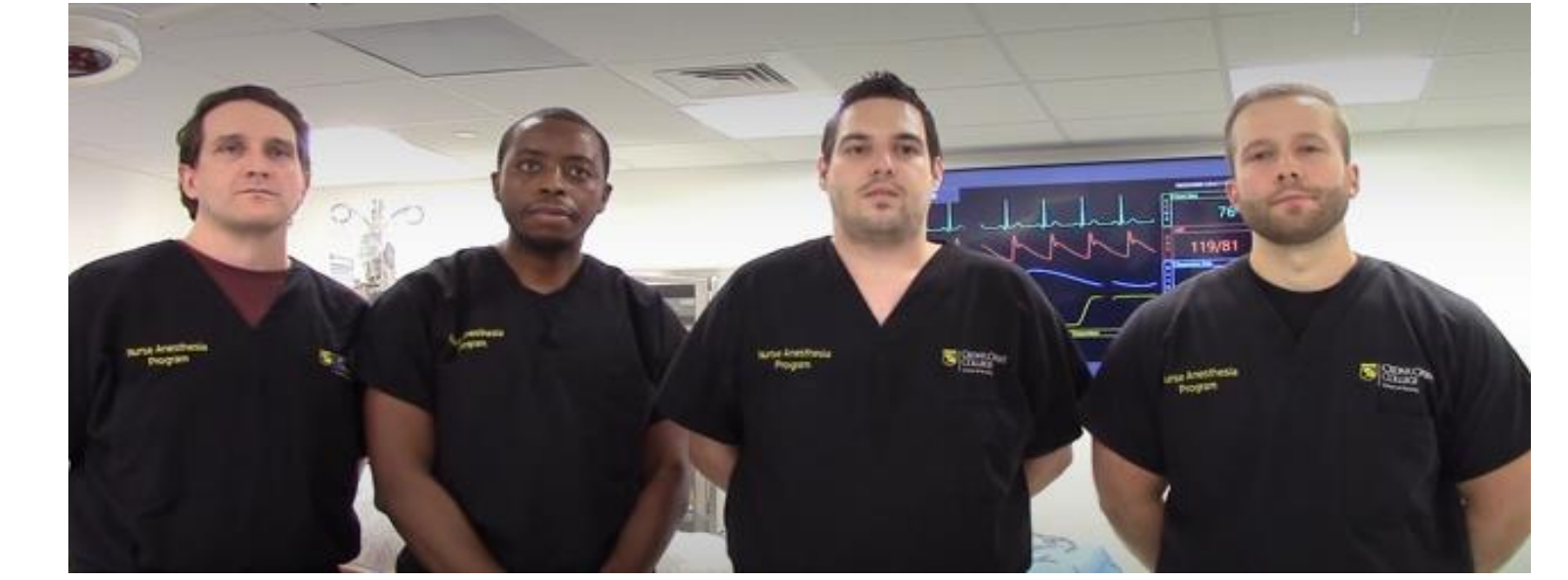# Efficacy of a Multimedia Educational Module on Best Practices of Anesthesia Patient Safety

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Background

o The Institute of Medicine set a goal that by 2020, 90% of all clinical decisions are to be supported by accurate and timely evidence-based research (Lehane et al., 2019).

o E-learning is an efficient way of translating EBP findings into current practice (Elkman, 2018). Nursing learners are both satisfied with virtual learning and find it an effective means of education (Rouleau et al., 2019).

o Anesthesia providers' need to ensure patient safety is maintained and continually update standards of care with EBP. The COVID-19 pandemic placed an insurmountable amount of stress on the healthcare delivery system and DNP projects were unable to be carried out in the clinical setting
  o A group of senior student registered nurse anesthetists (SRNAs) created a multimedia simulation-based educational module on four EBPs for anesthesia patient safety during the perioperative period

o Corneal abrasion (CA) - most common eye complications during general anesthesia. Prevalence ranges from 0% to 44% without prophylactic measures.
  o EBP recommendations include taping the eyelids after induction, careful application and removal of tape, and developing educational initiatives to increase providers knowledge on CA risk factors (Grixti et al., 2013; Papp et al. 2019).

o Intraoperative lidocaine infusions shown to reduce opioid consumption, postoperative constipation, nausea/vomiting, ileus, and pruritus, and length of hospital stay when compared to opioid monotherapy (Cooke et al., 2019; Eipe et al., 2016; Moeen & Moeen, 2019).

o Quantitative neuromuscular monitoring allows for an objective real-time measure of neuromuscular responses to train of four (TOF) stimulation - and more accurate when compared to the traditionally used peripheral nerve stimulator (Bhananker et al., 2015; Grabitz et al., 2019).

o Neuromuscular blocking agents (NMBAs) and reversal agents should be dosed based on the level of blockade and quantitative measurement. A protocol for dosing reversal agents, based on level of blockade, helps reduce anesthesia provider-to-anesthesia provider variability and residual muscle weakness (Brull & Kopman, 2017; Rudolph et al., 2018).

