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Improving Emergence and Awaken Time in the Obese Population: Development of a Desflurane Protocol in the Obese Population

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Summary

Introduction to the Problem

The prevalence of obesity has continued to grow. As of 2014, 36.5% of the United States population is obese (Center for Disease Control and Prevention, 2014). Illinois is one of 20 states in which 30-35% of the population is obese (Center for Disease Control and Prevention, 2016). Obesity increases the risk of several comorbidities. These comorbidities can result in complications during the perioperative period. Obstructive sleep apnea (OSA) and delayed gastric emptying are common risk factors associated with obesity (Kaw, Gali, & Collop, 2011). Both OSA and delayed gastric emptying can complicate the perioperative course. Patients with OSA also had a significantly longer post-anesthesia care unit (PACU) length of stay (Brousseau, Dobson, & Milne, 2014). Sakai et al. (2006) conducted a retrospective study which showed lack of protective reflexes (coordination of swallowing and respiration). Moreover, obesity has been associated with increased risk of perioperative pulmonary aspiration (PPA) (Sakai et al., 2006). Shorter-acting anesthetics, such as Desflurane may decrease the incidence of apnea or desaturation in the PACU, thereby, decreasing the length of stay in the post-operative unit. Slow emergence can delay the time until protective reflexes return, increasing the risk for aspiration of stomach contents. Faster emergence has the potential to decrease the risk of aspiration.

Literature Review

Inhalation agents with a higher blood gas partition coefficient (higher solubility) have a slower onset and recovery (Khan, Hayes, & Buggy, 2014). When comparing inhalation agents,

Desflurane has the lowest blood-gas and oil-gas coefficient (Khan, Hayes, & Buggy, 2014). Multiple studies showed patients both obese and those with a normal body mass index (BMI) to have a faster wake-up time when Desflurane was used over Sevoflurane, Isoflurane, and Propofol (Clla, Albertin, Colla, & Mangano, 2007; De Baerdemaeker et al., 2003; Ergonenc, Ergonenc, & Bican, 2014; Kaur, Jain, Sehgal, & Sood, 2013; Juvin, Vadam, Malek, Dupont, Marmuse, & Desmonts, 2000; Liu et al., 2014; Strum et al., 2004; Wachtel, Dexter, Epstein, & Ledolter, 2011; Werner et al., 2015). The definition of "awake" varied with each study. Several of the studies measured the time from when Desflurane was discontinued to the time when a patient could open their eyes and met extubation criteria. Some studies used scales such as the Modified Aldrete Score (MAS) system and Short Orientation-Memory-Concentration test (SOMCT) to assess a patient's cognitive function. While the methods of assessing a patient's cognitive function varied, all the studies had similar results. Although a faster wake-up time is ideal for all patients, some patients such as those with obesity are at higher risk for complications that are associated with slower wake-up times.

Methodology

This project was a non-experimental quality improvement protocol and did not require data collection from patients. A protocol was developed using evidence-based research from the articles presented in the literature review. The Desflurane protocol served as a template for the anesthesia staff at a Central Illinois community hospital to use as an anesthetic guide for the care of the obese population. The protocol consisted of pre-operative assessment tools and a questionnaire to assess the risk of aspiration and obstructive sleep apnea, as well as, the definition used to define obesity. The protocol included; indications, contraindications, and how to administer Desflurane for induction and maintenance. The protocol was implemented utilizing

an educational PowerPoint presented to the anesthesia and the pharmacy staff. A total of five staff members were present for the presentation. A voluntary survey using true/false questions (appendix b) assessed the effectiveness of the presentation and protocol. The final question used a Likert scale from 1 to 5 was used to assess the likelihood of using Desflurane in the obese population.

No patient information or data was collected for this project. Therefore, this project received an exempt IRB from Southern Illinois University Edwardsville. The risks were minimal for the participants who attended the presentation and completed the survey.

