

# FIRST PLACE 2020

## CAS MEDICAL STUDENT ESSAY

Anulika Nwakaeze

### Anesthesiologists: The Pioneers of Patient Safety

Since its inception, anesthesia has facilitated the safe provision of surgical procedures and has been instrumental in rendering cutting-edge healthcare (Verma, 2015). Anesthetists are undeniably pioneers of patient safety, yet there are still advancements to be made. This is particularly salient when cases of anesthetic mishaps, although rare, result in catastrophic outcomes (Kamensky, 2014). Factors such as patient optimization and monitoring, evidence-based guidelines, and the incorporation of novel educational tools have augmented the anesthetist's role as a figurehead in patient safety, but further development is necessary for anesthesiology to continue its legacy as a leader in patient safety (Kamensky, 2014).

Anesthetists were the first advocates for the provision of safe operative care (Lewis, 2018). In fact, it was Ellison Pierce, an anesthetist, who coined the term "patient safety," and went on to found the Anesthesia Patient Safety Foundation (APSF) in 1985, the first organization to specifically assess operative factors that contribute to patient outcomes (Lewis, 2018). Thus, patient safety and anesthesiology are intrinsically linked. Firstly, a comprehensive preoperative assessment ensures that patients are optimized for surgery (Levy, 2019). This improves patient outcomes during the operation and speeds recovery in the postoperative period (Levy, 2019). Secondly, surgical safety checklists introduced by the World Health Organization in 2008 standardize the approach to perioperative safety (Haynes, 2009). These streamlined safety protocols reduce the opportunity for complications that may compromise patient safety (Haynes, 2009).

Anesthesia is unique in medicine as a specialty whose procedures do not offer a direct therapeutic benefit (Gaba, 2000). Thus, it is particularly glaring when adverse events occur in the context of anesthetic management (Cooper, 2002). In the tragic case of Elaine Bromiley, who was admitted for elective surgery in 2005, such adverse events led to severe complications during induction of general anesthesia that resulted in hypoxic brain damage and subsequent death (Kamensky, 2014). The investigation that followed revealed critical steps in Elaine's management that were erroneous, potentially contributing to her untimely demise (Harmer, 2005). These steps included a failure to adequately recognize and address a "can't intubate, can't ventilate" emergency (McClelland, 2015) according to established guidelines (Henderson, 2004). Most chilling of all is that these factors represented lapses in routine anesthetic care that could affect nearly any clinician (Kamensky, 2014).

Patient safety is an important process that anesthetists strive to protect (Cooper, 2002). However, routine practices in anesthesiology have been shown to be less effective in safeguarding patient outcomes than is generally believed (Steadman, 2017). The pre-operative examination of a patient's airway characteristics in an attempt to judge the ease or difficulty in performing intubation or mask ventilation is a standard practice in anesthesia that is considered to be a critical step in ensuring that a patient is optimized for surgery (Gupta, 2005). In the case of Elaine Bromiley, pre-operative assessment revealed congenitally fused cervical vertebrae that was not judged to pose a complication to her anesthetic management (Harmer, 2005); she was determined to have a Mallampati score of two upon physical exam (Kamensky, 2014). Although there is some statistical correlation with intubation success provided by an assessment of the four Mallampati views, no airway assessment tool is absolutely sensitive or specific for determining intubation success (Steadman, 2017). As high as 20% of difficult intubations are not predicted by pre-operative assessment (Pinnock, 2003). Importantly, adverse respiratory events related to anesthetic care can still occur in patients who were previously assessed as having a "normal" airway (Steadman, 2017). Thus, the preoperative assessment, although an important step in guiding the anesthetic plan, does not necessarily predict what will transpire in the operating room (Steadman, 2017). Anesthetists must be aware of this limitation and should be equipped with other potential management plans should complications arise (Kamensky, 2014).