Purpose

1. To improve anesthesia providers' knowledge on topics of anesthesia safety which include corneal abrasion prevention, intraoperative lidocaine infusions, the use of quantitative neuromuscular monitoring, and timing/dosing of reversal agents through a multimedia educational intervention

2. Create a willingness to change one's clinical practice based on EBP recommendations

PICO Question

In anesthesia providers, does a multimedia simulation-based educational intervention increase knowledge about current best practice for patient safety, monitoring, and administering neuromuscular blocking reversal agents in accordance with evidence-based practice (EBP) guidance?

Methodology

o Collaboration with multi-institutional anesthesia stakeholders, leaders, coordinators, providers, and educators occurred to obtain common patient safety concerns within the clinical arena

o Cognitive Theory of Multimedia Learning (CTML) was used to develop the module to bridge the gap between purposeful learning and the human mind

o Multimedia education module: four-10-minute EBP anesthesia patient safety videos with supplemental materials, one-12-minute simulation-based scenario demonstrating the patient safety recommendations

o Pre-test/post-test survey design to compare provider's knowledge and attitudes on anesthesia patient safety
  o Pre-test 10-item survey: 2 demographic, 6 knowledge-based and 2 current participant practice questions
  o Post-test 10-item survey: 7 knowledge-based and 3 willingness to change practice questions

o Implemented over a two-week period from January 23, 2021 to February 5, 2021 to permit for adequate time to complete the modules and surveys

o A convenience sample of 40 anesthesia professionals were invited via email to participate

Results

o 40 anesthesia professionals were invited, 60% (N = 24) were full participants in the project with varying levels of experience:

Table 1
Demographics

	n	% Total	Category	n	%Total
Anesthesia Role: MDA	4	16.67%	Years of Experience: 0-5 years	16	66.67%
CRNA	8	33.33%	6-10 years	5	20.83%
SRNA	12	50.00%	11-15 years	3	12.50%
Total Sample Size:	24	100.00%	Total:	24	100.00%

Table 2
Current Practices

Question:	n	% Total
Current methodology to assess neuromuscular paralysis: Qualitative:	22	91.67%
Quantitative:	2	8.33%
Total:	24	100.00%
Intraoperative use of Multimodal Lidocaine Infusions: Yes:	8	33.33%
No:	16	66.67%
Total:	24	100.00%

Anesthesia Provider Role — MDA, CRNA, SRNA
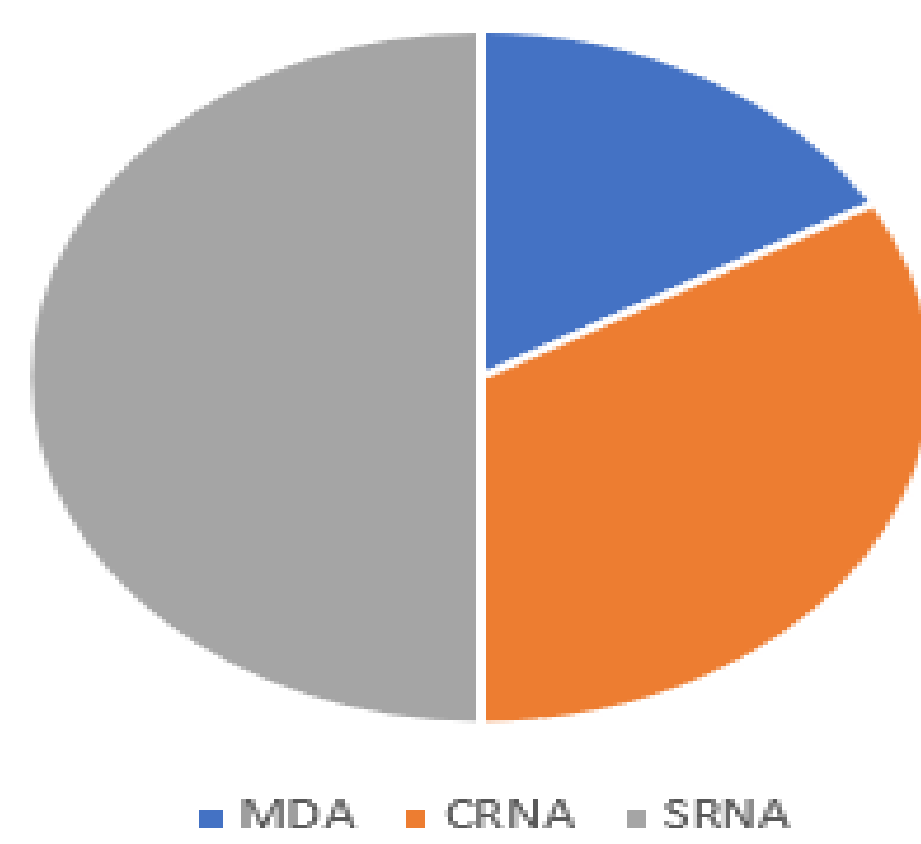
Percentages of Correct Responses for Knowledge-Based Questions — Pre-Survey / Post-Survey: Corneal Abrasions #1 (62%, 91%), Corneal Abrasions #2 (37%, 91%), Train of Four #1 (70%, 75%), Reversal Dosage (33%, 83%), Train of Four #2 (91%, 95%), Lidocaine (50%, 100%)

