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Implementation of a GlideScope Educational Program for Novice Student Registered Nurse Anesthesiologists

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Introduction of the Problem

Southern Illinois University Edwardsville lacked hands-on skills in simulation and didactic education regarding GlideScope video laryngoscopy. This project sought to provide missing elements of airway management education by improving technique, increasing confidence, and decreasing the risk of injury related to airway management with the GlideScope video laryngoscope. The project's sample consisted of 32 1st-year students registered nurse anesthesiologists (SRNA) who were one semester away from entering the clinical setting. GlideScope video laryngoscopy education and technique should be implemented in preclinical coursework to prepare novice student registered nurse anesthesiologists before clinical. GlideScope video laryngoscopy has become a cornerstone of difficult airway management (Joffe et al., 2019). An evidence-based GlideScope educational program for novice SRNAs should increase knowledge and confidence related to GlideScope video laryngoscopy and decrease injuries associated with GlideScope use.

Patients presenting to the operating room for elective or emergent procedures will undergo airway management, and many will undergo laryngoscopy for endotracheal tube placement. While there are many ways to perform laryngoscopy and intubation, the routine practice of direct laryngoscopy remains the most prevalent (Chemsian et al., 2014). Direct laryngoscopy is a standard part of anesthesia care; however, airway assessment findings and other comorbidities can alert the provider to a potentially difficult airway. Patients with limited mouth opening, limited cervical range of motion, decreased thyromental distance, retrognathic jaw, increased neck circumference, and increased Mallampati score indicate increased difficulty related to direct laryngoscopy (Marley & Sheets, 2018). Comorbidities, such as obesity, craniofacial abnormalities, trisomy 21, and pregnancy, can also complicate intubation (Marley &

Sheets, 2018). Video laryngoscopy is a powerful tool when direct laryngoscopy is impossible due to various factors. GlideScope video laryngoscopy allows the anesthesia provider to obtain a direct view of the glottis while decreasing neck extension, overcoming excess dependent tissue, and decreasing the force required to generate a sufficient view for tube placement. This is due to the camera being placed near the tip of the hyperangulated laryngoscope blade. This often allows the user a view of the glottic opening without aligning the airway axes. The reduced force necessary for GlideScope video laryngoscopy to obtain an optimal view of the glottis decreases the force placed on surrounding airway structures, decreasing the incidence of dental damage, soft palate injury, and lip lacerations (Schieren et al., 2019). Despite these advantages, the GlideScope does have limitations.

The GlideScope video laryngoscope has similar and unique risks compared to direct laryngoscopy. The primary risks associated with GlideScope are its known blind spot and the operator's fixation on the video screen during blade placement and endotracheal tube delivery to the glottis (Amundson & Weingarten, 2013). These risks create the potential for non-visualized injuries to the soft palate and posterior oropharynx. In order to overt these complications, the manufacturer has provided a technique for device use, the “4-Step Technique." In the “4-Step Technique” Verathon first instructs operators to look into the mouth for midline blade introduction. Secondly, the operator looks at the video monitor to obtain the desired view of the glottis. Thirdly, the operator is to look back into the mouth while introducing the endotracheal tube until it is past the base of the tongue. Lastly, the operator looks at the video monitor to guide the endotracheal tube into the glottis for successful intubation. Simulation provides a safe venue for novice anesthesia providers to practice the GlideScope technique without jeopardizing patient safety.

Simulation as an adjunct to didactic education can benefit novice anesthesia providers. Simulation is ideal for novice providers to gain experience in controlled settings where mistakes can be corrected and techniques refined before risking patient safety. Evidence has suggested higher skill transfer, quicker learning, and increased student satisfaction than didactic education alone (Marvin et al., 2020; Vanderbilt et al., 2014). Simulation can be on a spectrum from low fidelity to high fidelity. The low-fidelity simulation focuses on a specific task or technique utilizing manikins or anatomy trainers. High-fidelity simulation, by contrast, seeks to build on those tasks or techniques by replicating the patients' clinical picture and the physical and psychological components of patient care delivery. Lower fidelity simulations are most beneficial to novice providers due to the need to build foundational skills (Munshi, Labadidi & Alyousef, 2015). High-fidelity simulation is more valuable to advanced providers seeking to refine practice (Vanderbilt et al., 2014).

