing frequency distributions of the participants' self-reports to evaluate the impact of the educational intervention.
- The frequency distributions yielded a positive change from pre- to post-test evaluations evidenced by an increased percentage of self-reported "strongly agree" responses for all survey questions.

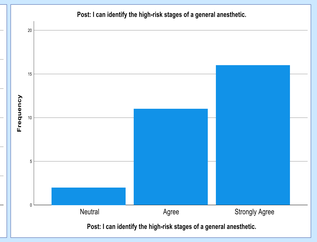
Question	PRE										POST									
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree		Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1. I have assisted anesthesia providers with airway interventions.	24	82.8%	5	17.2%							25	86.2%	4	13.8%						
2. I understand my role in assisting anesthesia providers with airway securement.	20	69.0%	9	31.0%							24	82.8%	5	17.2%						
3. I feel comfortable explaining the patient's progression through the continuum of sedation.	4	13.8%	7	24.1%	13	44.8%	4	13.8%	1	3.4%	15	51.7%	11	37.9%	3	10.3%				
4. I can identify the high-risk stages of a general anesthetic.	1	3.4%	7	24.1%	12	41.4%	7	24.1%	2	6.9%	16	55.2%	11	37.9%	2	6.9%				
5. I understand my role during the period of anesthesia induction.	19	65.5%	7	24.1%	3	10.3%					22	75.9%	7	24.1%						
6. I understand my role during the period of anesthesia emergence.	15	51.7%	9	31.0%	3	10.3%	2	6.9%			21	72.4%	8	27.6%						
7. I believe that basic anesthesia knowledge is applicable to my scope of practice.	20	69.0%	7	24.1%	2	6.9%					24	82.8%	4	13.8%	1	3.4%				
8. I feel confident in assisting the anesthesia provider during an airway emergency.	8	27.6%	17	58.6%	2	6.9%	2	6.9%			19	65.5%	9	31.0%	1	3.4%				
9. I would recommend this educational module for future employee education.	15	51.7%	11	37.9%	3	10.3%					26	89.7%	3	10.3%						

- Two survey items producing the most diverse pre-test response distributions demonstrated the most improved post-test responses. This change suggests item clarification or knowledge improvement following the education.
  - "I feel comfortable explaining the patient's progression through the continuum of sedation"
  - "I can identify the high-risk stages of a general anesthetic"









Implications for Practice

- 89.7% of participants strongly agreed to recommending the anesthesia education for future OR RN employee education.
- Presented opportunities for diversification of the OR nurse role relating to intraoperative anesthesia cares warrants investigation of RN scope of practice, which likely varies across healthcare settings.
- <u>Recommendations for intervention improvement:</u>
  - Revise the educational module and survey questions to clarify intervention intent.
  - Distribute educational materials via email or print-out for participant reference and note-taking.
  - Address attitudes resistant to change considering proposed overlap of nursing with intraoperative anesthesia cares.

Conclusion

The tailored education intervention yielded positive change and improved nurse participants' self-reports of understanding and comfort associated with basic intraoperative anesthetic cares. The identified anesthesia nursing educational gap provided an opportunity to advance OR nursing competence and confidence when assisting the anesthesia provider to facilitate safe and efficient patient care.

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An Educational Module to Increase Perioperative Staff's Knowledge about Basic Anesthesia Equipment to Improve Emergency Preparedness

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Project Chair: Dr. Kathleen Wren, PhD, CRNA

Abstract

Purpose:
This quality improvement project seeks to provide education to the perioperative staff promoting a culture of safety through an improved knowledge base about anesthesia equipment and their role in assisting the trained airway professional during untoward events.

Design:
A pre and posttest Likert scale design was used to evaluate the effectiveness of the educational module presented on anesthesia airway equipment.

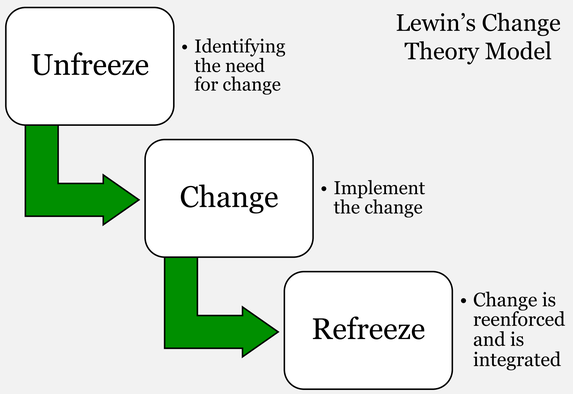
Method:
Data was pre and post educational presentation. Both the pre and post test data was analyzed to determine the overall successfulness of the education and staff's self assessed increase in knowledge.

Conclusion:
These findings indicate staff satisfaction with this education and suggest that continued use for employee on boarding would be beneficial.

Introduction & Background

- Hypoxia, laryngospasm, and aspiration are common untoward events that can occur in the ambulatory surgery center as well as the hospital operating room (Nagelhout & Elisha, 2018; Luba, Apfelbaum, & Cutter, 2013).
- Non-anesthesia staff in the operating room are essential helping hands during airway emergencies (Alfredsdottir & Bjornsdottir, 2007).
- Perioperative staff have cited that a culture promoting prevention and protection of patients against untoward events is at the forefront of their role (Alfredsdottir & Bjornsdottir, 2007).
- Perioperative staff are not routinely provided anesthesia airway equipment education although they routinely assist during airway securement.
- Increasing their knowledge of the equipment will enhance the understanding of their role and ultimately mitigate threats to patient safety (Alfredsdottir & Bjornsdottir, 2007).

Theoretical Framework



Project Setting

- This project took place in two urban hospitals, one located in Oshkosh, Wisconsin and the other in Appleton, Wisconsin.
- Registered Nurses and Surgical Technicians were both included in the population given both groups are typically present in the operating room during airway securement.
- These groups are expected to help during intubation and airway emergencies but neither institution routinely provides staff with basic anesthesia equipment education.

Methodology

Initial Likert scale pre-test was taken by participants prior to the education module to gauge baseline knowledge.

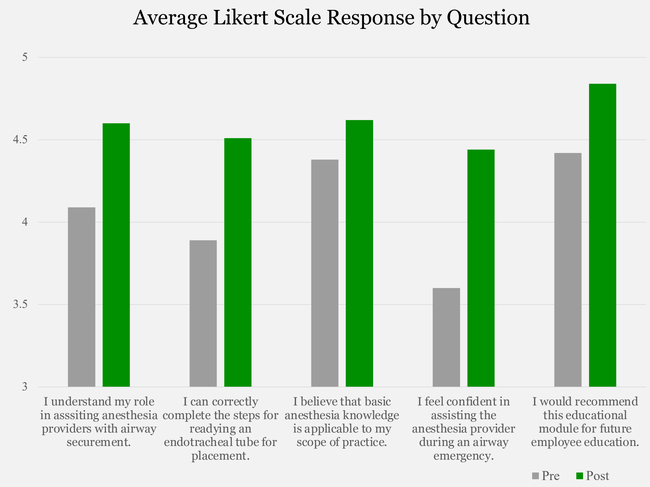
The education was provided via PowerPoint presentation with slides including information on routine airway equipment and difficult airway adjuncts. Hands on demonstration with equipment and scenario discussion was included.

An identical Likert scale post-test was taken after the provided education to assess knowledge gained.

Review of Literature

- Safe transitions between phases of care in the operating room (i.e. induction through emergence) is key to a successful case (Wakeman & Langham, 2018).
- Coordinated effort between all members of the perioperative team during untoward airway events helps improve patient outcomes (Bjurstom et al., 2019).
- Perioperative staff have specifically identified the lack of information and knowledge as a barriers to providing the best and safest patient care (Alfredsdottir & Bjornsdottir, 2007).
- Staff have identified that their personal competence in technical skills and preparation for the case are most important to their role in the operating room (Wakeman & Langham, 2018).
- Little research exists regarding successful implementation of basic anesthesia equipment education to perioperative staff.

Results



- Ordinal data was obtained via utilization of a 5-point Likert scale pre and post survey to assess participants baseline knowledge and confidence regarding anesthesia equipment and assistance.
- The mean years of clinical experience for participants was 10.18 +/- 9.682 years.
- There was a weak, positive correlation between years of clinical experience post-rating ($r=0.249$, $p<.05$).
- Based on the results of the 'paired samples test' on average participants responses improved by 0.53 in the Likert scale response ($P< 0.003$).
- There was a significant difference in pre- and post- ratings for questions 2 ($t_{44}=-3.458$, $p<.001$), 3 ($t_{44}=-4.346$, $p<.001$), 8 ($t_{44}=-3.100$, $p=.002$), 9 ($t_{44}=-6.103$, $p<.001$), and 10 ($t_{44}=-4.313$, $p<.001$).
- On average the post survey questions saw a 43% standard deviation improvement in the Likert scale response ($P<0.001$).
- Based on paired sample effect size test results, on average the post survey responses were nearly a full standard deviation better compared to the pre survey responses.
  - Supported by an average Cohen's d of 0.81 and Hedges' correction of 0.82
- There were large effect sizes for the differences in pre- and post-ratings for questions 2 ($d=.991$), 3 ($d=.960$), and 9 ($d=.928$). There were moderate effect sizes noted for the difference in ratings for questions 8 ($d=.529$) and 10 ($d=.657$).

Implications for Practice

- Basic anesthesia equipment knowledge and education increases the intraoperative staff's confidence when assisting during an airway emergency.
- Both Registered Nurses and Surgical Technicians in the operating room believe basic anesthesia equipment knowledge and education is applicable to their role.
- Enhanced coordination of all perioperative staff during airway emergencies improves patient outcomes (Bjurstom et al., 2019).
- Anesthesia equipment knowledge may also be useful beyond the perioperative setting in other environments where airway securements occur i.e., labor and delivery.

PICOT Question

Among perioperative staff (Population), how does an educational module explaining basic anesthesia equipment (Intervention) compared to no education (Comparison), impact intraoperative staff's confidence in responsiveness to anesthesia emergencies in the operating room (Outcome) after implementation of the education (Time)?

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I would like to recognize my DNP project chairperson, Dr. Kathleen Wren, for all her support. Thank you to our local hospitals who allowed me to educate their staff through my project and to all the voluntary participants without whom this project would not have been possible.

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