Call Shift Fatigue

Marc Bentz, CRNA, MNA

bentzmr@vcu.edu

Virginia Commonwealth University

Abstract:

Call-shift fatigue is a problem faced by a variety of healthcare providers. Certified Registered Nurse Anesthetists (CRNAs) are no exception. The increasing demand for anesthesia services at all hours has placed rising demands on CRNAs to provide safe anesthesia care. Fatigue and its negative ramifications play a major role in affecting both patient safety and individual provider health. This paper explores the literature related to the negative consequences associated with fatigue in medicine and more specifically anesthesia. Fatigue-avoidance strategies and fatigue countermeasures are discussed as possible ways to combat the effects of call-shift fatigue and assist CRNAs in continually providing safe, patient focused care. Recommendations by the American Association of Nurse Anesthetists (AANA) and The Joint Commission are discussed to assist CRNAs in finding solutions to the problem. AANA standards for CRNA practice and code of ethics are also highlighted. Anesthesia related issues associated with fatigue are a major problem affecting both the profession and patient safety. Recognition of the issue by individual CRNAs and leaders in the anesthesia community along with education on the topic can assist in shaping the future, and allow CRNAs to continue to provide high quality, patient safety focused care to individuals in need.

Introduction:

Fatigue affects individuals in many professions. Anesthesia providers, including Certified Registered Nurse Anesthetists (CRNAs) are no exception. Fatigue experienced by anesthesia providers poses several public health and safety concerns. (1) Call-shift fatigue is a significant problem among CRNAs. The increasing demand for anesthesia services combined with the increasing number and complexity of cases requiring anesthesia services day and night is a major contributing factor. These increasing demands coupled with the expectations for CRNAs to provide safe anesthesia care pose a major concern for both the safety of the patient and the provider. (1) Lack of effective policies and restrictions on work hours for CRNAs, on a federal, state, and hospital level, can lead to lapses in patient safety. In order for anesthesia to continue to be deemed a patient safety focused profession, proper education on the topic of fatigue and the effects it can have on the individual provider as well as the patient must be provided to current and future practicing CRNAs. (2)

Literature Review:

A comprehensive literature review was conducted using PubMed, Medline, and Google Scholar to examine issues concerning CRNAs and other healthcare professionals call shift fatigue, mechanisms used to counteract fatigue such as fatigue countermeasures and fatigue avoidance strategies, and guidelines for counteracting fatigue by other safety focused professions (aviation, nuclear power plant workers, etc.). The literature search was conducted using search terms relevant to the areas of interest. All relevant references were reviewed and inappropriate references were discarded.

Several studies have been conducted to identify the negative effects of sleep-related fatigue on performance and patient outcomes. In a study conducted by Rogers, et al. researchers found that the occurrence of errors were three times more likely for nurses who worked shifts longer than 12.5 hours. Risks associated with patient errors began at as few as 8.5 hours but did not increase significantly until shifts extended beyond 12.5 hours in duration. (3) Ayas et al examined the extended hours of medical interns; lapses in concentration and fatigue were the two most commonly reported contributing factors associated with an increased risk of percutaneous needle stick injuries. (4) Despite the implementation of increased measures to prevent needle stick injuries, hours worked per day, weekends worked per month, and working shifts other than day shift were associated with an increased incidence of needle stick injuries among registered nurses. Working a shift greater than 13 hours per day more than once a week also significantly increased the risk of injury. (5)

The negative consequences of sleep-related fatigue can also have negative health consequences. These negative health effects include: increased depression, irritability, obesity, diabetes, hypertension, cardiovascular disease, negative effects on the immune system, and an increased risk of sleep-related motor vehicle crashes. (6) Blum et al. in their study of medical residents found that for every extended work shift of more than 24 hours worked in a month, the risk of having a car accident increased by 9.1%, and the risk of having a car accident on the commute home after an extended shift increased by 16.2%.(7) Lack of regular sleep habits and not getting the required sleep has been directly linked to impaired individual health. Problems associated with individual provider health can carry over into the workplace and have a negative effect on patient safety as well. A

retrospective review by the CDC indicated that sleeping less than five hours per night increased the likelihood of subjects being obese by 42%, and developing: diabetes 40%, hypertension 69%, high cholesterol 36%, and shockingly increased the incidence of having a heart attack by 152%. (8) Prolonged wakefulness and fatigue has a dramatic effect on vigilance, clinical performance, cognitive function, and even personal health risks in healthcare professionals.