Project Methods

The purpose of the project was to provide education related to GlideScope VL. This project aimed to increase students' knowledge of laryngoscopy, specifically GlideScope VL, increase confidence in device use and ultimately reduce injuries associated with GlideScope VL. A non-experimental quality improvement pre-test/post-test design was implemented to evaluate the knowledge and confidence of participants before and after the project implementation. The pre and post-test consisted of seven identical knowledge-based questions and one Likert-scale question related to participant confidence in GlideScope VL use. The pre-test was also used to gain demographic information. The post-test also allowed for free text responses to the educational intervention.

An evidenced-based educational PowerPoint and low-fidelity skills simulation experience on GlideScope VL was created for the 1st-year SRNAs at SIUE. The pre-test was administered before any intervention. The educational PowerPoint was provided to the students one week before the simulation experience for review before the hands-on skills simulation. The simulation experience was performed in the skills lab at SIUE. The Verathon "4-Step Technique" was reviewed with each group of students before the simulation. Students were tasked with using the GlideScope video laryngoscope to intubate airway training manikins. After completing this exercise, the students were invited to complete the post-test.

Evaluation

Qualtrics survey pre and post-tests were used to compile and analyze the project data and evaluate the project's objectives and benefit to participants. Identical knowledge-based multiple-choice, true-false, and select all that apply questions were used with a Likert-scaled question asking about confidence with device use were employed for the pre and post-test surveys. In addition to the identical questions, the pre-test utilized questions inquiring about demographics, and the post-test used a free text response to get feedback from the participants. The results of the identical items on these surveys were then averaged and compared against one another. First-year SRNAs' overall knowledge of GlideScope VL was improved from baseline according to the correct response rate on the post-test being significantly higher than the pre-test for the knowledge-based questions. This result indicated that the evidenced-based educational PowerPoint was an effective intervention concerning knowledge acquisition related to GlideScope VL. First-year SRNAs' confidence in GlideScope VL use was significantly higher on the post-test compared to the pretest. This increase indicated that 1st year SRNAs benefited from having a hands-on skill simulation. In addition to these positive results, many students left

thankful responses in the free text area on the post-test. By exposing students to this equipment before entering the clinical setting, students reported feeling more prepared, validating a need for this content in the N529 Orientation to Nurse Anesthesia course.

Limitations to the project included participant testing fatigue, lack of university-owned equipment, simulation time constraints, and lack of central distribution for educational materials. Time constraints did not prevent the project from being carried out but put a strain on certain participant groups with additional questions or desired time to practice the hands-on skills. The lack of university-owned equipment hindered the ability to allow students additional practice time. However, Verathon's representative was vital to the project's success by providing the equipment for the simulation session. Students also participated in another DNP project implementation during the designated laboratory time. While the projects were unrelated, each project did compete for laboratory time.

Students also had to complete cumulative final exams immediately before the simulation session. This may have interfered with the participants' motivation to review the educational PowerPoint before the simulation session. Implementation of this project may have additional benefits if performed concurrently with intubation skills lab and airway anatomy didactic. There is no plan to continue this project with future cohorts, which severely limits the sustainability of this project.

Impact on Practice

First-year SRNAs reported an overall increase in confidence levels regarding GlideScope VL before entering the clinical setting. Increasing a novice provider's knowledge base and hands-on skill set may mitigate complications through proper technique and knowledge of potential injuries. Understanding the risks and manufacturer-recommended steps to decrease the incidence

of injury may improve patient safety and practitioners' airway management skills. Patient safety is paramount and may be positively impacted long-term by projects seeking to provide novice providers with the essential knowledge and hands-on skills for safe, successful practice.

Conclusions

Laryngoscopy is a foundational skill for all anesthesia providers. Direct laryngoscopy has classically been the definitive choice for intubation. Video laryngoscopy is gaining prevalence as a first choice for routine and difficult intubation. With an expected rise in the use of video laryngoscopy, it is imperative to provide the necessary education and hands-on skills simulations related to video laryngoscopy. Due to market prevalence, anesthesia providers and students should receive continuing education and simulation opportunities outside the clinical setting regarding GlideScope VL. Education for GlideScope VL should center on Verathon's essential "4-Step Technique." Focusing on this technique can mitigate associated risks with GlideScope VL for airway management. Overall, improving a provider's knowledge and technique will improve patient outcomes positively, regardless of the device used. This project has the potential to be continued and implemented annually with slight changes for future cohorts in accordance with the most current evidence.

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