Evaluation

Results from the current study showed an increase in knowledge following the presentation of Desflurane in the obese population. Five individuals attended the presentation for the Desflurane protocol. Of the five, four were anesthesia providers (three registered nurse anesthetists and one anesthesiologist). The fifth individual was a member of the pharmacy staff. Four of the providers were male. The age of the individuals ranged from 30-64, and the majority (four out of five) had eleven to twenty-four years of experience in their field of expertise. Following the demographic questions, five questions were used to assess the understanding of the presentation's information. All staff members (100%) identified inhalation agents with higher blood-gas and oil-gas coefficient has a slower onset and recovery. Every staff member (100%) recognized Desflurane as having the lowest blood-gas and oil-gas coefficient. All participants (100%) identified 30-35% of Illinois' population as being obese. Every staff member (100%) correctly answered the true or false question that stated, "obesity decreases the risk for apnea and aspiration during the postoperative period." All staff members (100%) recognized Desflurane as having the fastest wake-up time in the obese population. The staff members (100%) agreed that

they do not routinely use Desflurane in the obese population due to lack of access and cost. At the end of the survey, a Likert scale from 1 to 5 was used to assess the likelihood of using Desflurane in the obese population. The majority of participants (80%) strongly agreed to use Desflurane as their primary agent in the obese population as a result of the presentation. There were no barriers to presenting the project. However, there were limitations to this project. For example, the sample size was small with only five participants. Therefore, the results cannot be generalized to a larger population.

Impact on Practice

The goal of this project was to develop a Desflurane protocol for the obese population founded in evidence-based research and present the protocol to the anesthesia and pharmacy staff at a Central Illinois community hospital. The objectives consist of the staff members being able to verbalize the anesthesia risk associated with slow wake-ups in the obese population and list the benefits of using Desflurane over other general anesthetic agents. Before this project, Desflurane was not routinely used as the primary anesthetic in the obese population among the anesthetic providers at a Central Illinois community hospital. The results showed that the anesthesia staff supports the implementation of this protocol. Currently, the anesthesia staff and pharmacy staff are working to estimate the cost of Desflurane and signing a contract with Baxter. An improvement to the project in the future would be to implement during an anesthesia meeting or to implement the project at more than one facility in order to increase the sample size population. With an increase in sample size, the results could be generalized to a larger population. Implementation of this protocol will benefit obese patients by reducing the risk for apnea and aspiration during recovery. Shorter wake-up times will decrease the length of stay in the PACU making the Desflurane protocol more cost effective for the hospital. A decrease in

PACU length of stay will allow for faster turnover, therefore, more surgeries can be performed allowing a larger portion of the community to be served.

Conclusion

Recovery time from anesthesia can improve patient outcomes and decrease PACU stay by using the Desflurane protocol in the obese population. The evidence-based research has been reviewed and demonstrates Desflurane having the fastest wake-up time compared to any other general anesthetic agent (Clla, Albertin, Colla, & Mangano, 2007; De Baerdemaeker et al., 2003; Ergonenc, Ergonenc, & Bican, 2014; Kaur, Jain, Sehgal, & Sood, 2013; Juvin, Vadam, Malek, Dupont, Marmuse, & Desmonts, 2000; Liu et al., 2014; Strum et al., 2004; Wachtel, Dexter, Epstein, & Ledolter, 2011; Werner et al., 2015). Results from the survey showed that the anesthesia staff support the use of Desflurane and strongly agree to use Desflurane in the future as their primary anesthetic in the obese population. Presenting and providing St. Francis Hospital with this protocol has the potential to improved wake-up times and decreased the risk for complications found in the obese population due to slower wake-up times. Decreasing wake-up times in the obese population will reduce the risk of apneic periods and aspiration in the PACU leading to shorter PACU stays and improving patient satisfaction. Shorter PACU stays will benefit the hospital by increasing patient turnover rates and decreasing cost associated with post-operative complications.

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