A national survey of CRNAs found astonishing information related to call-shift fatigue and errors associated with patient safety. In the survey by Biddle and Aker, the researchers found that 25% of CRNAs reported fragmented sleep, 16 % reported that experiencing sleep-related behaviors during the delivery of an anesthetic to a patient, 68% reported being excessively tired during work hours, and shockingly, 49% of CRNAs in the survey reported that they have witnessed a colleague asleep during a case while providing care for an anesthetized patient. (1) A primary study conducted on CRNAs and call-shift fatigue by Domen, et al. found that 82% of study participants reported experiencing call-shift fatigue, 87% used fatigue countermeasures, 77% used fatigue-avoidance strategies, and an alarming 28% reported committing a medical error because of fatigue. (9)

Experts in the field of fatigue have presented evidence pointing out the relationship between shift length and poor performance related to decreased vigilance in medical personnel and anesthesia providers. The evidence indicates that medical personnel and anesthesia providers who work shifts longer than 12 hours are more likely to have decreased vigilance and poorer performance. (10)

Dawson and Reid in 1997 demonstrated the effects of fatigue in a comparison with the effects of alcohol on the human body. The study concluded that even moderate levels of fatigue could produce increased levels of impairment that exceeds comparable levels of alcohol impairment. The researches in this study showed the effects of fatigue by demonstrating that 17 or more hours of wakefulness was equivalent to a blood alcohol concentration of 0.05% and greater than 24 hours of wakefulness was equivalent to a blood alcohol concentration of 0.10%. (11) To put these findings in perspective, the legal limit to drive a car is a blood alcohol concentration of 0.08%.

Different strategies have been proposed to combat the effects of fatigue in a profession where the patient safety consequences can be catastrophic. Fatigue-avoidance strategies and fatigue countermeasures have been recommended by healthcare and aviation fatigue experts to combat the effects of fatigue. Fatigue-avoidance strategies are the first thing recommended and include healthy sleep practices, otherwise known as proper sleep hygiene. (9) An expansion of these strategies includes avoiding stimulants before bed, having a regular bedtime, and taking naps before long shifts, when possible. Second, fatigue countermeasures include tactics such as taking naps, activity breaks, increasing light intensity and the use of stimulants such as caffeine. (9) Offering anesthesia providers regular morning, lunch, and afternoon breaks along with standing in the operating room and interacting with other team members are other examples of using fatigue countermeasures as it relates to anesthesia providers. Hayashi et al showed how the use of both fatigue-avoidance strategies and fatigue countermeasures improved performance on computerized tasks and decreased daytime sleepiness. These results were achieved with the combination of a short nap with caffeine, exposure to light, or face

washing. (12) Research conducted on bright light therapy may activate the circadian system and possibly improve vigilance performance. (13) Finally, researchers working with United States aviation personnel found that aviators that used countermeasures such as medications to assist with daytime sleepiness and light therapy promoted alertness. (14) Research also conducted on bright light therapy may activate the circadian system and possibly improve vigilance performance.

Many styles and techniques have been employed to create an effective PowerPoint presentation. There is nothing more frustrating to an audience than sitting through a long drawn out presentation bombarded by slides after slide of small text and irrelevant graphs, and poorly designed templates. (15) Some basic tips can be utilized to ensure that the information being presented is distributed in an effective and efficient manner.

Planning ahead can assist the presenter in developing a PowerPoint presentation that is curtailed to the size and composition of the audience. Other key factors to plan for include the allotted time and what objectives the presenter wants the audience to take away from the presentation. An effective presentation is structured in a way that the presenter tells the audience what they are going to be told, then tells the audience the information, and finally, tells the audience what they have been told. (16) The presentation should begin by the presenter taking a few minutes to introduce the topic along with some background information to get the audience interested. Next, the presenter should expand upon ideas outlined in the introduction. Finally, it is important to remember that the audience will take home no more than five key points, pick a few that will highlight the significant points of the presentation. (16)

Slide design can also have a positive or negative impact on a PowerPoint presentation. It is important for the presenter to pick a simple there for the PowerPoint design and stick to it. Song and Schwarz, in their research, found that students who were presented with instructions that were printed in easy to read font were more willing to carry out the recommended tasks than those students presented with the same instructions in difficult to read font. (17) Typically, yellow or white text on a dark blue background will provide a sharp contrast, making the information easier to read. Slide content should not contain several full sentences and bullet points, the presenter should try to keep slides to a minimum of five main bullet points per slide. The presenter can then expand upon the bullet points without losing the attention of the audience with excessive words on a slide. Finally, avoid superfluous images that are inconsistent with the topic being discussed. (15)