As a dynamic specialty, anesthesiologists must have the situational awareness to quickly identify a routine procedure that has gone awry and be able to communicate this effectively to the care team (Schulz, 2013). Although “to err is human” (Kohn, 2000), systemic errors that manifest as deficiencies in communication, teamwork, and situational awareness can have drastic consequences for the patient (Schulz, 2013). In Elaine Bromiley’s case, a shocking twenty minutes transpired with multiple rounds of unsuccessful intubation in lieu of ensuring adequate oxygenation, before the decision was made to abandon induction (Harmer, 2005). The anesthesiologist involved in the case later reported that he was not aware of how much time had elapsed during the crisis situation and failed to respond to inquiries from nurses to contact the intensive care unit or prepare for a surgical airway (Harmer, 2005). The lack of situational awareness and breakdown in communication in this case, compounded by fixation on one solution, may have prevented appropriate recognition of the emergency situation and activation of appropriate contingency protocols (Kamensky, 2014). Death or brain damage as a consequence of respiratory events account for 17% of closed claims outcomes, with 27% of those due to difficult intubation (Steadman, 2017). Inadequate ventilation/oxygenation, esophageal intubation, and premature extubation are readily detectable and preventable errors that still continue to plague the specialty, even when modern monitoring technologies are in place (Cheney, 2006). Moreover, studies found that anesthetic care is frequently less than appropriate in respiratory-related adverse events (Cheney, 2006). Therefore, it is incumbent upon the anesthesiologist to maintain acute awareness of situational and patient factors during anesthesia and be able to communicate effectively with the care team (Kamensky, 2014).

Although anesthesiology was the first specialty to introduce patient safety as a primary concern in medicine, it is apparent that safety levels can plateau or even dwindle over time without continuous effort at evaluation and improvement (Cooper, 2002). Despite the ethos that “no patient shall be harmed by anesthesia” (Warner, 2018), mistakes and system failures still occur in anesthesiology and place patients in danger (Beattie, 2018). Thankfully, anesthesiology is a specialty that is not complacent with what it has accomplished, but rather looks to progress toward the ideal state of zero complications (Cooper, 2002). A meta-analysis by Bainbridge et al. identified more than a ten-fold decrease in anesthesia-associated mortality since the 1970s, and a reduction in anaesthetic-related and perioperative mortality over the past 50 years (Beattie, 2018). The continued reduction in anesthetic and perioperative mortality suggests that heightened efforts toward standardisation and patient optimisation, advanced levels of experience, and safe surgery checklists are translating into continued improvements in patient outcomes (Beattie, 2018). Advancements in technology facilitate the ongoing development of anesthesia as a figurehead in patient safety.

Simulation technology is a novel educational model that is enhancing the specialty (Naik, 2012). Anesthesiologists were the first to employ computer screen and mannequin based interactive patient simulators, which have become widespread in the specialty and have expanded into other areas in medicine (Naik, 2012). Simulations have been instrumental in acquiring competency in dynamic and crisis-based situations, such as difficult intubation and other respiratory adverse events (Naik, 2012). Coupled with real-time feedback for decision making and debriefing, simulation-guided learning equips anesthesiologists with the tools needed to respond quickly and effectively to situations that, although are rarely encountered in clinical practice, would become dire without an expert level of procedural acuity (Hoelzer, 2015). Healthcare simulation has proven to be a valuable tool to improve education in and maintenance of patient safety, but ongoing training is required and must be disseminated to a wider array of anesthesiologists (Hoelzer, 2015).

Anesthesiologists were the first advocates of patient safety. Although tragic cases, like that of Elaine Bromiley, still occur and highlight room for significant improvement (Kamensky, 2014), the reflective nature of this specialty empowers it to continue to champion quality patient outcomes (Cooper, 2002). Patient safety has benefitted through excellent pre-operative assessment, safe surgical checklists, and quality training, including simulation technology (Steadman, 2017; Hoelzer, 2015). The various safety advances made in anesthesiology are an important model for the rest of health care (Cooper, 2002). Anesthesiology remains a work-in-progress and will require long term commitment to achieve the full promise of its proposed ethos, “no patient shall be harmed by anesthesia” (Warner, 2018). By continuing to improve upon patient safety and research, anesthesia is poised to continuously lead medicine; improving the operative process, with patient outcomes a foremost priority.

**Anulika Nwakaeze**

University of Alberta  
nwakaeze@ualberta.ca