Years of Experience — 0-5 Years, 6-10 Years, 11-15 Years
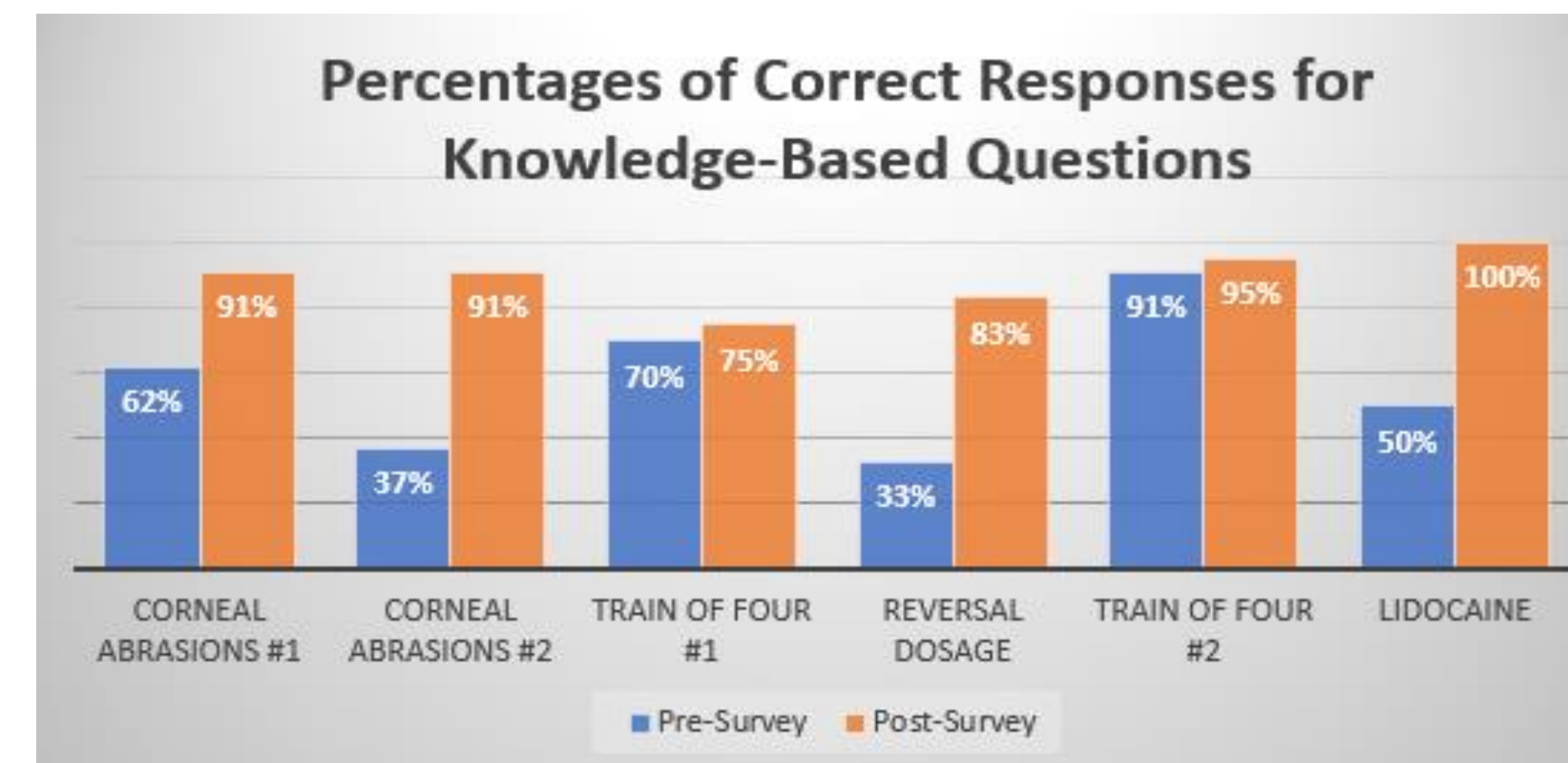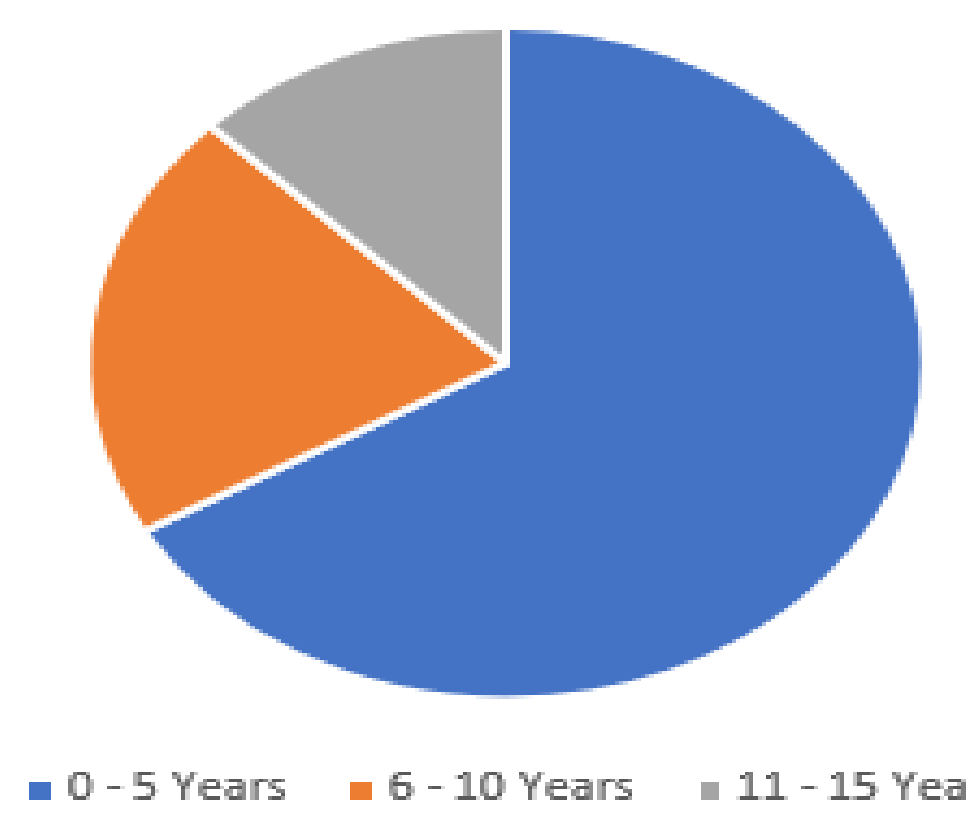
Knowledge-based Questions
o McNemar's Test used to evaluate the frequency of correct responses in each of the pre/post survey knowledge-based questions pairs

