



Featured Article

## Simulation Training for Fiber-Optic Intubations

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### KEYWORDS

fiber-optic intubations;  
simulation;  
confidence;  
competence;  
anesthesia;  
satisfaction

### Abstract

**Background:** Fiberoptic intubations (FOIs) are one skill Certified Registered Nurse Anesthetists (CRNAs) must be able to perform. However, the high-risk, low-volume nature of this skill may affect a practitioner's ability to safely perform this skill. The purpose of this project was to implement a FOI simulation training program for CRNAs.

**Methods:** A pre-test/post-test design was used for competence using timed intubations before and after a training program.

**Results:** Mean time to conduct a FOI decreased 52.87 seconds after the simulation training, which was found to be significant ( $p=.01$ ). Participants also reported high levels of satisfaction and self-confidence.

**Conclusion:** Simulation training can provide an opportunity to provide safe care when performing FOIs.

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Airway management is one of the most important skills for an anesthesia provider. In an American Society of Anesthesiologists closed claims study, adverse outcomes related to airway complications were the single largest class of injury to anesthetized patients (Abdelmalak, Makary, Hoban, & Doyle, 2006). Such events are tragic for the patients, family members, and the anesthesia provider.

The fiber-optic intubation (FOI) advanced airway technique is the gold standard for management of a known or predicted difficult airway (Agro & Cataldo, 2010; Guglielmi et al., 2010; Pean et al., 2010). Anesthesia providers need to be competent in this essential skill. An awake fiber-optic approach is a safe intubation technique to use when confronted with a difficult airway because there is a wide margin of safety (Gerheuser & Gurtler, 2011). This intubation technique ensures correct placement of the airway without interfering with the patient's ability to breathe.

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Additionally, anesthesia providers can see the airway anatomy and be guaranteed the correct placement of the tube.

However, fiber-optic scopes are difficult to use if the operator is inexperienced, if there are secretions present, or if the patient's airway is not well anesthetized causing him

to cough and not cooperate for the procedure (Benumof & Saidman, 1999). Fiber-optic scope users need to have confidence and experience with the equipment to safely and effectively use the device. Although FOI is a core skill for an anesthesia provider, many complete their training without obtaining this necessary competency, often due to simply a lack of opportunities to use this technique (McNarry, Dovell, Dancy & Pead, 2007). A worldwide survey confirmed that the lack of sufficient FOI skills and routine opportunities to use this technique contributed to decreased FOI skills (Goldman & Steinfeldt, 2006). Anesthesia providers must have confidence and competence

when securing an airway with a fiber-optic scope.

Fiber-optic airway placement is the safest way to intubate a patient with a difficult airway because the scope is the most flexible, least traumatic, and minimally stimulating technique. Simulation training offers tremendous opportunities to practice high-risk, low-volume skills such as FOIs in a safe environment (Brett-Fleegler et al., 2012). The purpose of this project was to develop and implement an educational simulation training program allowing Certified Registered Nurse Anesthetists (CRNAs) the opportunity to practice safe FOIs and evaluate its effect on competence and self-confidence.

Good evidence supports simulation training with Human Patient Simulators (HPSs) improves competence and self-confidence and procedural simulation improves operational performance when using the fiber-optic scope (Blum, Borglund & Parcels, 2010; Davis et al., 2006). This program is a new paradigm for teaching FOI skills using high-fidelity HPSs for licensed anesthesia providers. Previous research has shown that a simulation-based training opportunity can increase intubation skills and confidence (Davis et al., 2006; Russo et al., 2007). Rowe and Cohen (2002) reported use of simulation successfully trained residents to intubate pediatric patients with a fiber-optic scope. After simulation practice, residents who had never

practiced FOIs before improved over the control group. Time to successful intubations and the number of times they hit the mucosa before successful intubation were decreased in the simulation group. Russo et al. (2007) reported a significant improvement in the way participants perceived their confidence and accuracy using a fiber-optic scope following a combination of lectures, skill stations, and simulation practices.

In the past, loss of airway or technological mishaps was the most dangerous crisis for an anesthesia provider. Technology has improved, but an airway crisis is still a worst-case scenario frequently resulting in adverse outcomes (Heidegger, Gerig, Ulrich & Kreienbuhl, 2001). Support for anesthesia providers to increase self-confidence and competence with FOIs is paramount to improved patient safety. However, practicing an awake intubation would expose a live patient to potential undue harm; therefore, practicing FOIs on HPSs is an ideal training method for anesthesia providers. Additionally, the use of high-fidelity HPSs in medicine, particularly anesthesia, is gaining momentum and is now a compulsory part of training in many countries (Cumin, Weller, Henderson & Merry, 2010). As a result of the need for anesthesia providers to be confident and competent in the use of the fiber-optic scope, the project was designed to address the following clinical question: Among licensed nurse anesthetists, how does completion of a high-fidelity HPS training program for FOIs affect skill performance competency?

## Participants

Military nurse anesthetists are the largest group of anesthesia providers at this Northern military treatment facility; of 20 anesthesia providers, there are 8 anesthesiologists and 12 CRNAs. This population of CRNAs expressed a need for FOI skill development. Training took place in the CRNAs own work facility and in actual operating room suites. In this facility, the first Thursday of every month is set aside for training with no scheduled cases in the morning. The project was done on a scheduled training day which meant that the anesthesia providers did not have to come in on a day off or drive to a different hospital to get the training as requested in the needs assessment. The operating rooms used for simulation were not going to be used at any time for patient care on the training day; therefore, the CRNAs could spend as much time as they wanted practicing FOIs on the manikins as part of the training.

Nine anesthetists were available on the day of training, and all agreed to participate in the program. Each CRNA is a military officer with a master's degree in nursing and has passed anesthesia boards. The anesthetists work full time and are responsible for preoperative evaluations and a variety of operative cases including obstetrics. The CRNAs work independently in every surgical specialty and take overnight in-house call shifts. Military CRNAs must be able to

### Key Points

- While CRNAs must be able to safely perform high-risk skill of FOIs, the low volume need for this skill may affect their ability to implement this skill safely when needed.
- High-fidelity HPS provide the capability to offer training opportunities to practice FOI skills with a variety of different airway issues.
- Use of high-fidelity HPS scenarios may improve confidence and competence of CRNAs performance of FOIs.

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