Practice makes perfect. The presenter should make sure to review the slides and practice the presentation several times before the scheduled presentation. The presenter should ensure to pace himself or herself and project their voice clearly allowing themselves to modulate their voice to highlight key messages. (16) Finally, the presenter should allow time for the audience to ask questions. The presenter should conclude the presentation by thanking the audience, hosts, and collaborators and, most importantly, the presenter should make themselves available by providing contact information. While student engagement can be difficult, creating and delivering an effective PowerPoint presentation can prevent student distraction form, text messaging, surfing the web or giving into the lure of social media, and facilitate a better student experience. (15)

Methods:

The purpose of this project was to formulate and disseminate an evidence-based power point presentation to a class of student registered nurse anesthetists on the topic of call shift fatigue. An evidence-based power point presentation on the topic of call-shift fatigue was created and disseminated to 70 student registered nurse anesthetists in varying levels of their nurse anesthesia training at the University of South Carolina, Masters in Nurse Anesthesia Program as a part of their seminar course (PHPH 772). The presentation took place on Wednesday, April 20 at 1500 in the University of South Carolina School of Medicine classroom at two medical park at Palmetto Health Richland in Columbia, South Carolina. The presentation was also video broadcast to students that are members of the same class at the satellite location in Greenville, South Carolina. The objectives for the presentation were for students to be able to understand the effects of call-shift fatigue on patient safety and individual provider health, understand the effective use of fatigue avoidance strategies and fatigue countermeasures, and understand measures that need to be taken in order to continue to provide patient safety focused anesthesia care. All students in attendance at both locations were given a 5-question evaluation of the presentation (See Appendix A). Overall, student registered nurse anesthetists strongly agreed that the presentation was interesting and applicable to their practice. They also stated that they strongly agreed that the learning objectives for the presentation were met along with the speaker having an effective presentation style.

Discussion:

Fatigue and the many effects and risks associated with fatigue are not an issue mutually exclusive to the healthcare profession and anesthesia. Several studies, as

outlined in the literature review, indicate that the practice of extended work hours contributes to high levels of healthcare worker fatigue, which in turn, increases the risk of adverse events, compromises in patient safety, and increased risk to personal safety and well being. (18) Other professional organizations such as, aviation, nuclear power, train engineers and truck drivers also face issues associated with fatigue and the safety of not only the individual professional but the safety of others as well. Shockingly, these other professions have placed restrictions on an individual's work hours and call-shift hours while no such restrictions exist for staff CRNAs. Truck drivers have restrictions that limit the amount of time they can continuously drive to no longer than 11 hours. Workers at nuclear power plants are federally mandated to work shifts no longer than 12 hours at a time, as do train engineers. Airline pilots, a profession often compared to anesthesia for its similarities in risk, are restricted to flying no more than eight hours in a 24-hour period on domestic routes. (9)CRNAs who work call shifts do not have any federal work-hour restrictions despite anesthesia being labeled a "safety-sensitive" profession. (9)

It is the responsibility of the nurse anesthesia profession to address the issues linked to call shift fatigue and the detriment it can have on patient safety. As the healthcare industry continues to evolve and change, CRNAs are in an excellent position to ensure patients have continued access to high quality care. CRNAs have the ability to promote access to affordable care while maintaining a high standard of quality and patient safety. (19) In order to ensure patient safety continues to be a top priority for nurse anesthetists, the profession needs to consider the consequences of fatigue as outlined by the current literature on call shift fatigue when developing policies and guidelines for CRNA call-shift duration and frequency. (9) It is ultimately the personal

and professional responsibility of the individual CRNA to ensure he or she is adequately rested and fit to provide the high quality care required by the patient. The individual CRNA is also responsible for upholding the requirements of the nurse anesthesia standards for practice and code of ethics outlined by the American Association of Nurse Anesthetists (AANA). CRNAs are ethically responsible for adhering to the AANAs Code of Ethics by assuring that they are well rested and fit for duty. (20)

The AANA standards for nurse anesthesia practice state; CRNAs are responsible for the quality of services they render. (21) Of the eleven standards outlined by the AANA, standards five, ten, and eleven capture those greatly affected by the negative effects of fatigue. Standard V clearly states, "The CRNA should attend to the patient continuously until the responsibility of care had been accepted by another anesthesia professional." (21) As discussed earlier, a fatigued anesthesia provider is unable to continuously provide the high level of care required by the profession in order to ensure patient safety is of the utmost priority. Furthermore, Standards X and XI relate to the CRNAs responsibility to continuously participate in quality care while maintaining the basic rights of the patient. (21) Anesthesia professionals are unable to protect the basic rights of the patient and deliver quality care while fatigued. Call-shift fatigue violates the AANAs standards for nurse anesthesia practice and the professions commitment to patient safety.

