Video Versus Direct Laryngoscopy on Intubation Success Rates in the SRNA

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Abstract

General anesthesia can be supported by placing an endotracheal tube through the trachea to provide oxygenation, ventilatory support, and deliver inhaled anesthetics. Two common modes of endotracheal intubation consist of Direct Laryngoscopy (DL) or Video Laryngoscopy (VL). Studies have shown that intubation has been associated with patient complications such as airway trauma and repeated or prolonged attempts at intubation may increase the risks of more severe complications such as hypoxia, hemodynamic instability, cardiac arrest, and death. As novice anesthesia providers, student registered nurse anesthetists (SRNAs) are in the beginning processes of mastering this skill while still maintaining patient safety. Over a 3-month period, first-year SRNAs at AdventHealth University were voluntarily asked to report which tool was used for each intubation and whether the intubation was successful. The Wilcoxon signed-rank test was used to analyze this data. The project's aim was achieved, which demonstrated a significant difference in median success rate between the two methods. Over the 3-month study period, intubation success with VL was greater than that of DL. In the first month of the study, participants utilized the VL far more than the DL and were more successful with intubating with the VL. By the third month of the study, participants began utilizing the DL more frequently and had greater success when compared to the first month. This demonstrates that VL improves SRNAs intubation success, aids in recognizing pertinent airway anatomy, knowledge, and supports a culture change to one where the use of VL in the SRNA is encouraged.

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Nearly 50 million anesthetics are performed by anesthesia providers each year, with about 40% of these cases requiring general anesthesia (AANA, 2021, Lewis et al., 2016). General anesthesia can be accomplished by performing an endotracheal intubation in order to provide oxygenation and ventilation, prevention of aspiration, as well as the delivery of inhalation agents required to maintain patient safety for the surgery or procedure to take place. Two commonly used modalities for intubation include DL, with devices such as the Macintosh or Miller blade used to create a direct line of sight to the glottic opening, and VL with a McGrath or Glidescope, for example, which uses video imaging to capture a view of the glottis for indirect access of the airway.

Despite its wide margin of safety, endotracheal intubation for general anesthesia, regardless of the approach used, is associated with severe patient complications, such as laceration or injury to the lips, soft palate, and tonsils, and damage to the teeth, trachea, and larynx. Furthermore, studies have shown that subsequent endotracheal intubation attempts lead to delayed intubation and/or oxygenation and is related to even more life-threatening complications, such as hemodynamic instability, hypoxic brain damage, cardiac arrest, and death (Baek et al., 2018; Howle et al., 2021; Howson et al., 2020; Huang et al., 2017; Howson et al., 2020; Jiang et al., 2017; Kriege et al., 2917; Scholtis et al., 2017). Thus, prompt and skilled securement of the airway is of utmost importance to the anesthetist and is a critical step in

providing general anesthesia (Huang et al., 2017; Kriege et al., 2017; Lewis et al., 2016; Li et al., 2021; Madziala et al., 2018; Savino et al., 2017).

Certified Registered Nurse Anesthetists (CRNAs) and Student Registered Nurse Anesthetists (SRNAs) provide approximately 50% of the anesthetics administered each year in the United States (AANA, 2021). Many nurse anesthesia programs require at least 2000 clinical hours of providing direct anesthesia care, with a majority of SRNAs graduating with over 3000 hours of clinical experience. During this time, a minimum of 250 tracheal intubations must be documented on the student's record as outlined by The Council on Accreditation of Nurse Anesthesia Educational Programs (COA, 2020). Of these 250 successful intubations, 25 must be considered "alternative tracheal intubation techniques", which includes the use of a VL, fiberoptic or endoscopic device.

As novice providers, SRNAs are at a crucial stage in their education and training in the skill of intubation. Therefore, we deem it is important to provide the knowledge and evidence in the practice of this invaluable skill. SRNAs gain most of their training and practice in the clinical setting. Thus, we believe that by addressing the rates of success between two widely used techniques for laryngoscopy; VL and DL, we may provide evidence that may benefit the anesthesia community, especially SRNAs and SRNA clinical preceptors and educators, in terms of best practices for intubation and intubation education.

Significance & Background of Identified Problem

Successful endotracheal intubation requires the use of a laryngoscope to carefully retract the soft tissues of the oropharynx, including the tongue, to provide a straight path to the larynx where a flexible endotracheal tube may pass through the vocal cords and secured by inflating the attached balloon at the distal tip. Video laryngoscopes have been developed by using the same

mechanism, with the difference of utilizing a video image screen to indirectly view the larynx. This technology has been designed to improve visibility of the airway, often in times of predicted or encountered difficult airways (Lewis et al., 2016, Savino et al., 2016). This type of design enables the anesthetist to view the larynx without a direct line of sight. The visualization of the glottic opening may become a difficult task. Difficulties that arise with intubation, such as repeated intubation attempts, for example, prolong the time to intubation and increase complications, such as hypoxic events (Lewis et al., 2016; Savino et al., 2017). These devices have been shown to be of great benefit in challenging situations, such as a known or suspected difficult airway, providing an improved Lehane-Cormack view of the glottic opening, minimizing manipulation of the airway of the patient with a traumatic cervical spine injury, tracheal tube exchange, and rescue after failed fiberoptic intubation (Scholtis et al., 2017).

Endotracheal intubation success using VL has been widely documented in the literature and study populations primarily consists of airway experts, such as anesthesiologists, ENT surgeons, emergency physicians, and critical care specialists (Arulkumaran et al., 2018; Baek et al., 2018; Griesdale et al., 2012; Li et al., 2021; Mosier et al., 2013; Nouruzi-Sedeh et al., 2009; Okamoto et al., 2019; Savino et al., 2017; Silverberg et al., 2015; Suzuki et al., 2019). Interestingly, there are only a handful of data on the success rates of VL in the non-expert population (Griesdale et al., 2012; Nouruzi-Sedeh et al., 2009; Savino et al., 2017).

In the hands of the novice provider, VL devices, such as, the Glidescope and McGrath have been shown to have a higher intubation success rate than conventional DL (Hoshijima et al., 2018; Griesdale et al., 2012; Nouruzi-Sedeh et al., 2009). One study, by Nouruzi-Sedah et al., (2008), examined the first-attempt intubation success rates for endotracheal intubations using VL, namely, the Glidescope, and DL by inexperienced personnel. The participants of their study

consisted of nurses, medical students, first-year residents, and a paramedic, all of whom only intubated a manikin beforehand. Their results determined that the VL group led to a significantly higher success rate (93%) compared with the DL group (51%) in the novice provider (Nouruzi-Sedeh et al., 2009).

Therefore, this study served to contribute to the small evidence in the literature which point to beneficial outcomes of utilizing VL techniques, to not only the novice anesthetist themselves, but to their patients as well. First-attempt success rate is recognized as an important outcome measure as studies have shown an increase in the adverse event rate with successive failed intubation attempts (Savino et al., 2017). Thus, the purpose of this study was to compare first-attempt intubation success rates in the SRNA class of 2024 population at AdventHealth University (AHU) using two widely popular intubation modalities: video laryngoscopy (VL) versus direct laryngoscopy (DL) during their first 3 months of clinical experience.

PICOT Evidence Review Questions

The following are two questions, presented in the Problem Intervention Comparison and Outcome (PICO) format, which supported the review of literature and assisted in guiding the innovation. The first questions guided the review of the literature, while the second question directed the innovation.

1.) In the SRNA (P), what is the effect of utilizing video laryngoscopy (I) on the SRNA's intubation success rates (O)?

2.) In the Cohort 2024 SRNAs enrolled at AHU's Doctorate of Nurse Anesthesia Practice program (P), how does the use of video laryngoscopy (I) compare to direct laryngoscopy (C) effect the SRNA's first-attempt intubation success rates (O) during their first 3 months of clinical rotations (T)?

Search Strategies

The studies utilized for this scholarly review were obtained from the following databases: EBSCOhost, CINHAL, and PubMed. A total of 28 studies were initially populated, of which ten studies met search criteria. The key search terms included: "direct laryngoscopy" AND "video laryngoscopy" OR "glidescope" OR "c-mac" OR "McGrath" OR "airtraq". The MeSH terms included: "Intubations, Endotracheal", "Laryngoscopy", "Airway Management", "Laryngoscopes", and "Laryngoscopy". By using the "See all similar articles" function in PubmMed, were able to locate an additional nine studies that became pertinent to our literature review and met search criteria. Seven more studies were included in this review that met search criteria except for the data of publication but became seminal studies to our scholarly project bringing the total of studies to 26. The inclusion criteria included peer-reviewed, human subjects, linked full text, English, and published between 2016 to 2021. Studies were reviewed by title, abstract, and full text to determine whether they met inclusion criteria. Publications were excluded from the systemic reviews if they were case reports, case series, and editor reviews. Studies pertaining to other fields or irrelevant to our topic were excluded.

GRADE Criteria

The literature for this project was evaluated using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) criteria. A GRADE level -3 was originally given for the evidence of the articles. The basis for this rating stemmed from the method of data collection which included random control trials and systematic reviews. Due to bias, lack of blinding in observational studies, small sample sizes, the overall grade level was reduced to a final GRADE level -2. The methodological flaws recognized in the studies include convenience sampling and lack of previous studies comparing similar variables. The overall quality of

evidence is moderate with high recommendation for ongoing clinical studies for improvement strategies in SRNA clinical success, see Appendix A.

Literature Review and Synthesis of Evidence

Overview

The literature review and synthesis of the evidence includes a description of the operational definitions that are used in this paper to help create a consistent basis of terminology. The literature review also includes a discussion on what the existing literature states regarding the problem in question, namely, first-attempt intubation success rates of VL compared to DL. Next, outcomes such as time to intubation, complications of intubations, and glottic visualization are discussed in the review. And finally, a summary of the applicability to practice concludes this portion of the literature review.

Operational Definitions

Direct laryngoscopy: a rigid retractor type device that uses a detachable metal blade (Macintosh, curved blade; Miller, straight blade), to move the tongue and soft tissue in the oropharynx to enable a straight line of sight to the larynx in order to pass an endotracheal tube.

Video laryngoscopy: VL will refer to a rigid (as opposed to flexible fiberoptic devices) blade to retract the soft issues in the same manner as in direct laryngoscopy, but with a digital technology at the tip of the blade to transmit video images to an eye piece viewable to the intubator.

First-attempt Intubation Success: the securement of the airway with an endotracheal tube on the first-attempt.

Overall Intubation Success: the ability to achieve successful intubation on a single patient, regardless of the number of attempts.

Video Laryngoscopes: The types of laryngoscopes include in the category of VL include McGrath, Glidescpope, C-Mac, and AirTraq.

Endotracheal Intubation: The use of a laryngoscope to pass an endotracheal tube through the oropharynx into the glottic opening for the securement of an airway in patients requiring general anesthesia.

Intubation Attempt: each time a device (VL or DL) is removed from the oropharynx.

Student Registered Nurse Anesthetist (SRNA): a baccalaureate or graduate-level registered nurse currently enrolled in a nurse anesthesia educational program accredited by the Council on Accreditation of Nurse Anesthesia Educational Programs (COA) (COA, 2020).

Literature Review

VL compared with DL in terms of intubation success rates was a common primary outcome of the studies that were reviewed. A recent study showed a greater intubation success rate on the first-attempt for the VL group (79%) compared to a lower 63% success rate for the DL group (Li et al., 2021). Similar studies and systemic reviews in various practice settings, such as the ED, OR, and ICU showed similar results (Arulkumaran et al., 2018; Baek et al., 2018; Griesdale et al., 2012; Mosier et al., 2013; Nouruzi-Sedeh et al., 2009; Okamoto et al., 2019; Savino et al., 2017; Silverberg et al., 2015; Suzuki et al., 2019).

Similarly, Lewis et al., 2016, performed a meta-analysis systemic review in the literature, consisting of 64 studies with 7044 adult participants in which they discovered that VL displayed statistically significant fewer failed intubations, even during an anticipated difficult airway. However, in terms of first-attempt intubation success rates, their analysis showed that there was no statistically significant difference between the two devices. This later finding correlated with many other studies on this topic, including both systemic review studies and single-study

projects (Hoshijima et al., 2018; Howle et al., 2021; Huang et al., 2017; Jiang et al., 2017; Lascarrou et al., 2017; Sainsbury et al., 2017; Savino et al., 2017; Suzuki et al., 2019).

Despite these findings, a possible and relevant explanation for this may be associated with a number of factors including the provider's expertise level, the patient population, the use of neuromuscular blocking agents, and the practice setting. Most of these studies were performed by airway management experts on patients without predictors of difficult intubation, which would explain why there would be no difference in the first-attempt success rates among this population. The instances where a highly experienced provider may show superiority for VL over DL may be in the case of a difficult airway, for instance (Jiang et al., 2017). These findings suggest that expert providers do not experience the same benefit from VL compared to DL across practice settings on patients without predictors of known or suspected difficult airways.

Interestingly, when these studies were further stratified by provider, studies with physician intubators had a lower rate of first-attempt success with VL compared to DL, whereas non-physicians had a higher rate of success with VL (93%) compared to DL (51%) (Baek et al., 2018; Griesdale et al., 2012; Li et al., 2020; Nouruzi-Sedeh et al., 2009; Savino et al., 2017; Suzuki et al., 2019). This could possibly suggest that VL may lead to increased first-attempt intubation success rate in novice providers, such as SRNAs, who have less experience with endotracheal intubation. This provides reason to explore the possible benefit on focusing on studies on non-expert level anesthesia providers, such as the SRNA population.

Time to Intubation

Time to intubation was a common theme throughout the studies which compared VL to DL. Significant difference in the mean time to intubate between the VL and the DL group was found to be significantly different: approximately 90 seconds for DL and 63-73s seconds for VL

(Baek et al., 2018; Sainsbury et al., 2017). In contrast, there are numerous studies whose results display that VL when compared to DL did not result a decrease time to intubation (Hoshijima et al., 2018; Howle et al., 2021; Huang et al., 2017; Li et al., 2021).

Complications of Intubation

Studies concerned with comparing VL with DL also focused on the effect that each modality had on the incidence of patient complications, such as injury. In Scholtis et al (2017), a total of 155 intubations in the operating room were observed to determine if injury rates in the patient population were statistically different from using the Glidescope (VL) compared to DL. Their findings suggested that there was no association between injury rates and the use of VL versus DL due to a p value (0.3976) that was not below their acceptable limit for correlative conclusion. Other studies mirrored their results which showed no difference in the complication rates, including trauma, respiratory complications, or cardiovascular complications in the VL group compared to the DL group (Baek et al., 2018; Huang et al., 2017; Li et al., 2021; Sainsbury et al., 2017). Only in the systemic review performed Lewis et al., 2016, did we find statistical differences on the incidence of patient complications, but only in the following categories: laryngeal or airway trauma and voice hoarseness, but not found in the other topics of measure, such as hypoxia, sore throat and mortality.

Glottic View

A Lehane-Cormack classification system was used to compare glottic visualization in the studies that were reviewed. The majority of data reveal that video laryngoscopes can aid in successful intubation in situations of known or suspected difficult airways in practice settings where the patients may be unstable or unpredictable, such as in the ICU and ED, for example, due to its superior view of the glottic opening and vocal cords (Baek et al., 2018; Hoshijima et

al., 2018; Howle et al., 2021; Huang et al., 2017; Jiang et al., 2017; Lewis et al., 2016; Madziala et al., 2017; Okamoto et al., 2019). Specifically, one study showed that for the VL group, 63% of intubation attempt achieved a Lehane-Cormack grade of 1, while the DL group displayed a grade II or III view 81% of the time (Madziala et al., 2017). Despite better glottic visualization, however, this did not translate into an improved first-attempt success rate in the surgical patient, where the environment and patient selection can be carefully selected (Jiang et al., 2017).

Many studies compared intubation success rates in varying scenarios such as difficult pediatric airways, ICU setting, trauma, and within physician residents with varying results, however, no study has yet compared the success rates in novice SRNAs. Novice SRNAs have limited intubation experience, little confidence and understanding of the anatomical structures used to guide DL. VL could potentially be used as a teaching tool in this population until their knowledge, experience, and skill have demonstrated proficiency to advance to the other techniques. Improving SRNAs success early on in their practice may improve their confidence and knowledge of the airway, limit failed intubation attempts and reduce oropharyngeal and laryngeal tissue trauma in the patient, along with the reduction of more severe patient complications. The results of this study may help promote a change in culture among anesthesia providers, preceptors, and hospitals to support the use of VL in SRNAs during their first clinical experiences.

Project Aims

The primary purpose of this scholarly project was to compare first-attempt intubation success rates in the SRNA population at AHU using two widely popular intubation modalities: VL versus DL.

The objectives were delineated as follows:

1.) For the SRNA cohort of 2024, provide evidence-based information regarding first-attempt intubation success rates in VL compared to DL during their first trimester of clinical with data collection for each assigned clinical day every week, during the 3 month timeframe that includes January 2022, February 2022, March 2022 and April 2022 at AHU clinical sites.

2.) All SRNAs from the cohort of 2024 will provide effective and safe endotracheal intubation that is patient centered under supervision of an attending anesthesiologist and CRNA by April 2022.

3.) All SRNAs belonging to the cohort of 2024 will display a 90% intubation success rate using the laryngoscope that produced the most first-attempt success rates from the first 3 months of their clinical experience.

Methods

This scholarly project design was quantitative, prospective and experimental and determined the best approach due to the nature of the study by expert consultation. The following variables were studied: intubation tool as the independent variable, and first-attempt intubation success as the dependent variable. Inclusion criteria were first-attempt intubations using either a DL or a VL in the AHUs DNAP cohort of 2024 during the first three months of clinical experience extending from January to April 2022. Exclusion criteria were all subsequent attempts, attempts by other providers (not the study participants), and those attempts outside the date range for data collection. The proposal received approval from the AdventHealth University Scientific Review Committee, acknowledging obtaining the scientific merits to conduct this scholarly activity. In addition, the AdventHealth Institutional Review Board (IRB)

determined that the project was a Quality Improvement/Quality Assessment (QI/QA) and no oversight from the IRB was needed.

Recruitment of approximately 30 study participants from the 2024 SRNA Cohort at AHU was performed by scholarly project team members and scholarly project chair through email, flyer handouts, and through periodic reminders and informal sessions. An example of the recruitment letter of invitation and flyer handouts can be found in Appendix B. All participation in the study was completely voluntary, and compensation for their participation was not provided. No potential risks, discomforts or benefits, apart from the contribution to evidence-based practice, for participation were identified.

The setting and study site were AdventHealth clinical sites where first-year SRNAs were involved in direct patient care. These sites included the following campuses: Orlando, East, Winter Park, Celebration, Apopka, and Altamonte.

The Data Collection Tool as seen in Appendix C, is an excel type document that was sent out to each student prior to the data collection period via email. It consisted of two questions that each student was asked to answer about each case in which an endotracheal intubation was performed by them. For each case, they answered whether a VL, or a DL device was used, and if the intubation was successful on the first-attempt. A drop-down menu selection was integrated into the excel worksheet to minimize any erroneous answer input. Upon completion of the data collection period, study participants were asked to review and update their intubation attempts in the Data Collection Tool provided and send back via email to scholarly project staff.

The data was de-identified and randomized prior to transcribing it into a Microsoft Excel spreadsheet by the project staff for protecting confidentiality of study participants. The data was uploaded to a password protected file on Microsoft SharePoint and kept for 5 years.

The first-attempt success rate for the VL group and the DL group was compared using a non-parametric Wilcoxon Signed Rank Test. The test is performed two-sided with an alpha value of less than 0.05 to be considered significant. The null hypothesis (H0) is as follows: The median success rate between two methods is zero. The alternative hypothesis (H1) is as follows: The median success rate between the two methods is not equal to zero. Tho Nguyen, MPH, a Biostatistician with AdventHealth Research Institute performed the Wilcoxon Test and determined the p-value to be 0.0017. Therefore, we concluded that there was a significant difference in median success rate between the two methods. At the conclusion of the statistical analysis, evidence-based recommendations were created based on the results of this study.

The Plan-Do-Study-Act model was utilized in this project in a deliberate way.

Plan

A literature review was completed on articles relevant to intubation success and intubation tools. A presentation which included the purpose, aims, methods, and significance was given to key stakeholders, peers, AHU faculty members, and study participants. Participant activity was requested and communication with participants took place via email.

Do

This phase consisted of the AHU DNAP cohort 2024 SRNAs entering their results in the Excel spreadsheet contingency table emailed to them prior to their first clinical day following their normal clinical routine assignments.

Study

This phase included collaboration with Tho Nguyen to aid in the analysis of data. As the intubation success rates demonstrated a difference between the two different tools, a Wilcoxon signed rank test was used to demonstrate if this difference was statistically significant.

Act

Involved stakeholders involved AHU faculty, students, and program directors were presented with evidence-based recommendations based on these study outcomes.

Planning and Procedures

Planning Timeline

Key players were formally interviewed via Microsoft Teams in June 2021, with permission received for recording. Through these interviews, insight was gained regarding possible barriers, limitations, resources, and impact that this study may have had on future SRNAs and patients. The key players consisted of Jim Molinaro, Chief CRNA of Central Florida, USAP; Jessenia Haigh CRNA preceptor at USAP; and Aixa Figuero, AHU DNAP SRNA Class of 2022. Jim Molinaro was selected based on his position at USAP and the impact his role has on the CRNA staff. Through email notification, Jim Molinaro was able to reach out to all CRNAs in practice and update them on this ongoing study. Aixa Figuero was selected due to being an end user of this scholarly project but was not part of the study population. Jessenia Haigh, CRNA, was interviewed to gain information on how this project may impact the attitudes of the preceptors and any barriers that may have been encountered.

Implementation Timeline

The implementation plan began in January of 2021, which consisted of a review of existing literature on first-attempt intubation success between VL and DL. The base knowledge obtained from this review helped identify the existing problem, that success rates between these two tools have not been assessed in the novice SRNA. In May 2021, a problem was identified, PICOT questions formulated, and a proposal for a topic was submitted to the AHU faculty for approval. Studies and scholarly articles pertinent to the subject were analyzed using matrix tables

in June 2021. Following approval by AHU faculty, key players were identified and approached for interviews. Key players were selected based on their positions held at USAP and their roles at AHU. *They were selected as follows: Jim Molinaro, Co-Chief CRNA of Central Florida, USAP; Jessenia Haigh CRNA at USAP; and Aixa Figuero, SRNA class of 2022 and AHU.* Following the interview of key players and end-users, a proposed method PowerPoint was presented to Dr. Roy Lukman and Dr. Sarah Snell in June 2021. This presentation focused on first-attempt intubation success on first year SRNAs at AHU using VL or DL and capitalized on the value of first-attempt intubation success in SRNAs as well as the impact on patient safety.

IRB determined this project to be quality improvement/quality assessment, and no oversight by the IRB was needed. On December 30th of 2021, SRC approval was obtained. A presentation was given to the study participants following their clinical orientation day in December of 2021 to explain how the table should be filled out and when to return it via email (April 2022). The excel spreadsheet for data collection was then sent to the participants on December 17th, 2021.

Data collection began in January 2022, the time in which the participants (Cohort 2024 SRNAs at AHU) entered clinical rotations. Data collection continued for three months ending in April 2022. Following data collection, in June 2022, Wilcoxon Signed Rank test was used to quantify the data examining the differences in variables. Dissemination of project findings and recommendations occurred in the Spring of 2023. Please see Appendix D for timeline reference.

Budget/Grant

This scholarly project did not apply for a grant, nor did it necessitate a budget. Through interviews with key players and end users, it was determined that no additional staff, money, equipment, or space was required. The setting in which the study took place was already

supplied with all necessary tools including direct laryngoscopes and video laryngoscopes in every anesthetizing clinical location. Study participants were required to fill out an electronic survey sent via email and returned via email, a task that did not require any funds.

Barriers and Facilitators

The first barrier that was encountered in this project was ensuring full participation by the study participants. The study participant group consisted of 30 SRNAs of which 14 returned completed Data Collection Tools via email. Upon interviews with the key players, each recommended ongoing communication with the study participants through email as well as action on their behalf to motivate the participants to complete the study. It was important to de-identify the data once obtained to maintain study participant anonymity. Once the data was collected, only the names of the participants remained on the email thread, therefore, through the transfer of raw data, the names were no longer associated with the results thereby resolving this particular barrier.

Secondly, another barrier that was identified included resistance by clinical preceptors to allow novice SRNAs to choose VL over DL during their first few weeks of clinicals. Facilitator and key player, James Molinaro, facilitated this barrier by informing all CRNAs and anesthesiologists that this study was going to be performed at all AdventHealth campuses in Central Florida where SRNAs rotate through and to allow the implementation of this study.

Lastly, another potential barrier identified was improper or inaccurate reporting on the contingency tables by participants. We alleviated this barrier by completing a face-to-face presentation with the study participants on how to fill out these tables correctly prior to data collection, utilizing a pre-filled, drop-down menu style excel format, routine check-ins with

study participants via email, distributing informational handouts via email, and answering any participant questions as they arise.

Facilitators to this project included: a Co-Chief CRNA for USAP, an AHU DNAP senior SRNA, a biostatistician with the AdventHealth Research Institute, and a USAP CRNA staff member. These key players helped to provide recommendations for directing, implementing, and analyzing the results of the project. the project.

Results

Data was examined to determine whether a relationship existed between the independent variable (VL or DL) and the dependent variable (first-attempt intubation success). The study participant sample of n=14 was obtained with a response rate of 47% (14/30). Demographics of study participants include first-year SRNAs, with no prior anesthesia clinical experience. Only first-attempt intubations were recorded during the first three months of clinical for the cohort of 2024. Second-attempt and subsequent attempts were excluded, along with attempts made by other providers and those utilizing other means of intubating, such as the utilization of fiberoptic intubation, nasal intubation, and the use of an airway change catheters.

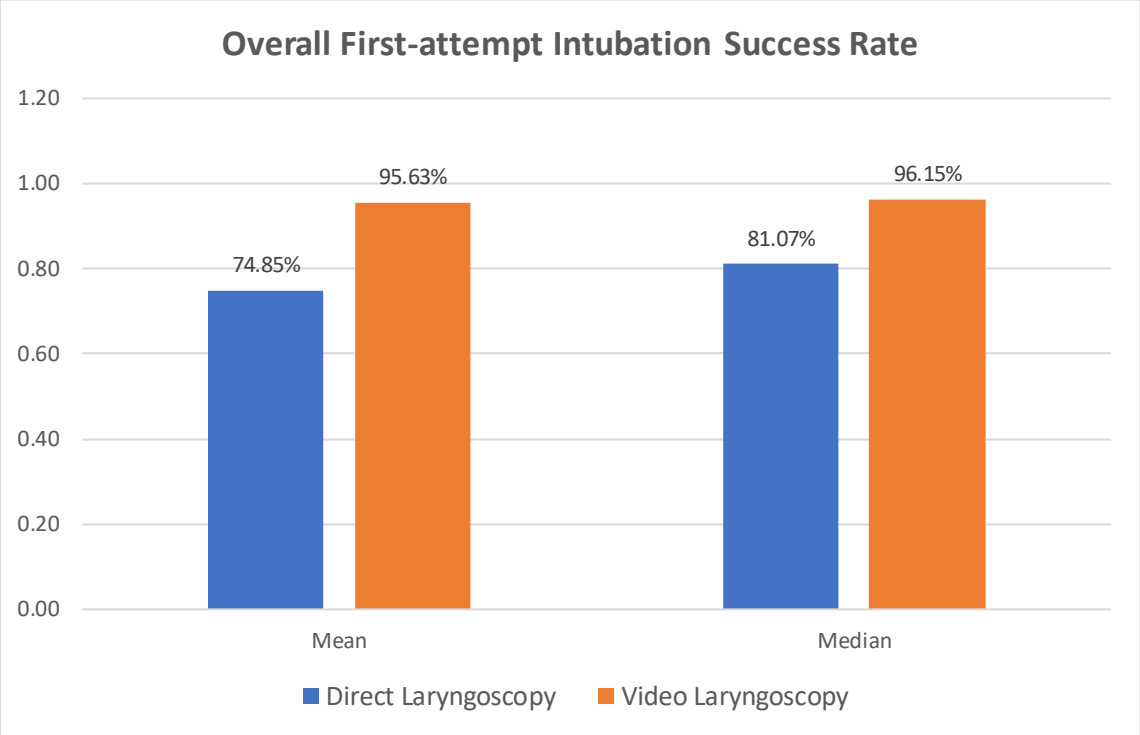
Intubation Success Rates

First-Attempt Intubation Success Rates Overall

As seen in Figure 1, the mean first-attempt success rate was 0.96 using the VL compared to 0.75 mean first-attempt success rate with the DL. There was a total of 216 DL attempts during the study period. 166 DL attempts were successful (76.85%), and 50 DL attempts were unsuccessful (23.15%). There was a total of 539 VL attempts during the study period. 517 VL attempts were successful (95.92%) and 22 VL attempts were unsuccessful (4.08%).

Figure 1

Mean First-Attempt Intubation Success Rate.



Note. Figure 1 demonstrates the difference in success rate between the two most common intubation tools, the DL and the VL.

Analysis of the data was performed using the non-parametric Wilcoxon Signed Rank test due to the limited sample size and the skewed distribution of the data. The null hypothesis was determined that the median success rate between the two methods was zero. The two-sided Wilcoxon Test statistic resulted in a p-value of 0.0017. By using the median value, the results demonstrated that there was a significant difference in median success rates between VL (96%) and DL (81%) intubation techniques in the study population studied. Therefore, the null hypothesis was rejected.

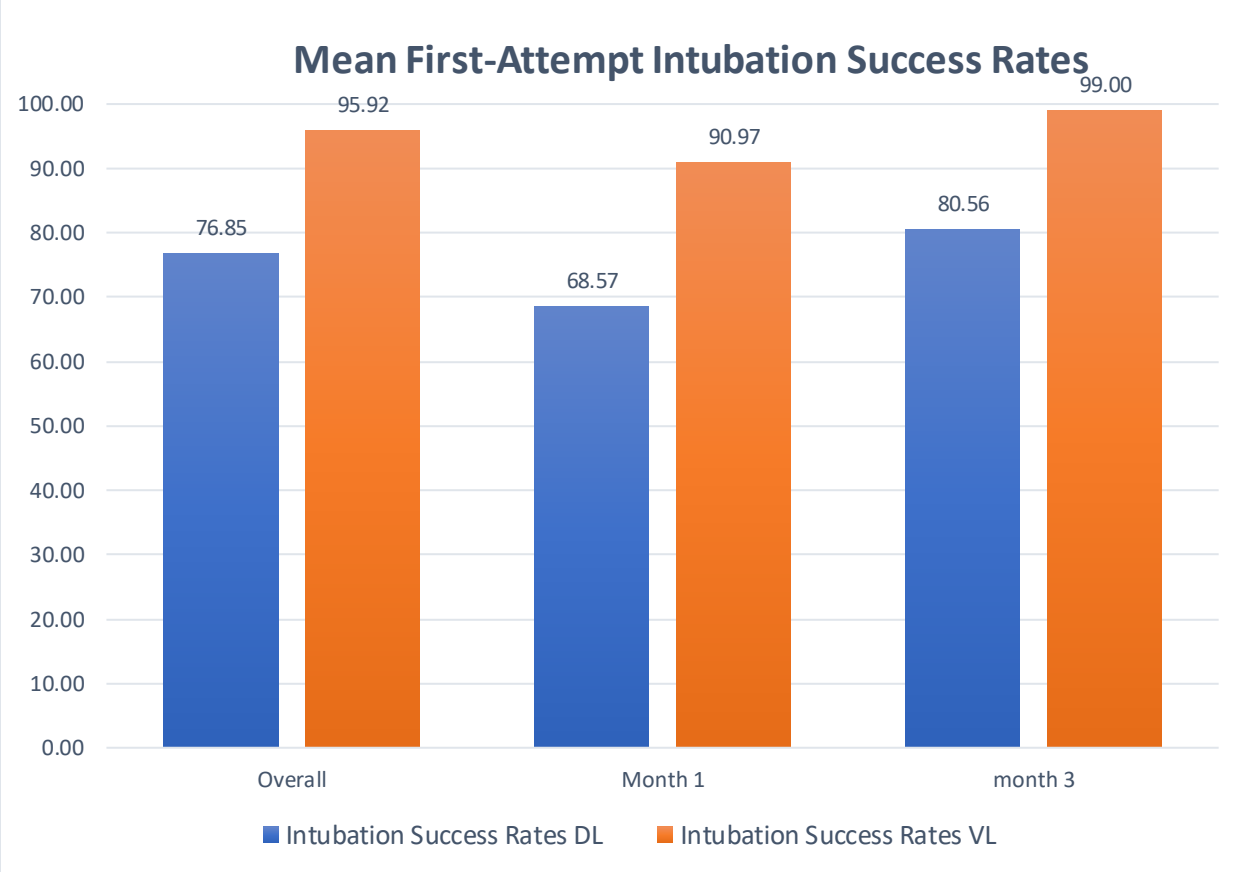
First-Attempt Intubation Success Rates Month 1 vs Month 3

As seen in Figure 2, first-attempt intubation success rates were further analyzed on a month-by-month basis. In month 1, first-attempt DL intubation success rate in our study

participants was 68.57%, compared to month 3 for first-attempt DL intubation success 80.56%. The results for DL intubation success rate increased nearly 12%. In contrast, in month 1, the first-attempt VL intubation success rate was found to be 90.97%, whereas by month 3, the first-attempt VL intubation success rate was found to be 99.00% for a positive increase of 8.03%. The mean first-attempt intubation success rates for both modalities increased between 8-12% during the first 3 months of clinicals.

Figure 2

Mean First-Attempt Intubation Success Rates



Note. Comparison of First-attempt Intubation Success Rates, Overall, Month 1 and Month 3 time marks.

Device Utilization

Device Utilization Overall

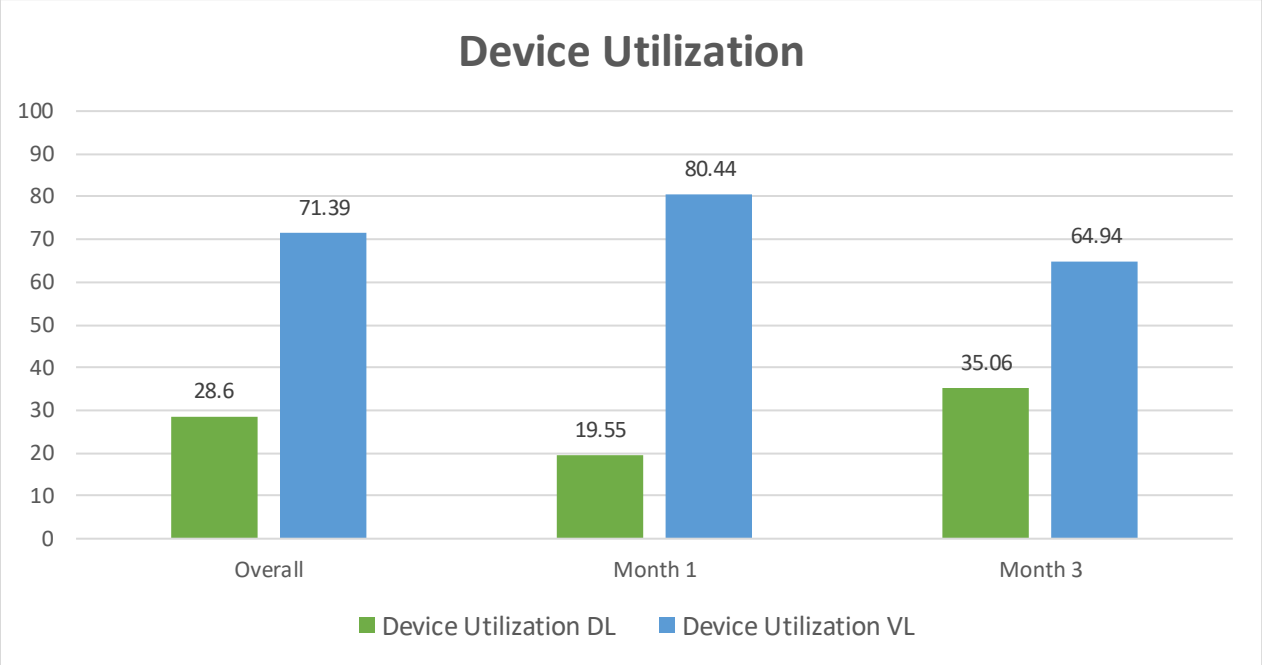
A total of 755 intubation attempts were made by 14 study participants over the course of 3 months. Of these intubations, 166 were recorded as successful DL attempts (76.85%) and 50 were recorded as unsuccessful DL attempts (23.15%). In addition, 517 were recorded as successful VL attempts (95.92%) and 22 were recorded as unsuccessful VL attempts (4.08%). The results of this data indicate that a 19.07% increase in successful intubation was seen in the VL category compared to DL. In terms of device use, a DL blade was used 28.6% (216/755) of the time, and a VL device was used 71.39% (539/755) of the time, indicating a preferential use of a VL device over DL (see figure 6).

Device Utilization Month 1 versus Month 3

When analyzing the raw data by individual month, we found several interesting key points. Firstly, during the first month there was a total of 179 intubations. DL was used only 19.55% (35/179) of the time, while the VL device was used 80.44% (144/179) of the time. In the 3rd month, there was a total of 308 intubations. During the third month, DL was used 35.06% (108/308), whereas the VL was used 64.94% (200/308) of the time. The result of this data, as demonstrated in Figure 3 shows that by the end of the study period, the utilization of a DL device increased from 19.55% to 35.06%. In contrast, utilization of a VL device from month 1 (80.44%) decreased in month 3 to 64.94%.

Figure 3

Month 1 vs Month 3 Graph



Note. Comparison of device utilization overall, and month 1 and month 3 time marks.

Month 1 vs Month 3 Table

	DL - Yes	DL - No	VL - Yes	VL - No
Grand Total:	**166**	**50**	**517**	**22**
ALL:	ALL DL ATTEMPTS:		ALL VL ATTEMPTS:	
	216		**539**	
Percent:	76.85%	23.15%	95.92%	4.08%
At Month 1:	24	11	131	13
	Month 1 DL ATTEMPTS:		Month 1 VL ATTEMPTS:	
	35		144	
Percent:	68.57%	31.43%	90.97%	9.03%
At Month 3:	87	21	198	2
	Month 3 DL ATTEMPTS:		Month 3 VL ATTEMPTS:	
	108		200	
Percent:	80.56%	19.44%	99.00%	1.00%

Note. Raw Data which includes Overall total, month 1 and month 3 time marks.

Discussion, Applicability to Practice, and Contribution to Professional Growth

First-Attempt Intubation Success Rates

According to the Wilxocon signed rank test, a statistically significant difference was found between median intubation success rates in VL (96%) and DL (81%). This data was generated in our population of SRNAs in the operating room setting and closely resemble that of previous studies on the subject with expert providers and in various practice settings, such as the ED and ICU (Arulkumaran et al., 2018; Baek et al., 2018; Griesdale et al., 2012; Li et al., 2021; Mosier et al., 2013; Nouruzi-Sedeh et al., 2009; Okamoto et al., 2019; Savino et al., 2017; Silverberg et al., 2015; Suzuki et al., 2019). When stratified by provider level, our novice SRNA population closely resembled previous studies on this subject which displayed higher levels of success with VL compared to DL in the non-expert provider (Baek et al., 2018; Griesdale et al., 2012; Li et al., 2020; Nouruzi-Sedeh et al., 2009; Savino et al., 2017; Suzuki et al., 2019).

The results of this scholarly project contributes to the body of knowledge in the literature which showed higher rates of intubation success with VL in various the practice settings, and in various levels of experience. The results indicate that VL promotes a significant advantage over DL in intubation success, thus improving patient safety and decreasing complications of repeated, failed, or prolonged intubation attempts.

Device Utilization

The preferential utilization of intubation device has not been studied thus far in the SRNA population, or any other anesthesia provider. During the first month, SRNAs strongly preferred the use of the VL, choosing the VL 80% of the time. In comparison, by the third month of the study, SRNAs were choosing the VL only 65% of the time. DL utilization increased from roughly 20% in the first month to just over 35% in the third month. Interestingly, during this 3-month period, the intubation success rates for DL also increased (12% increase in success rate).

This shows that although the use of a VL device over the 3-month period had decreased by 15.5% with high rates of success, the use of DL increased in combination with an increase in first-attempt success rate. This suggests that over time, the study participants became more comfortable with intubation, their knowledge of airway anatomy and airway management increased, and/or maybe the use of VL contributed to their DL success. Future studies may illuminate these unknown variables and should be focused on these areas of interests.

According to the review of the current literature, we believe that there is more than sufficient evidence in existence to support current practice changes. The majority of studies comparing the effects of VL and DL on intubation success rates are primarily focused on expert provider populations in practicing settings outside of the OR. By targeting the SRNA population in the OR setting, we specifically addressed the lack of data in the literature. The improved outcomes from this study can yield benefits in every dimension of anesthesia; from SRNA education to patient outcomes.

The potential to impact SRNA education and patient safety was the principal goal of this scholarly project. By delineating intubation success rates in the different devices available, we have come to a clearer understanding of how to promote best practices in anesthesia care. Discussions stemming from this project will result in further studies that may be performed on this topic in the future, such as the effect of incorporating VL in the pre-clinical simulation settings, the effect of intubation success on self-evaluation measures, such as confidence and anxiety, and the effect of VL use on SRNA education and knowledge about airway anatomy, for instance.

CRNAs have been providing evidenced-based anesthesia care to their patients for over 150 years and continue to do so with the latest technological advances available to them. By

contributing to this body of knowledge to promote patient safety, we are ensuring that SRNAs obtain the best possible education and training and that the CRNA profession remain at the forefront of anesthesia care.

Analysis of Assumptions

For this analysis, the intubation tool was the independent variable, and the success or failure of first-attempt intubation was the dependent variable. For analysis to occur, several assumptions were made. The first of these assumptions was that the dependent variable was measured at the continuous level (success rate of each tool converted to a percentage). The second assumption was that our independent variable consisted of two categorical related groups (each participant utilized each independent variable).

Limitations

The comparison of the effectiveness of VL to DL on intubation success rates may be limited by study population, size, and setting. Additionally, with the range of various laryngoscopy products available, it may be difficult to differentiate success or failures of individual devices. Another limitation identified was the level of influence that preceptors had on the study participants regarding device utilization. Furthermore, we were unable to control for confounding variables such as anticipated or unanticipated difficult airways, and or emergency cases. Inaccurate documentation by the study participants was also a limitation we had to consider while analyzing the data. We recommend completing this study in the future with a larger sample size and using a proctor to document each individuals intubation attempts to ensure accurate reporting.

Conclusion

Studies have shown subsequent or failed endotracheal intubation attempts lead to delayed intubation and/or oxygen desaturation and is related to life-threatening complications, such as hemodynamic instability, the need for emergency surgical airway, hypoxic brain damage, cardiac arrest, unanticipated intensive care admission, and death. Minimizing the number of endotracheal intubation attempts is associated with fewer patient complications and thus, improved patient outcomes. There are a lack of studies that examine the success rates of DL vs VL in the SRNA population. The objective of this scholarly project was to fill that gap in the literature and provide the best practices for SRNA training and education. Our data shows that median first-attempt intubation success rates in the VL subgroup displayed a statistically significantly higher rates of success when compared to the DL subgroup (96% vs 81%). The results of this study hope to impact future studies in this area of nurse anesthesia education, and promote a change to adopt the routine utilization of VL devices to ensure high quality and safe patient care.

Dissemination

A PowerPoint presentation was created to present to AHU's faculty, key members, and DNAP colleagues remotely via Microsoft Teams in June 2021. Following data collection and analysis in the Spring of 2022, dissemination took place on the AHU Campus in Orlando, Florida, in the Spring of 2023. This scholarly project will be stored in the AHUs library archives for future students and faculty to access.

Appendix A

N650 MATRIX TABLE

Madziala, M., Smereka, J., Dabrowski, M., Leung, S., Ruetzler, K., & Szarpak, L. (2017). A comparison of McGrath MAC® and standard direct laryngoscopy in simulated immobilized cervical spine pediatric intubation: a manikin study. *European Journal of Pediatrics*, *176*(6), 779–786. https://doi.org/10.1007/s00431-017-2909-9

Scholtis, M. P., Stoudt, R. S., & Gavel, T. R. (2017). A randomized, blinded, clinical study of injury incidence during endotracheal intubation: Comparison of GlideScope video laryngoscopy and direct laryngoscopy. *AANA Journal*, *85*(6), 445-451.

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study 1: Compare the first-attempt intubation success rate of the McGrath and direct laryngoscopy for emergency intubation in a pediatric manikin model with immobilized cervical spine. **Study 2:** To determine if a difference exists in incidence of injury following endotracheal intubation using either direct laryngoscopy or GlideScope video laryngoscopy.	**Study 1:** **Primary outcome:** Rate of successful placement of the endotracheal tube. **Secondary outcome:** Time to intubation, quality of glottic view, and ease of intubation. **Study 2:** **Primary outcome:** Does a difference in rate of injury exist between GlideScope and direct laryngoscopy	**Study 1:** **Subjects:** 75 paramedics with <5 years of experience in EMS additionally with limited pediatric intubation experiences. **Setting:** Simulation manikins on the floor in a well-lighted room. **Study 2:** **Subjects:** 155 recruited subjects randomly selected to to be in one of 2 groups **Setting:** University of Dusseldorf, Germany) a large tertiary teaching institution.	**Study 1**: Statistical software Statistica 13.1 (StatSoft, Tulsa, OK, USA). Percentages were used for qualitative variables and median with interquartile range (IQR) for quantitative variables. Occurrence of normal distribution was confirmed by the Kolmogorov-Smirnov test. **Study 2:** X^2 test with a *P* value <0.05 was considered significant.	**Study 1:** Overall success rate 100% in McGrath group; 77% in the direct laryngoscopy group. **Study 2:** X^2 statistic of 1.0445 with an exact *P* value of 0.3976.	**Methodological flaws: Study 1** Used pediatric manikin and not real-life children. Inability to replicate true difficult airway scenarios with airway bleeding and tongue edema/secretions, airway movement with chest compressions. **Study 2** Small sample size, convenience sampling, and lack of performing preintubation examinations. **Inconsistency:** None **Indirectness:** None **Imprecision** **Study 1:** none **Study 2:** none
Design				**Implications**	
Study 1: Quasi-experimental study				**Study 1**: No difference in time to intubate, first-attempt success rate, overall success rate, and glottic view between the two	

Study 2: Correlational pilot study.	**Secondary outcome:** Rate of injury related to GlideScope vs direct laryngoscopy			methods of laryngoscopy in normal airway scenarios. However, significant differences exist in difficult airway scenario with videolaryngoscopy being more efficient. **Study 2:** GlideScope is equally as safe as the traditional direct laryngoscopy.	**Publication bias:** None

N650 MATRIX TABLE

Gao, Y., Song, Y., Gu, Z., Zhang, J., Chen, X., Sun, H., & Lu, Z. (2018). Video versus direct laryngoscopy on successful first-pass endotracheal intubation in ICU patients. World Journal of Emergency Medicine, 9(2), 99-104. http://dx.doi.org/10.5847/wjem.j.1920-8642.2018.02.003

Sainsbury, J., Telgarsky, B., Parotto, M., Niazi, A., Wong, D., & Cooper, R. (2017). The effect of verbal and video feedback on learning direct laryngoscopy among novice laryngoscopists: A randomized pilot study. *Canadian Journal of Anesthesia/Journal Canadien D'Anesthésie, 64*(3), 252-259. http://dx.doi.org/10.1007/s12630-016-0792-x

Purpose	**Variables**	**Setting/Subjects**	**Measurement and Instruments**	**Results**	**Evidence Quality**
Study One: Compare the rate of successful first-pass intubation of the direct laryngoscopy and the video laryngoscopy in the ICU. **Study Two:** To determine skill acquisition in with using conventional direct laryngoscopy and Macintosh-style video laryngoscope. **Design** **Study One:** Quasi-experimental study **Study Two:** Correlational pilot study	**Study One:** **Primary Outcome:** Rate of successful first pass-intubation, the proportion of patients with successful intubation within 3 attempts. **Secondary Outcome:** Total duration of intubation. **Study Two:** **Primary Outcome:** Total time to intubate using instruction with a Macintosh-style video laryngoscope (MacVL) compared to	**Study One** **Subjects:** Physicians who worked in the ICU for at least 5 years or worked in ICU's for at least 1 year after receiving at minimum 2 months of anesthesiology training. **Setting:** The ICU at the First Affiliated Hospital of Nanjing Medical University (Najing, China) **Study Two** **Subjects:** 68 of 87 (78%) consecutive medical students.	**Study One:** Chi-square test or Fisher's exact test for categorical variables. Statistical tests were performed in. SPSS version 16.0 (SPSS Inc., Chicago, IL, USA). **Study Two:** Statistical analysis performed using Prism 5.0 (GraphPad Software Inc., La Jolla, CA, USA). One-way analysis of variance (with Bonferroni's post hoc correction). Chi square test used for success rates and complication rates.	**Study One:** Overall success rate 67.9% in the video laryngoscope group; 69.5% in the direct laryngoscopy group. **Study Two:** Mean time to intubate with the control group 91 seconds, VL-1 group 61 seconds, and VL-2 group 66 seconds. **Implications** **Study One:** No significant difference in the rate of successful first-pass intubation between VL and DL. **Study Two:**	**Study One: Methodological flaws:** Randomized study, not a multicenter trial. Limited amount and quality of data. **Inconsistency:** Video laryngoscopes with hyperangulated blade or specific intubation channel, can produce different results. **Indirectness:** None **Imprecision:** Intubation expertise requires theoretical skills, manikin practice, and supervised hands-on training. This cannot be precisely defined individually. **Publication bias:** None **Study Two:**

	a conventional direct laryngoscopy. **Secondary Outcome:** Intubation success rate, intubating opportunities, complications, and confidence scores.	**Setting:** Toronto General Hospital and Toronto Western Hospital.		Trend towards higher success rate in the VL groups and clinically shorter intubation time.	**Methodological flaws:** Small sample size **Inconsistency:** No recording of students baseline time to intubate. **Indirectness:** none **Imprecision:** none **Publication bias:** Unable to ensure patients in the three cohorts were similar with respect to ease of direct laryngoscopy and tracheal intubation.

Systematic Review Articles

Huang, H., Peng, J., Xu, B., Liu, G., & Du, B. (2017). Video laryngoscopy for endotracheal intubation of critically ill adults: A systemic review and meta-analysis. *Chest, 152(3), 510.* Howson, A., Goodliff, A., & Horner, D. (2020). BET 2: Video laryngoscopy for patients requiring endotracheal intubation in the emergency department. Emergency medicine journal: *EMJ*, *37*(6), 381–383. https://doi.org/10.1136/emermed-2020-209962.3					
Purpose/Objectives	**Search Strategy**	**Number and Type of Studies in the Review Including Sample Sizes**	**Results**	**Conclusions/ Implications**	**Evidence Quality**
Study One: To compare the effect of VL and DL in ICU patients requiring endotracheal intubation. **Study Two:** To examine whether video laryngoscopy (VL) would improve first-pass success and reduce complications rates in ED patients requiring endotracheal intubation, when compared with direct laryngoscopy.	**Study One:** **Databases:** Pubmed, Embase, Cochrane **Search Terms:** "video-laryngoscope" or "video laryngoscopy" or "laryngoscopes" AND "critically ill" or "intensive care", or "critical care", or "sepsis", or "burns", or "trauma" **Limits:** inception to 2017, RCTs, ICU adult pt requiring an EI, randomized to either VL or DL for EI, first-attempt success rates, glottic visualization, time to intubation, difficult intubation, mortality, and complications. **Reviewers:** Data extraction was undertaken by 2 authors (H-BH and BX) independently. **Study Two:**	**Study One:** 5 RCTs with 1301 patients (640 in VL group, 661 patients in DL group) **Study Two:** 4 papers were identified as suitable for inclusion using reported search strategy.	**Study One:** Better glottic visualization with VL (RR:1.24, 95% CI, P = 0.003) Use of VL did not result in significant increase in first-attempt success rate when compared to DL (RR: 1.08, 95% CI, P=0.35). Time to intubation, difficult intubation, and mortality, and most other complications were similar between VL and DL groups. **Study Two:** Article 1: significant reduction in failed intubation rate for both normal and anticipated difficult airway using VL. Article 2: first intubation success and overall success rates were similar with DL and VL. Article 3: first-attempt success rates	**Study One:** VL did not increase first-attempt success rat during EI in ICU patients compared with DL. These findings do not support routine use of VL in ICU patients. **Study Two:** It is concluded that current evidence suggests VL is likely to improve first-pass success and reduce esophageal intubation rates, but there is no evidence at present that it improves clinically relevant outcomes. In addition, no difference was found between first pass success rates in	**Study One:** **Methodological flaws:** blinding only data collection level, observational studies more vulnerable to selection bias. **Inconsistency:** significant heterogeneity persistent in all subgroup analyses. **Indirectness:** none **Imprecision:** none **Publication bias:** did not assess publication bias due to limited number (less than 10) studies included in each analysis **Study two:** **Methodological flaws:** none mentioned **Inconsistency:** non mentioned

	Databases: National Institute of Clinical Excellence Healthcare Database, Medline, Embase **Search Terms:** "Video laryngoscope" or "laryngoscopy or laryngoscope" AND "direct laryngoscopy" and "endotracheal intubation" and "first pass" or "complications" or "mortality" **Limits:** abstracts screened for relevancy **Reviewers:** not commissioned, internally peer-reviewed		significantly higher with VL compared with augmented DL. Article 4: improved rates of first-pass intubation with VL in the ICU.	senior/experienced operators, who should use techniques with which they are familiar.	**Indirectness:** none **Imprecision:** none **Publication bias:** non declared

Systematic Review Articles

Jiang, J., Ma, D., Li, B., Yue, Y., & Xue, F. (2017). Video laryngoscopy does not improve the intubation outcomes in emergency and critical patients - a systematic review and meta-analysis of randomized controlled trials. *Critical care (London, England)*, *21*(1), 288. https://doi.org/10.1186/s13054-017-1885-9

Lewis, S. R., Butler, A. R., Parker, J., Cook, T. M., & Smith, A. F. (2016). Video laryngoscopy versus direct laryngoscopy for adult patients requiring tracheal intubation. *Cochrane Database of Systematic Reviews, 11*, CD011136-CD011136

Purpose/Objectives	**Search Strategy**	**Number and Type of Studies in the Review Including Sample Sizes**	**Results**	**Conclusions/ Implications**	**Evidence Quality**
Study One: To determine whether video laryngoscopy could improve the intubation outcomes in emergency and critical patients. **Study Two:** To assess whether videolayrngoscopy for tracheal intubation reduces risks of complications and failure compared to direct laryngoscopy	**Study One:** RCTs or quasi-RCT **Databases:** Cochrane Central Register of Controlled Trials (CENTRAL), PubMed, Embase, and Scopus databases **Search Terms:** **Limits:** Manikin studies, cadaveric studies, and retrospective or observational studies were excluded. **Reviewers:** Jia Jiang and Danxu Ma **Study Two:** RCTs or quasi RCT **Databases:** Cochrane Centreal Register of Controlled Trials (CENTRAL), MEDLINE, and Embase	**Study One:** Twelve RCT or qusi-RCT studies including 2,583 patients. 3 studies took place in the prehospital setting and the remaining 9 took place in the ICU or ER. **Study Two:** 64 RCTs of parallel and cross-over design that enrolled 7,044 adult participants (older than 16 years) requiring laryngoscopy performed with a videoscope or Macintosh laryngoscope in a clinical, emergency or outo-of-hospital setting.	**Study One:** No difference in first-attempt success rate between VL and DL (12 studies; RR, 0.93; 95% CI, 0.82-1.06; n = 2,583, P = 0.28; low-quality evidence). **Study Two:** fewer failed intubations were reported when a VLS was used (Mantel-Haenszel (M-H) odds ratio (OR), random effects 0.35, 95% confidence Interval (CI) 0.19 to 0.65; 38 studies; 4127 participants), and fewer failed intubations occurred when a VLS was used in participants with an anticipated difficult airway (M-H OR, random-effects 0.28, 95% CI 0.15 to 0.55; six studies; 830 participants	**Study One:** No improvement in intubation success rate with video scopes compared to direct laryngoscopy in emergency and critical care patients. Did find a lower rate of esophageal intubations with video scopes. **Study Two:** Videolaryngoscopes can improve the success rates of tracheal intubation, particularly when the patient is a difficult airway.	**Study 1:** **Methodological flaws:** **Inconsistency:** **Indirectness:** Did not compare one type of video scope but rather multiple including: C-MAC, McGrath, Airwayscope, and Airtrac. **Imprecision:** none **Publication bias:** None **Study 2:** **Methodological Flaws:** Anesthetists

	Search Terms: "Relevant to the review question and not limited to outcomes" **Limits:** Age > 16 yrs, requiring general anesthesia scheduled for surgery, ICU, and emergency departments as well as those with known difficult airways. (Mallampati score III or IV) or Cormack and Lehane score III or IV). **Reviewers:** Sharon Lewis and Andrew Butler.				were not blinded to the type of laryngoscope to e sued, this could lead to anesthetists favoring one type of blade.

Systematic Review Articles

Howle, R., Onwochei, D., Harrison, S., & Desai, N. (2021). Comparison of video laryngoscopy and direct laryngoscopy for tracheal intubation in obstetrics: A mixed-methods systematic review and meta-analysis. Canadian Journal of Anesthesia, 68(4), 546-565. https://doi.org/10.1007/s12630-020-01908-w

Savino, P. B., Reichelderfer, S., Mercer, M. P., Wang, R. C., Sporer, K. A., & Miner, J. R. (2017). Direct versus video laryngoscopy for prehospital intubation: A systematic review and Meta-analysis. Academic Emergency Medicine, 24(8), 1018-1026. https://doi.org/10.1111/acem.13193

Purpose/Objectives	Search Strategy	Number and Type of Studies in the Review Including Sample Sizes	Results	Conclusions/ Implications	Evidence Quality
Study One: To examine the efficacy, efficiency, and safety of video laryngoscopy compared with direct laryngoscopy in obstetrics. **Study Two:** To compare overall and first-pass success for VL versus DL in patients requiring intubation in the prehospital setting.	**Study One:** **Databases:** Central, CINAHL, Embase, MEDLINE and Web of Science databases. **Search Terms:** vocabulary terms and text words, relating to the main components of the review were chosen, including obstetrics and video laryngoscopy. **Limits:** Number of RCTs in obstetrics, assessors in the RCT were not blinded, the definition of outcomes was not standardized in the RCTs, case reports and observational studies had not undergone peer review, absence of sufficient data. **Reviewers: t**wo authors (R.H. and N.D.), discrepancies were resolved by discussion and disagreements settled by a third author (D.O.). **Study Two:** **Databases:** PubMed, Embase, and SCOPUS **Search Terms:** Setting: EMS, emergency medical services, prehospital, paramedic, air medical, helicopter and out-of-hospital. Procedure: VL, video intubation, indirect laryngoscopy, indirect intubation, GlideScope, Airtraq, Vividtrac, C-MAC, and King Vision.	**Study One:** 6 RCT's with 417 patients (966 in VLS group, 962 in DL group) **Study Two:** Eight studies met inclusion criteria.	**Study One:** First-attempt success rate (risk ratio: 1.02, 95% CI, P=0.29) and time to tracheal intubation (mean difference, 1.20 sec; 95% CI, P=0.76). First-attempt success rate and time to tracheal intubation demonstrated no difference between video laryngoscopy and direct laryngoscopy. **Study Two:** Estimates for overall intubation success using VL versus DL were a risk ratio (RR) of 0.05 (95% confidence interval [CI] = 0.01–0.18) in studies of physicians and RR = 2.28 (95% CI = 1.00–5.20) in nonphysicians. For first pass intubation success the pooled RR estimates	**Study One:** Evidence for the utility of the video laryngoscopy continues to evolve but supports its adoption in obstetrics. These findings support that video laryngoscopes should be immediately available as a first-line device. **Study Two:** Video laryngoscopy does not increase overall, or first-pass success rates and can lead to worsening performance with physicians who have	**Study 1** **Methodological flaws:** Data was insufficient to facilitate the meta-analysis of the other outcomes. **Inconsistency:** Heterogenous obstetric populations in cross-sectional and comparative studies. **Indirectness:** None **Imprecision:** None **Publication bias:** Serious risk of judgement bias on study from Aziz 2012. **Study 2** **Methodological flaws:** **Inconsistency:** Studies with physician providers were performed outside the United States and this may

	Limits: title, abstract, and full text. Exclusions were case reports, case series, reviews, studies restricted to children, studies comparing multiple video devices to each other without DL comparison, nonhuman studies, manikin/simulation studies or cadaver studies. **Reviewers:** Data abstraction was performed by two separate reviewers and inter-rater reliability calculated. Final abstracted data was agreed upon between the two authors (PS and SR).		for using VL versus DL were 0.32 (95% CI = 0.23–0.44) and 1.83 (95% CI = 1.18–2.84) among studies using physicians and nonphysicians.	direct laryngoscopy experience. However, nonphysician intubators with less direct laryngoscopy experience, may benefit from video laryngoscopy in the prehospital setting.	not be generalizable to the U.S. setting, heterogeneity in meta-analysis. **Indirectness:** None **Imprecision:** Heterogeneity across all studies was a limitation for meta-analysis **Publication bias:** None

Appendix B:

Letter of Invitation

Greetings AHU DNAP Class of 2024!

We are fellow SRNAs at AHU working on our scholarly project. We request your voluntary participation in our scholarly project in which we hope to compare the first attempt intubation success rates in SRNAs for both video and direct laryngoscopy in the first 3 months of clinical rotations. You are being asked to be part of this scholarly project because we feel your participation may help improve SRNA education and promote best practices in the clinical setting.

All we kindly ask of you is to complete and send back an electronic log sheet that we will send to you weekly in which you will document all your cases for that week for which an endotracheal intubation was performed. You will be asked to indicate whether a video largyoscope (McGrath, Glidescope) or direct laryngoscope (Macinotsh, Miller blade) was used and if you were successful in securing the airway on the 1st attempt. We recommend that you complete this log sheet daily at the same time you are adding your cases to Typhon so that the information is accurate and that you keep up to date.

Your participation is completely voluntary and all information provided to us will be anonymous. No reply is required.

If you have any questions, concerns, or complaints regarding this scholarly project, you may contact anyone of us with our contact information below. If you have any questions concerns, or complaints regarding rights as a study participant, you may contact the AdventHealth Orlando Institutional Review Board at email: AH.irb.general@adventhealth.com.

Sincerely,
Daniel Carter, SRNA, Daniel.Carter@my.ahu.edu
Rhonnie Geyrozaga, SRNA, Rhonnie.Geyrozaga@my.ahu.edu
Rachal Mahant, SRNA, Rachel.Mahant@my.ahu.edu
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Flyer Handouts

AHU NURSE ANESTHESIA NOVEMBER 4, 2021

VL vs DL Scholarly Project

Comparing Intubation Success Rates in the SRNA

To SRNA Class of 2024 at AHU:

We are pleased to invite you to participate in a scholarly project that will compare 1st -attempt intubation success rates in the SRNA.

The outcomes of this scholarly project hope to contribute to the body of knowledge concerning nurse anesthesia education, provide best practices, and influence standards of care, and provide a framework for future studies.

1

INTUBATE

As you intubate your patients in clinicals, please choose the device VL or DL.

2

RECORD

For each intubation, record what device was used, and if you were successful on the first attempt on the Data Collection Tool.

3

EVALUATE

At the completion of the study, the Data Collection Tool will be send back to us for analysis.

Failed/Delayed Intubation

Leads to life threatening complications.

Minimizing Intubation Attempts

Leads to improved patient outcomes.

Evidence

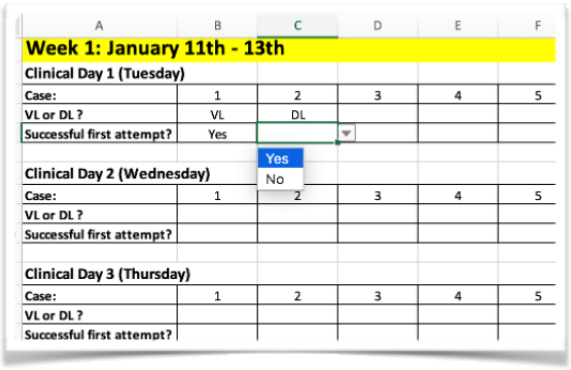
Results from this project may shed light on a superior device.

Data Collection Tool

For each clinical day during the first 3 months of your clinical rotations, data will be gathered for each case an intubation was attempted.

The Data Collection Tool provided will include each clinical day, and a drop down menu to indicate what device was used: VL (Video Laryngoscope) or DL (Direct Laryngoscope).

The second data point is to indicate if that attempt at intubation was successful on the first attempt: Yes or No.



	A	B	C	D	E	F
Week 1: January 11th - 13th						
Clinical Day 1 (Tuesday)						
Case:		1	2	3	4	5
VL or DL ?		VL	DL			
Successful first attempt?		Yes				
			Yes			
			No			
Clinical Day 2 (Wednesday)						
Case:		1	2	3	4	5
VL or DL ?						
Successful first attempt?						
Clinical Day 3 (Thursday)						
Case:		1	2	3	4	5
VL or DL ?						
Successful first attempt?						

Definitions:

Direct laryngoscopy (DL) is the use of a rigid retractor type device that uses a detachable metal blade (Macintosh, curved blade; Miller, straight blade) to move the tongue and soft tissue in the oropharynx to create a straight line of path of the naked eye to the larynx in order to insert an endotracheal tube.

Video laryngoscopy will refer to a rigid (as opposed to flexible fiberoptic devices) blade to retract the soft tissues of the oropharynx, with a digital camera at the tip of the blade to transmit video images to a display screen viewable to the intubator. *Video laryngoscope* types include McGrath, Glidescope, C-Mac, and AirTraq.

First-attempt intubation success is the securement of the airway with an endotracheal tube on the first attempt, with positive confirmation of correct placement, which includes positive ETCO2.

Participation:

Participation in this scholarly project is voluntary.

Participation will in the scholarly project will in no way effect your clinical or academic endeavors in the DNAP program.

All personal information will be anonymous.

Hard copies of Data Collection Tools will be scanned and securely kept for 7 years.

Appendix C

Example of Data Collection Tool

	A	B	C	D	E	F
1	**Week 1: January 11th - 13th**					
2	**Clinical Day 1 (Tuesday)**					
3	**Case:**	1	2	3	4	5
4	**VL or DL ?**	VL	DL			
5	**Successful first attempt?**	Yes				
6						
7	**Clinical Day 2 (Wednesday)**					
8	**Case:**	1	2	3	4	5
9	**VL or DL ?**					
10	**Successful first attempt?**					
11						
12	**Clinical Day 3 (Thursday)**					
13	**Case:**	1	2	3	4	5
14	**VL or DL ?**					
15	**Successful first attempt?**					

Appendix D

Proposed Scholarly Project Timeline

Task	Recommended Target Trimester	Date Completed
1. Determine topic for DNAP Project	**4th and 5th Trimester Summer/Fall 2021**	
1.1 Assignment of DNAP Scholarly Project Chair and the identification of one or two areas of focus	4th trimester	5/5/2021
1.2 Review the AHU Scholarly Repository to ensure your project of interest has not previously been completed.	4th Trimester	5/08/2021
1.3 Review relevant literature and evaluate feasibility	4th Trimester	5/23/2021
1.4 Discuss and refine best idea with 2023 cohort and DNAP faculty	4th Trimester	6/04/2021
1.5 Develop and Complete Scholarly Project Initial Presentation	4th Trimester	7/02/2021
2. Identify scholarly project site for DNAP Project	**4th and 5th Trimester Summer/Fall 2021**	
2.1 Discuss site options with DNAP Scholarly Project Chair	4th Trimester	6/13/2021
2.2 Consult with key site personnel for the Analysis and Comparison of Key Players Assignment and gain preliminary approval from DNAP Scholarly Project Chair to continue with the proposed project	4th Trimester	7/02/2021
2.3 Once assignment three has been graded, and faculty member and key player preliminary approval have been obtained: A. ***Complete the Study Site Director Approval Letter Template*** (Under Academics > University Research > Guides and Forms) and have it signed by an authorized representative from the project site. This form must be	4th Trimester 4th Trimester	 7/30/2021

completed if the scholarly project is to be conducted on students or at sites other than within the NAP (Ex. Nursing department, AdventHealth, USAP Anesthesia Group).	4th Trimester	8/06/2021
B. Once signed, please submit the signed Study Site Director Approval Letter, via e-mail to the DNAP department chair (Dr. Devasher) to obtain approval. When completed submit to Canvas	4th Trimester	8/06/2021
C. Submit to Canvas contact information for someone at the project site familiar with your proposed project. Preferably the individual signing the study site director's approval letter.	4th Trimester	8/06/2021
D. Submit Study Site Director Approval Letter, when completed, to CANVAS DROPBOX **Note: This form must also be submitted with the IRB/SRC application**		
3. Form DNAP Scholarly Project Committee (SPC)	**4th and 5th Trimester Summer/Fall 2021**	
3.1 Review requirements for SPC composition In the Student Scholarly Project Guidelines	4th Trimester	7/28/2021
3.2 Identify committee members, consider alternatives, select members in consultation with your assigned Scholarly Project Chair and obtain their approval.	4th Trimester	7/28/2021
3.3 Obtain approval from the NAP Program Administrator for proposed project mentor(s) and reviewer	4th Trimester	8/06/2021

3.4 Complete ***DNAP Scholarly Project Committee form*** by obtaining project chair, mentor and project reviewer signatures	4th Trimester	8/06/2021
3.5 Submit completed form, scholarly project chair approval e-mail and department chair approval e-mail thread to CANVAS DROPBOX	4th Trimester	8/06/2021
4. Develop DNAP Scholarly Project Proposal Paper	**4th and 5th Trimester Fall 2021**	
4.1 Prepare draft of DNAP scholarly project proposal paper	4th Trimester	6/25/2021
4.2 Revise the draft until a score of 95% has been obtained and the student has been notified of their eligibility for SRC/IRB submission	5th Trimester	10/20/2021
A. **Note: You may be required to submit multiple drafts and/or attend appointment(s) with the AHU writing center prior to obtaining approval**		
B. Determine instrumentation and obtain permission for use or complete face validation process. Note: Some revisions to the second PICOT statement may be required.	4th Trimester	6/18/2021
C. Consult with available statistician to refine proposed analysis.	4th Trimester	7/02/2021
D. Complete informed consent.	5th Trimester	9/29/2021
E. **Obtain written verification of your Project Mentors' approval** of your proposal by having him/her sign the ***NAP Scholarly Project Proposal Approval Form*** prior to submission to the Scholarly Project Chair.	4th Trimester	8/03/2021
F. Your Scholarly Project Chair will then submit the form to the NAP department chair (program administrator) for approval and signature	5th Trimester	08/05/2021

4.3 Submit the completed and signed NAP Scholarly Project Concept/Plan Approval Form to CANVAS DROPBOX	5th Trimester	NA
5. Obtain AHU Institutional Review Board Approval	**5th and 6th Trimester Fall 2021-Spring 2022**	
5.1 Once the student group has received a 95% or greater on the Scholarly Project paper and have been notified of their eligibility for SRC/IRB submission, the ***Working Document for Web-Based Research Project Submission form*** and the ***Department Chair Certification Letter*** must be completed.	5th Trimester	10/20/2021
A. A Scholarly Project Chair will then be assigned.	5th Trimester	7/27/2021
B. A thumb drive containing multiple required documents (See DNAP 793 Syllabus for list) should be prepared and submitted to the Scholarly Project Chair	5th Trimester	01/28/2021
C. The chair, will review the documents, sign the ***DNAP Scholarly Project Proposal Approval Form*** and will submit it to the Department Chair for his/her signature. It will then be returned once completed and uploaded to CANVAS by the students.	5th Trimester	11/30/2021
D. In the application to SRC/IRB application, The Scholarly Project Chair will be designated as the Principal Investigator. Students will be designated as Co-Investigators	5th Trimester	11/30/2021
5.2 Once the working document is completed submit to Scholarly Project Chair for review and approval.	5th Trimester	12/01/2021
5.3 The Scholarly Project Chair will then complete and submit the IRB/SRC Web-based Scholarly Project Application	5th Trimester	11/01/2021

A. The Research Office will notify the investigators about the summary of the SRC review within 13 working days	5th Trimester	11/14/2021
B. Following the SRC review, the Research Office will be responsible to submit the study proposal to **IRB** and will notify the investigators about the summary of the IRB review within **18 working days**	5th Trimester	11/14/2021
C. The total time to complete the "AHU Web-based Research Project Submission Process" with Scientific Review Committee (SRC) and Institutional Review Board (IRB) approvals **is approximately 36 working days**	5th Trimester	11/14/2021
D. IMPORTANT: this timeline is frequently exceeded. Please submit projects as soon as possible to prevent a delay in the scholarly project completion date and subsequent graduation	5th Trimester	11/14/2021
5.4 The student **MUST SUBMIT** the **AHU IRB NOTICE** of Exemption (at minimum) or Approval (if required) **TO** the designated **DROPBOX** in Canvas **BEFORE** proceeding with any aspect of project **IMPLEMENTATION**	5th Trimester	09/17/2021
6. Implement the DNAP Project Plan	**6th and 7th Trimester Spring and Summer 2022**	
6.1 Create database and data dictionary in Excel for project data entry and analysis. **Obtain the Scholarly Project Chair's approval for data dictionary via e-mail**	6th Trimester	01/28/2021
6.2 Implement your Project Proposal's plan per the SRC/IRB approved methodology	6th Trimester	Jan – March 2022
7. Develop final manuscript for professional dissemination	**8th and 9th Trimester Fall 2022-Spring 2023**	
7.1 Write results/findings, conclusion/limitations, and application to CRNA practice sections	8th Trimester	Fall 2022

7.2 Revise the wording in all prior sections of your proposal to now utilize past tense as appropriate	8th Trimester	Fall 2022
7.3 Complete your final Scholarly Project paper per the posted rubric	8th Trimester	Fall 2022
7.4 Submit the completed Scholarly Project final draft to your Project Mentors and Scholarly Project Chair for their review, recommendations for revision and editing. A. Obtain verification of your Project Mentor and Project Reviewer's approval of the Scholarly Project Final Manuscript by having him/her sign the ***NAP Scholarly Project Final Manuscript Approval Form.*** 1. Include all project components such as informed consent form, questionnaire/survey, power point presentation if applicable, analysis charts, etc. in the final manuscript after the reference section. Each component should be labeled as a separate appendix. B. Submit the NAP Scholarly Project Final Manuscript Approval Form (signed by mentor and reviewer), to the Scholarly Project Chair for his/her approval. C. If further revisions are not required the Scholarly Project Chair will submit the NAP Scholarly Project Final Manuscript Approval Form to the NAP Department Chair (Program Administrator) for approval and signature.	8th Trimester 8th Trimester 8th Trimester 8th Trimester	Fall 2022 Fall 2022 Fall 2022 Fall 2022
7.5 Submit the completed and signed NAP Scholarly Project Concept/Plan Approval Form to CANVAS DROPBOX	8th Trimester	Fall 2022
7.6 Prepare a research status report and submit via e-mail to the Scholarly Project Chair. This should be a comprehensive report communicating information on the findings and dissemination, changes, and issues.	9th Trimester	Spring 2023

8. Develop and revise poster presentation	**8th and 9th Trimester Fall 2022-Spring 2023**	
8.1 **Develop an electronic PowerPoint version of your proposed poster** about your project, using the Scholarly Project Poster Guidelines. This PowerPoint slide must be submitted for review and feedback.	8th Trimester	Fall 2022
8.2 **The AHU logo** A. The student must obtain the electronic version of the logo from the AHU Marketing department's website portal. B. The student must also email the electronic version of the poster with logo to the AHU Marketing department (eric.cadiente@ahu.edu) *(& cc the email to the Scholarly Project Chair*), to obtain approval from Marketing for the appropriate use of the logo. Once approved please do not alter the shape or placement of the logo without follow up approval. C. The AHU logo must be placed in the upper left-hand corner and the STTI logo placed in the upper right-hand corner	9th Trimester 9th Trimester 9th Trimester	Spring 2023 Spring 2023 Spring 2023
8.3 **Submit** the **FINAL (NOT Draft) electronic PowerPoint** slide of your Poster to your Scholarly Project Chair via AHU email and to DROPBOX. **A.** After the Scholarly Project Chair has given their approval for the electronic version of the final poster, it is the student's responsibility to **have the poster printed professionally, in compliance with the Scholarly Project Poster Guidelines** B. Final posters will be presented at the **AHU NAP Scholarship/Poster Presentation Day, which is tentatively planned for 4/3/2023 from 1-3pm (Monday**	9th Trimester 9th Trimester	Spring 2023 Spring 2023

afternoon). (May be online depending on COVID-19)		
9. Submit final electronic copy of completed documents to library archive	**9th Trimester Spring 2023**	
9.1 Submit a complete electronic copy (including all appendices) of the final approved documents to the AHU library **(**Neal.Smith@ahu.edu**).**	9th Trimester	Spring 2023
10. Prepare for and complete professional Dissemination	**8th and 9th Trimester Fall 2022-Spring 2023**	
10.1 Prepare a faculty – approved manuscript for submission to a professional journal	9th Trimester	Spring 2023
10.2 In addition to professional journal submission, the following are considered appropriate methods of dissemination: A. Submission of abstracts for oral presentation and poster presentations at professional meetings B. Executive summaries (as part of a business plan) C. Professional web page D. Guest editorials, news releases in print or on public radio/television	9th Trimester	Spring 2023 Spring 2023 Spring 2023 Spring 2023 Spring 2023 Spring 2023
10.3 Revise article or other appropriate method of dissemination as needed based on committee and other feedback	8th Trimester	Fall 2022
10.4 Obtain official submission/completion documentation and submit to DNAP Scholarly Project Chair and to Canvas DROPBOX	9th Trimester	Spring 2023
11. Prepare for Final Oral Presentation	**9th Trimester Spring 2023**	
11.1 Review guidelines and course schedule for conduct of presentation sessions A. Project Presentation (within DNAP 893) – Select AHU community members invited B. Clinical Site/Project site presentation	9th Trimester	Spring 2023

11.2 Obtain and complete the DNAP Final Project Presentation form with committee signatures and submit to DNAP Scholarly Project Chair	9th Trimester	Spring 2023
12. Complete final requirements for Scholarly Project Completion	**9th Trimester Spring 2023**	
12.1 Submit to CANVAS completed Scholarly Project documentation (All documents in one PDF)	9th Trimester	Spring 2023
A. Completed Project Final presentation (date and time completed only)	9th Trimester	Spring 2023
B. ***DNAP Project Final Presentation form*** completed	9th Trimester	Spring 2023
C. DNAP Project Hours Log	9th Trimester	Spring 2023
D. E-copy of final manuscript	9th Trimester	Spring 2023
E. Proof of journal submission or official completion document for project dissemination	9th Trimester	Spring 2023
F. Student Data Declaration – where is your project data stored, when it will be destroyed and who will be responsible for it (i.e. at the clinical site or at AHU per IRB documents)	9th Trimester	Spring 2023
G. IRB disposition-Students must close their projects with IRB after proof of submission or official completion documents are obtained	9th Trimester	Spring 2023

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