Table 3:
Frequency of correct responses

Question	Pretest	Post-test	Significance	Question	Pretest	Post-test	Significance
Corneal Abrasions #1	15	22	p = 0.002*	Reversal Dosing	8	20	p = 0.004*
Corneal Abrasions #2	9	22	p = 0.016*	Train of Four #2	22	23	p= 1.000
Train of Four #1	17	18	p = 1.000	Lidocaine	12	24	p = <0.001**

*p < 0.05   ** p <0.001

o Paired t-test used to evaluate the collective correct responses in pre/post survey of knowledge-based question pairs
  o Sample mean for pre-survey = 14; sample mean for post-survey = 21.33. Observed difference of 7.33 was tested and resulted a p = 0.0218
o Post-survey assessment of which modality is most accurate at depicting the depth of neuromuscular paralysis - 100% of participants chose quantitative neuromuscular monitoring

Willingness to Change Clinical Practice
o 100% of participants showed a willingness to make a practice change based on the educational module
o Despite inferential analysis showing statistical significance for most knowledge-based questions, the goal was to acquire clinical significance.

Willingness to Change One's Clinical Practice Based on the Educational Module — Corneal Abrasions 100%, Lidocaine 100%, QNM 100%

Conclusions

o Knowledge acquisition of EBP's resonates throughout the healthcare profession as the foundation for making informed, educated, and smart decisions on patients' behalf

o A fourfold increase in odds of correctly answering the knowledge-based questions after reviewing the multi-media educational module infers that participants' knowledge increased related to anesthesia patient safety

o When anesthesia providers are provided with current evidence-based recommendations, providers are willing to change practice

o Knowledge acquired from the educational module may help to reduce the incidence of corneal abrasion, post-operative pain and opioid consumption, and residual neuromuscular blockade

o Increased knowledge and willingness to change practice based on the educational module can lead to improved anesthesia patient safety, decreased healthcare costs, and increased patient satisfaction and positive outcomes

o Limitations include the research design, validity of the data collection tool, small sample size, lack of generalizability

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