Individual anesthesia providers, as well as organizations, should always put patient safety first. Call-shift duration and frequency of call shifts should be balanced with the desires and abilities of the staff CRNAs within a department. (2) Additional recommendations have been made by the AANA and the Joint Commission to employ

some evidence-based actions that health care organizations can take to mitigate the risks associated with call-shift fatigue, and therefore preserve patient safety. Educating staff on the topic of sleep hygiene and the effects of fatigue on patient safety is a great starting place. (18) Other strategies for combatting fatigue include an assessment of the organization's fatigue-related risks, strengthen the organizations hand off of care process, invite staff input when designing work schedules, and create and implement a fatigue management plan. A fatigue management plan includes strategies such as fatigue avoidance strategies and fatigue countermeasures as discussed earlier. Organization and institutional policies should foster a culture of safety where staff has the opportunity to express concerns related to fatigue and patient safety. (2) (18) A culture of safety is further strengthened through teamwork and support for staff that work extended shifts as a way to protect patients from potential harm. Finally, an organization committed to combatting the effects of sleep related fatigue on patient safety should provide and assess the environment provided for sleep and rest breaks to ensure that it fully protects and promotes a healthy sleep and rest environment. (2) Call rooms should provide CRNAs with a cool, dark, quiet, and comfortable room when necessary. (18)

The AANA is committed to promoting patient safety strategies to prevent or reduce errors in healthcare. The AANA has developed a position statement to provide guidance to healthcare practitioners regarding fatigue as it relates to human performance and well-being. (2) In alliance with evidence-based research on the topic, the AANA does not recommend that CRNAs provide anesthesia patient care for more than 12-16 consecutive work hours. Exceptions to this limit should be outlined within institutional policies. An extremely valuable recommendation made by the AANA is the

dissemination of education on the topics of sleep science, fatigue countermeasures, circadian rhythm, fatigue, clinical performance, and patient safety by nurse anesthesia educational programs. (2) The growing market in need of anesthesia services allows for individual practitioners to work at multiple facilities at all hours of the day and night, such as large hospitals and smaller endoscopy clinics, etc. Working at multiple facilities has a financial incentive. The question of the risk to patient safety remains, and man not outweigh financial benefit. Current and future nurse anesthetists need to be educated on the topic of call shift fatigue and reminded of the focus of the profession of nurse anesthesia being patient safety above all else.

Conclusion:

Extended work hours required by a growing need for anesthesia services at all hours of the day has led to the development of call-shift fatigue and the negative sequela associated with patient safety. Fatigue-related medical errors and negative health consequences for individual practitioners is of great concern. Administrators, leaders in the anesthesia community, and individual CRNAs should consider the negative results of evidence-based research on the topic of call-shift fatigue when developing policies and guidelines for CRNA call-shift duration and frequency. (9) Student Registered Nurse Anesthetists (SRNAs) and Certified Registered Nurse Anesthetists (CRNAs) need to be continuously educated on the topic of fatigue and the effects it has on patient safety and individual well-being. Fatigue countermeasures and fatigue avoidance strategies should be employed to ensure that CRNAs who work extended shifts are operating at the highest functional capacity. Other recommendations such as limiting work hours to no more than 12

hours along with frequent breaks and an overall environment within an organization that fosters a culture sensitive to fatigue and its negative effects. Workplace fatigue for anesthesia providers poses both a public health and safety concern because of the ever-increasing demands placed on CRNAs to provide safe anesthesia care. The nurse anesthesia profession needs to recognize the associated patient safety consequences and develop practices that continue to elicit CRNAs commitment to delivering high quality patient centered care with a strong focus on patient safety.

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Appendix A:

Presentation Evaluation: Call-shift Fatigue

Presenter: Marc R. Bentz, CRNA, MNA

Please rate each of the following statements by circling a number between 1 and 5 where the numbers mean the following:

1: Strongly Disagree 2: Disagree 3: Neutral 4: Agree 5: Strongly Agree

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. The learning objectives were met.	1	2	3	4	5
2. The content of the presentation was interesting.	1	2	3	4	5
3. The information was applicable to my practice.	1	2	3	4	5
4. I will apply what I learned from this presentation to my own practice.	1	2	3	4	5
5. The speaker had an effective presentation style.	1	2	3	4	5

Additional comments: