

**Correlation of Variables for Program Success and First Time SEE Scores of the Doctor of  
Nurse Anesthesia Practice Program Student Registered Nurse Anesthetists at  
AdventHealth University**

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## Abstract

Nurse anesthesia is considered one of the most rigorous fields in advanced practice nursing, and many graduate nurse anesthesia programs have limited availability. Due to the academic rigor of graduate nurse anesthesia programs, selection and admission requirements are established to assist program directors and faculty in selecting candidates with the highest probability of completing the program and passing the National Certification Examination (NCE). The Self-Evaluation Examination (SEE) is taken by student registered nurse anesthetists (SRNAs) to prepare for the NCE, and SEE scores strongly correlate to NCE scores. Evaluation of specific pre-admission variables may assist in identifying applicants most likely to succeed. Methods for this project included the Spearman's Rho Correlation test of de-identified retrospective data collected by the nurse anesthesia department at AdventHealth University (AHU) to identify statistically significant correlations between the independent and dependent variables, followed by a linear regression analysis of any statistically significant correlations. This study determined the correlations of pre-admission cumulative grade point average (cGPA), science grade point average (sGPA), total Graduate Record Examination (GRE) score, and Health Sciences Reasoning Test (HSRT) overall score with nurse anesthesia program grade point average (NAPGPA) at the end of the fourth trimester and with the SEE total score during the fifth trimester for students who matriculated to AHU's DNAP Program from 2018 to 2020. This study found the following four statistically significant correlations: cGPA with NAPGPA, cGPA with SEE total score, sGPA with SEE total score, and NAPGPA with SEE total score. This study made four recommendations to the program's leadership for pre-admission requirements and three recommendations regarding program progression.

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**Correlation of Variables for Program Success and First Time SEE Scores of the Doctor of Nurse Anesthesia Practice Program Student Registered Nurse Anesthetist at AdventHealth University**

Nurse anesthesia is a demanding field of advanced practice nursing, and it requires years of preparation to become a Certified Registered Nurse Anesthetist (CRNA) (Ortega et al., 2013). Candidates must meet specific admission requirements, which include past academic performance and scores on standardized exams. Although minimum standards are in place for nurse anesthesia applicants, many applicants meet or exceed minimum requirements yet don't succeed in the program or fail the National Certification Examination (NCE) (Caldwell, 2015; Lebeck, 2003; Ortega et al., 2013). Increased educational rigor associated with doctoral education reinforces the need for examination of current program admission variables to foster academic success (Burns, 2011; Caldwell, 2015; Ortega et al., 2013).

Certified registered nurse anesthetist programs have limited capacity, and each student position is valuable for the program and for the community it serves (Lebeck, 2003). As part of the accreditation process for CRNA programs, some basic admission requirements have been established to assist program directors and faculty in choosing qualified applicants (COA, 2021). However, entry into a CRNA program does not guarantee students' graduation or success on the NCE (Caldwell, 2015; Lebeck, 2003). Therefore, identifying pre-admission factors that are more likely to correlate with success in a CRNA program and on the NCE is critical for student success and program accreditation (Lebeck, 2003; Ortega et al., 2013; Patzer et al 2017).

AHU's application process includes: submission of an unencumbered professional registered nursing license or an advanced practice registered nursing license, a bachelor of science degree in nursing or other related science major (i.e. chemistry or biology), a minimum

pre-admission cumulative grade point average (cGPA) of 3.00, a satisfactory Graduate Record Examination (GRE) score within the last five years, completion of the Health Sciences Reasoning Test (HSRT), a minimum of one year of intensive care unit (ICU) experience excluding orientation, BLS/ACLS certifications, three recommendation letters, and a professional essay (AdventHealth University, 2022). The purpose of this project will be to determine if there is a correlation between the pre-admission cumulative GPA (cGPA), science grade point average (sGPA), total GRE score, or the HSRT overall score, and the nurse anesthesia program GPA (NAPGPA) at the end of the fourth trimester or the first SEE total score during the fifth trimester for SRNA cohorts admitted to AHU's Doctor of Nurse Anesthesia Practice (DNAP) Program from 2018 to 2020. The project findings may lead to a change in the University's admission criteria, to help select optimal candidates for completing the program and passing the NCE on the first attempt.

### **Significance and Background of Clinical Problem**

Nurse anesthesia practice is known to be one of the most demanding and rigorous fields in advanced practice nursing (Ortega et al., 2013). Candidates complete several years of preparation, and entry into a CRNA program does not guarantee a student's successful completion of an anesthesia program (Caldwell, 2015; Lebeck, 2003). Program directors are interested in pre-admission variables that may better correlate with performance during the program, on the SEE, and on the NCE (Caldwell, 2015; Lebeck, 2003; Ortega et al., 2013; Patzer et al 2017). Due to the limited number of nurse anesthesia program positions, applicants who fulfill the admission criteria still may not be selected for a position in a program (Burns, 2011). Therefore, determining the candidates who will most likely succeed in the program is important,

yet it is challenging for program directors and nurse anesthesia faculty (Burns, 2011; Lebeck, 2003).

CRNAs have been providing anesthesia in the United States for more than 150 years. As advanced practice registered nurses, CRNAs are among the nation's most trusted health care providers (U.S News & World Report, 2021). CRNAs provide over 50 million anesthetics to patients each year in the United States and represent 80% of the anesthesia providers in rural counties (AANA, 2021). As of May 2020, there were 41,960 CRNAs employed in the United States (U.S. Bureau of Labor Statistics, 2021). Florida has the highest number of CRNAs in the country, with a total of 3,660 practicing CRNAs (U.S. Bureau of Labor Statistics, 2021). However, in 2007, the profession was facing a shortage within the United States of 1,282 CRNAs, and this gap was expected to persist until 2020 (Daugherty et al., 2010). Florida's current trends include a projected 20% increase in anesthesia services due to a population expected to increase by 3.3 million between 2012 and 2025 (Wunder et al., 2017).

There are several factors that may threaten the capacity of nurse anesthesia programs to meet the identified need for CRNAs. The Council on Accreditation of Nurse Anesthesia Educational Programs (COA) has mandated that all students admitted to a nurse anesthesia program, as of January 2022, will be required to obtain a doctoral degree upon graduation (COA, 2021; Malina et al., 2014). This conversion from a master's degree to a doctoral degree as a requirement for entry to practice is currently an unknown factor that some have predicted may decrease the number of applicants to CRNA programs (Wunder et al., 2017). Additionally, increasing the length of the nurse anesthesia program from a previous 28-month tenure to a minimum of 36 months, increases the overall financial burden for the SRNA, nurse anesthesia faculty, and the university (Burns, 2011; Malina et al., 2014). The average cost to an SRNA



attending an anesthesia program is estimated at \$161,809 (Macintyre et al., 2014). This total does not include personal expenses or national standardized exam fees of \$250 for the SEE and \$995 for the NCE (NBCRNA, 2020). Potential applicants to CRNA programs who do not have financial independence may not be able to sustain the financial burden of over \$100,000 in debt, and this could be a potential barrier to becoming a nurse anesthetist, thus furthering the CRNA shortage (Malina et al., 2014). Despite the significant financial investment, SRNAs graduating from a CRNA program cannot be guaranteed certification or advanced practice licensure, as they must pass the NCE after program completion (Caldwell, 2015; Lebeck, 2003).

Due to the rigor of CRNA programs, pre-admission variables have been implemented to select the strongest candidates who have the best chance of success within the program. Although there are many recommendations on the best pre-admission variables for potential SRNAs, there is a lack of information on how early in the program these pre-admission variables correlate with student performance. Therefore, this project will examine the correlation of four selected pre-admission variables with nurse anesthesia program grade point average (NAPGPA) at the end of the fourth trimester and the first SEE total score during the fifth trimester as a measure of student success within AHU's DNAP Program for the cohorts admitted from 2018 to 2020.

### **PICOT Evidence Review Questions**

Two questions, posed in PICOT format, have assisted in a systematic review of the literature. The first question is as follows: For student registered nurse anesthetists enrolled in master's and doctoral degree programs (P), do the pre-admission cumulative grade point average (cGPA), science grade point average (sGPA), total Graduate Record Examination (GRE) score, or Health Sciences Reasoning Test (HSRT) overall score (I) correlate with nurse anesthesia

program grade point average (NAPGPA) (O) or the first Self-Evaluation Examination (SEE) total score (O)? The second question addresses the innovation: For student registered nurse anesthetists who enrolled into the AdventHealth University Doctor of Nurse Anesthesia Practice Program in 2018-2020 (P), do the pre-admission cumulative grade point average (cGPA), science grade point average (sGPA), total Graduate Record Examination (GRE) score, or Health Sciences Reasoning Test (HSRT) overall score (I) correlate with the nurse anesthesia program grade point average (NAPGPA) (O) at the end of fourth trimester (T) or the first Self-Evaluation Examination (SEE) total score (O) during the fifth trimester (T)?

### **Search Strategies**

The search strategy included PUBMED, Google Scholar, accrediting bodies, professional organizations, and government agencies. Key search terms included: *Health Sciences Reasoning Test (HSRT) AND Nurse Anesthesia program success AND National Certification Examination (NCE) AND Self-Evaluation Examination (SEE) AND Graduate Readiness Examination (GRE) AND grade point Average (GPA) AND science Grade Point Average (sGPA) AND Graduate Nursing School AND Certified Registered Nurse Anesthetist AND predictor AND success AND admission requirement AND admission criteria*. MESH terms included: *admission criteria, success, admission, graduate, and predictor*. Twenty-seven articles met inclusion criteria which included: last 20 years, relevance, abstract, and titles that indicated relation to the proposed PICO questions. Evidence was limited to healthcare professions and studies observing relevant admission criteria. Exclusion criteria included articles published before 1991.

### **GRADE Criteria**

The literature was evaluated using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria. For the supporting body of evidence, the

GRADE level initially was a moderate three, due to the types of studies including correlational studies and retrospective studies. The literature was then graded down due to limitations, imprecision, and methodological flaws such as small sample size and studies limited to only single institutions, and inconsistencies with time of test administration. The final overall GRADE level was downgraded to a level two.

### **Literature Review and Synthesis of Evidence**

Due to the competitive nature of CRNA programs, pre-admission criteria have been implemented to identify the best candidates, including: A baccalaureate degree in nursing, an unencumbered license as a registered nurse, a minimum of one year of ICU experience, a GRE score of 300 or better (required by about 50 percent of schools), GPA at least 3.0, time shadowing a CRNA, and specialty certifications such as the Critical Care Registered Nurse certification (CCRN) (AANA, 2021; Miller, 2020). These requirements are set by CRNA programs to select candidates who are most likely to succeed in their respective programs, on the SEE, and ultimately on the NCE (NBCRNA, 2017).

Despite pre-admission criteria, determining the candidates who will most likely succeed remains a challenge for program directors and nurse anesthesia faculty (Burns et al., 2011). SRNAs who meet or exceed pre-admission criteria may withdraw from the anesthesia program or fail the NCE (Ortega et al., 2013). Identifying optimal pre-admission variables will aid program directors and nurse anesthesia faculty in selecting candidates who are likely to progress through the program and ultimately pass the NCE (Caldwell, 2015; Lebeck, 2003; Ortega et al., 2013; Patzer et al., 2017). If an anesthesia program has poor cohort NCE pass rates, its accreditation status can be negatively affected (COA, 2019). Additionally, NCE pass rates can impact the public's general perception about the school (Guiot et al., 2018).

This study examined the correlation of four pre-admission factors with two interim program progression variables. The four pre-admission factors were: cumulative GPA (cGPA), science GPA (sGPA), total Graduate Record Examination (GRE) score, and Health Sciences Reasoning Test (HSRT) overall score. This project studied the correlation of each of these four variables with the nurse anesthesia program's grade point average (NAPGPA) at the end of the fourth trimester and with the first Self-Evaluation Examination (SEE) total score during the fifth trimester. Additionally, the project examined the correlation between the nurse anesthesia program grade point average (NAPGPA) at the end of the fourth trimester and the first Self-Evaluation Examination (SEE) total score during the fifth trimester.

### **Grade Point Average**

Although data suggests GPA demonstrates a strong correlation to program success, there are varying studies describing which GPA (sGPA, cumulative GPA, nursing GPA) is the best predictor of student success. Patzer et al. (2017) found that the most important predictors of graduate nursing school success were admission GPA, nursing GPA, and undergraduate science GPA. Ortega et al. (2013) concurred, finding undergraduate GPA, undergraduate science GPA, and the GRE total score to be significantly correlated ( $p < .001$ ) with graduate academic success, noting that the undergraduate GPA showed the strongest correlation. Burns et al. (2011) underscored the Ortega et al. (2013) finding that higher admission GPA predicts a higher program GPA. Burns et al. (2011) also demonstrated a relationship between GPA, sGPA, and academic progression for SRNAs, finding students to be three times less likely to experience academic probation for every one-point increase in sGPA. Wilson et al. (2015) supports this relationship, finding that for every one-point increase in cumulative GPA, the chance of successfully completing a graduate nursing program increases up to 7.12 times, and students are

4.2 times less likely to experience academic probation. Suhayda et al. (2008) established baselines for relevant GPAs, finding an average cumulative GPA of 3.25 and an undergraduate nursing GPA of 3.00 predicted a 99% success rate for master's level nursing students. Additional studies found that a cumulative GPA of 3.36, sGPA of 3.30, and undergraduate nursing GPA of 3.36 correlated significantly to student success (Burns, 2011; Suhayda et al., 2008; Wilson et al., 2015).

In addition to predicting program success, the literature says that GPA is also correlated with passing the NCE (Zaglaniczny, 1992). Pre-admission grade point averages of 3.25 or higher showed greater probability of successfully passing the NCE, although no evidence directly supports whether undergraduate, cumulative, or science GPA correlates with higher NCE scores (Burns et al., 2013; Eaglin, 2017, Hulse, et al., 2007; Ortega et al., 2013). However, a seminal study by Zaglaniczny (1991) suggests SRNAs with an average anesthesia program cGPA of 3.64 or anesthesia program sGPA of 3.53 are associated with higher scores on the NCE compared to SRNAs with an average program cGPA of 3.37 or anesthesia program sGPA 3.14. The literature includes additional recommendations for future studies assessing correlation between pre-admission GPAs and NCE scores.

### **Graduate Record Examination**

According to the Educational Testing Service (ETS), the Graduate Record Examination (GRE) was created to assess test takers' readiness for graduate school (ETS, 2021). Several studies have suggested use of the GRE as a predictor of success in graduate programs; however, some of these studies have not included SRNAs (Utzman et al., 2007; Young., 2005). Further, these studies offer inconclusive results regarding whether there is a significant correlation between GRE scores for admission to non-anesthesia graduate nursing programs and graduate

GPA (Ortega et al., 2013). For instance, in two studies of academic success in graduate school, the GRE only predicted a 5% to 8% variance in graduate GPA (Katz et al., 2009; Ortega et al., 2013; Patzer et al., 2017). Research also suggests that the GRE may have less predictive power than undergraduate GPA. A large study of graduate nursing students including SRNAs found the GRE to add little predictive value for applicants with an undergraduate GPA of 3.0 or higher and a nursing GPA of 3.0 or higher (Ortega et al., 2013). Additionally, a study by Oakland University in Rochester, Michigan suggested that GRE scores were unnecessary for admission when undergraduate GPA was 3.28 or greater (Ortega et al., 2013). Katz et al (2009), supports this statement, claiming GRE scores provide a barrier to nursing school admission while offering little predictive value of success. Studies have also demonstrated a weak correlation between the GRE and NCE pass rates (Zaglaniczny, 1991; Lebeck, 2003).

Despite evidence that seems to rule out the GRE as a predictive admission criterion, there is research offering contrasting opinion. For instance, Burns et al. (2011) found a positive relationship between total GRE score and current GPA for SRNAs. Utzman et al, (2007) and Young (2005) found GPA and GRE scores to be a significant admission variable for prediction of academic success. However, the study completed by Young (2005) was associated with doctoral students in educational leadership, and Utzman (2007) reflected physical therapy students; neither study was associated with SRNAs.

### **Health Sciences Reasoning Test**

The Health Sciences Reasoning Test (HSRT) measures reasoning and decision-making processes and is calibrated to undergraduate and graduate health sciences educational programs (Insight, 2021). The HSRT was designed for measuring baseline critical-thinking skills based on questions written in health-related and professional practice contexts (Insight, 2021). The HSRT

is composed of 33 multiple-choice questions administered in 50 minutes and is tailored to healthcare situations that require no prerequisite knowledge of healthcare (Cox et al., 2013; Insight, 2021; Kelsch et al., 2014). The lack of this knowledge has not been shown to affect the outcome of the HSRT (Cox et al., 2013; Kelsch et al., 2014). The HSRT includes assessment in multiple categories: analysis, interpretation, evaluation, explanation, inference, deduction, induction, numeracy, and an overall reasoning skill score (Insight, 2021). An overall HSRT score of 15 to 20 is indicative of moderate critical-thinking abilities, 21 to 25 is indicative of strong critical-thinking abilities, and  $\geq 26$  is indicative of superior critical-thinking abilities (Cox et al., 2013; Huhn et al., 2011; Insight, 2021).

While the company that produces the HSRT indicates that scores on this test may predict successful professional licensure and improved clinical performance (Insight, 2021), evidence of this predictive capacity is focused on non-anesthesia graduate education. As mentioned by Kelsch and Friesner (2014), performance on the HSRT was highly correlated with applicants' Pharmacology College Admission Test (PCAT) cumulative percentile scores. Cox et al. (2013) found that scores on the reading comprehension, verbal, and quantitative sections of the PCAT were significantly associated with HSRT scores. However, there was no association between the HSRT and other sections of the PCAT or other standard cognitive assessment tools (Cox et al., 2013). In another study related to pharmacology education, Basak et al. (2008) found that pre-admissions tools such as the HSRT can provide evidence of a student's clinical reasoning skills and may provide insight on a student's reflective process for developing clinical reasoning. Huhn et al. (2011), found that the HSRT was able to discriminate novice physical therapists with less than 1 year experience versus expert physical therapists with greater than 5 years of experience,

resulting in the novice physical therapist scoring in the 44th percentile and the experts scoring in the 62nd percentile, demonstrating the HSRT's testing validity.

Although the HSRT has shown evidence of assessing clinical reasoning and critical thinking skills, the HSRT was found not to be a valid predictor of graduate occupational therapy (OT) student success (Cavaliere et al., 2020). Cavaliere et al. (2020) conducted a study of 209 OT students, measuring student success by students' successful completion of the program, and concluded that the HSRT was not predictive of student success ( $\rho(209) = .246, p < .001$ ). However, due to the lack of moderate-to-strong correlations between HSRT scores and academic performance and the absence of literature in the context of nurse anesthesia education, the usefulness of the HSRT as an admission instrument may be limited, suggesting further research in identifying student success using the HSRT (Cox et al., 2013; Cox et al., 2014).

### **Self-Evaluation Examination**

The SEE provides information to students about their progress in the nurse anesthesia program and prepares students for the NCE experience (NBCRNA, 2019). The SEE also provides information to program directors about how well their program is preparing their students with the necessary knowledge to practice nurse anesthesia (NBCRNA, 2017). Therefore, awareness of factors that correlate with SRNAs' performance on the SEE is important for program directors and the NBCRNA (Lebeck, 2003; Muckle et al., 2012; Zaglaniczny, 1992). The first SEE was a 250 item, paper-and-pencil examination and was first administered on June 21, 1991, at the American College Testing (ACT) organization (Muckle et al., 2012). Currently, the SEE is composed of 240 questions during a four-hour testing period. On September 1, 2016, a new version of the SEE was initiated to better predict SRNAs' performance on the NCE (SEE,



2020). The updated SEE demonstrated an increase from 0.83 to 0.93 for overall score reliability, and additional subscores reflected a reliability index greater than 0.75 (NBCRNA, 2020).

A study conducted in 2017 by the NBCRNA observed a group of 2,310 SEE scores plotted against NCE first-time pass rates and demonstrated a strong predictability with Pearson correlation  $r=0.58$  (NBCRNA, 2017). In May of 2018, the SEE underwent changes yet again to reflect the revisions to the NCE content outline (NBCRNA, 2020). More recently, the NBCRNA again found a strong correlation between SEE total scores and performance on the first NCE attempt (NBCRNA, 2020). NBCRNA found this correlation was strongest for second-year and third-year students who take the SEE at least three months prior to taking the NCE (NBCRNA, 2020). The 2020 SEE evaluation report of 3,061 SEE scores conducted by the NBCRNA demonstrated a strong positive correlation between SEE scores and performance on the first NCE attempt with a correlation coefficient of  $r=0.53$  (NBCRNA, 2020).

In the preliminary evaluation of the reconfigured SEE (2017), the average SEE total score of 427.0 [standard deviation (SD): 40.7] correlated with a passing performance for the first-time NCE; a 376.1 (SD: 35.2) correlated with a failing performance for the first-time NCE (NBCRNA, 2017). In the 2020 SEE evaluation report, a SEE total score of 437.5 correlated with a passing performance for the first-time NCE (SD: 34.3) in 2019, and a SEE total score of 443.1 (SD: 35.4) correlated with a passing performance for the first-time NCE in 2020 (NBCRNA, 2020). The NBCRNA NCE and SEE Annual Report for Calendar Year 2021 identified the mean total score for Year-2 examinees (410.0,  $n=1,951$ , SD: 47.0) was higher than the mean total score for Year-1 examinees (394.2,  $n=144$ , SD: 39.0). The mean SEE score for the Year-3-and-above students was highest at 426.49 ( $n=3,728$ , SD: 40.8) (NBCRNA, 2021).

## **Conclusion**

While there are several articles discussing which pre-admission factors predict student success, sufficient evidence is lacking to support any one factor conclusively over another. This may suggest that student success is better predicted using multiple criteria not limited to only cumulative GPA, sGPA, GRE, or HSRT. The literature also varies regarding which GPA better predicted success. Additionally, there are opposing views of whether the GRE is a good predictor of nurse anesthesia program success. The literature discussing the HSRT suggests the need for additional research in identifying its predictive values for graduate program success. The data collected in this study may aid in identifying which variables better predict success in AHU's DNAP Program, on the SEE, and may ultimately relate to passing the NCE on the first attempt.

## **Applicability to Practice**

Identifying appropriate admission tools to predict success in a CRNA program and, ultimately, passing the NCE is critical for student success and continued program accreditation (Caldwell, 2015; Lebeck, 2003; Ortega et al., 2013; Patzer et al., 2017). With a limited number of nurse anesthesia programs and student positions available nationally, determining the candidates who demonstrate the greatest potential for success can be challenging for program directors and nurse anesthesia faculty (Burns, 2011; Lebeck, 2003). The goal of this scholarly project was to determine any correlation between pre-admission cumulative GPA (cGPA), science GPA (sGPA), total GRE score, or the HSRT overall score and the nurse anesthesia program GPA (NAPGPA) at the end of the fourth trimester or the first SEE total score during the fifth trimester for SRNAs who matriculated at AHU from 2018 to 2020. Determining the correlation will help the university identify the optimal candidates who have the highest probability of program success and passing the NCE on the first attempt. Currently there is a

shortage of CRNAs in the United States (Burns, 2011; Wunder et al., 2017). Due to this shortage, identifying the best candidates for success in nurse anesthesia programs and increasing the likelihood of passing the NCE will allow new CRNAs to enter the workforce more efficiently (Ortega et al., 2013).

### **Project Aims**

The purpose of this study was to determine if pre-admission cumulative grade point average (cGPA), science grade point average (sGPA), total GRE score, or the HSRT overall score correlated with nurse anesthesia program GPA (NAPGPA) at the end of the fourth trimester or the first SEE total score during the fifth trimester. The pre-admission variables of SRNAs who enrolled into AHU's DNAP Program in 2018-2020 were compared to the corresponding NAPGPA and the first SEE total score.

The project objectives were as follows:

**Objective 1-** Determine the correlations of cGPA, sGPA, total GRE score, and the HSRT overall score with the NAPGPA of SRNAs who enrolled at AHU's DNAP Program in 2018-2020.

**Objective 2-** Determine the correlations of cGPA, sGPA, total GRE score, and the HSRT overall score with the first SEE total score of SRNAs who enrolled at AHU's DNAP Program in 2018-2020.

**Objective 3-** Determine the correlation between the nurse anesthesia program grade point average (NAPGPA) at the end of the fourth trimester and the first (SEE) total score during the fifth trimester of SRNAs who enrolled at AHU's DNAP Program in 2018-2020.

**Objective 4-** Make evidence-based recommendations for AHU faculty regarding the pre-admission variables that may influence selection of optimal candidates to succeed within the program, on the first SEE, and thus later on the initial NCE attempts due to established strong

correlations between SEE performance in the second and third years and the subsequent NCE performance.

### **Methods**

This study utilized the Spearman's Rho Correlation Test. This scholarly project did not require informed consent since it was a retrospective review of de-identified data and did not involve human subjects. This study used a convenience sample of the following pre-admission criteria from the 2018-2020 enrollment cohorts of the AHU DNAP Program: cumulative GPA, science GPA, GRE total score, and HSRT overall score. These pre-admission factors were compared to the respective NAPGPA at the end of the fourth trimester and the first SEE total score during the fifth trimester. The data source was DNAP Program retrospective data about AHU cohorts that enrolled in 2018-2020. The data was collected from the program administrator's computerized student database with individual student records and scores, which were de-identified on an Excel spreadsheet and then provided by the program administrator. The de-identified data was statistically analyzed using the 4.4.2.0 (The R Foundation for Statistical Computing, Vienna, Austria) by the AdventHealth Cares Team Statistician Dr. Tho Nguyen. A univariate analysis was used to determine mean and standard deviation for each variable. The Spearman's Rho's Correlation Test was performed to determine if there were any significant correlations. The Spearman's Rho Correlation ( $r$ ) ranges from -1 to 1; the closer to 0 means a weak relationship. A strong positive relationship is considered if the p-value is  $<0.05$ . A linear regression analysis was conducted on the four statistically significant correlations identified using a 95% confidence interval. Data will be kept and stored for 7 years and then it will be destroyed.

### **Planning and Procedures/Limitations**

Formal one-hour interviews occurred on the Microsoft Teams video conferencing platform in June 2021 with each key player to discuss the different perceptions, barriers, and limitations for this study. The key players included Dr. Alescia DeVasher Bethea, AHU DNAP Program Administrator, Dr. Janice Lowden-Stokley, AHU Professor of nursing and Coordinator of student performance and nursing research, and Dr. Carolyn Fore, AHU Professor of nursing. De-identified data was collected and provided by Dr. Alescia DeVasher Bethea, and statistical analysis was completed by a statistician. Barriers included time to gather the de-identified data and limited literature comparing HSRT total score and nurse anesthesia graduate program success. Dr. Roy Lukman retired starting at the end of the year 2021; therefore, there was a transition to a new AdventHealth Cares Team statistician.

Limitations included a small sample size of 80 DNAP Program SRNAs. To note, cGPA only included undergraduate GPA and did not include graduate level courses; however, most SRNAs did not have any pre-admission graduate coursework. Science GPA was unavailable for 26 SRNAs, so N=54 regarding that factor. Two SRNAs were exempt from taking the GRE because they already earned a graduate-level degree prior to DNAP Program application. These limitations may have impacted interpretation and significance of data including confidence intervals and *p*-values. Data was gathered from only one university, so the results are not generalizable to other universities. An additional limitation included in the data collection is the range of time when the SEE was taken; SRNAs had a two-month period to complete the exam, allowing slightly different preparation times between SRNAs. Furthermore, NAPGPA was calculated in combination with all DNAP and non-DNAP courses. A total of 18 DNAP courses, 2 science courses, and 1 non-DNAP course were included in the NAPGPA calculation. Ideally,

NAPGPA would only include DNAP courses and science courses which address topics that are included on the SEE and NCE, and would exclude courses such as Religion. The literature review provided confounding variables between the pre-admission factors and their significance in predicting student success. Additionally, literature specific to doctoral nurse anesthesia programs was limited due to the required transition to doctoral degree programs by 2022.

### **Timeline**

A proposal for a topic was submitted to AHU DNAP Program faculty in May 2021. A problem and innovation were identified, and a PICOT-formatted question was developed. Relevant studies and scholarly articles were obtained between May 2021 and June 2021. After topic review and approval by AHU DNAP Program faculty, interviews were conducted among key players in June 2021. A proposed PowerPoint explaining the proposed methods was presented to Dr. Sarah Snell (assistant professor of nurse anesthesia) and Dr. Roy Lukman (AHU statistician) in June 2021. The scholarly project was submitted for Editorial Service Review in June 2021. Project chair review was submitted in July 2021. A PowerPoint was presented to faculty for project progression and feedback in early November 2021. Scientific Review Committee (SRC) approval was received in December 2021. Institutional Review Board (IRB) determination of “Not Research” was received in January 2022. Data collection was completed in May 2022 and data analysis was completed in June 2022. Poster presentation and application to ADCE and FANA were completed in August 2022.

### **Results**

Data was collected from 80 (N= 80) AHU DNAP Program SRNAs from the graduating cohorts of 2021 through 2023. The Spearman’s Rho Correlation Test was performed on cGPA, sGPA, total GRE score, and HSRT overall score to determine if there was a predictive

correlation between the NAPGPA and SEE total score. The Spearman's Rho Correlation ranges from -1 to 1; the closer to 0 means a weak relationship. Significance level was determined by P-value of 0.05. This study found four statistically significant correlations in the data that include: cGPA with NAPGPA, cGPA with SEE total score, sGPA with SEE total score, and NAPGPA with SEE total score. A linear regression analysis was conducted on each of the four statistically significant correlations identified using a 95% confidence interval.

### **Descriptive Analysis**

Data was collected about 80 (N=80) AHU DNAP Program SRNAs from the graduating cohorts of 2021 through 2023. No minimum sGPA was collected for the 2021 cohort; thus, total sGPA data included 54 (N=54) AHU DNAP Program SRNAs from cohorts 2022 and 2023. The data collected for the total GRE score included 78 (N=78) AHU DNAP Program SRNAs, as two SRNAs had already earned a graduate-level degree prior to the DNAP Program application process. A univariate analysis was used to identify the mean and standard deviation for each variable. The mean and median for the independent variables were identified: cGPA (3.42, 3.44), sGPA (3.23, 3.15), GRE (295.94, 297.50), & HSRT (80.29, 81.00). The mean and median for the dependent variables were identified: NAPGPA (3.74, 3.81) & SEE (420.39, 430.00). The AHU DNAP Program does not require a minimum sGPA in their current application process; however, the minimum cGPA required was a 3.00, inclusive of both undergraduate and graduate coursework. The AHU DNAP Program identified a competitive total GRE score as 300; the average GRE scores from the past five cohorts was 298, including cohorts in the prior master's program (AdventHealth University, 2021). In the NBCRNA 2021 NCE and SEE Annual Report, the mean total SEE score for year-two SRNAs was 410.0 (NBCRNA, 2021), while the AHU DNAP Program first-time SEE total score mean for year-two SRNAs was 420.39. An average

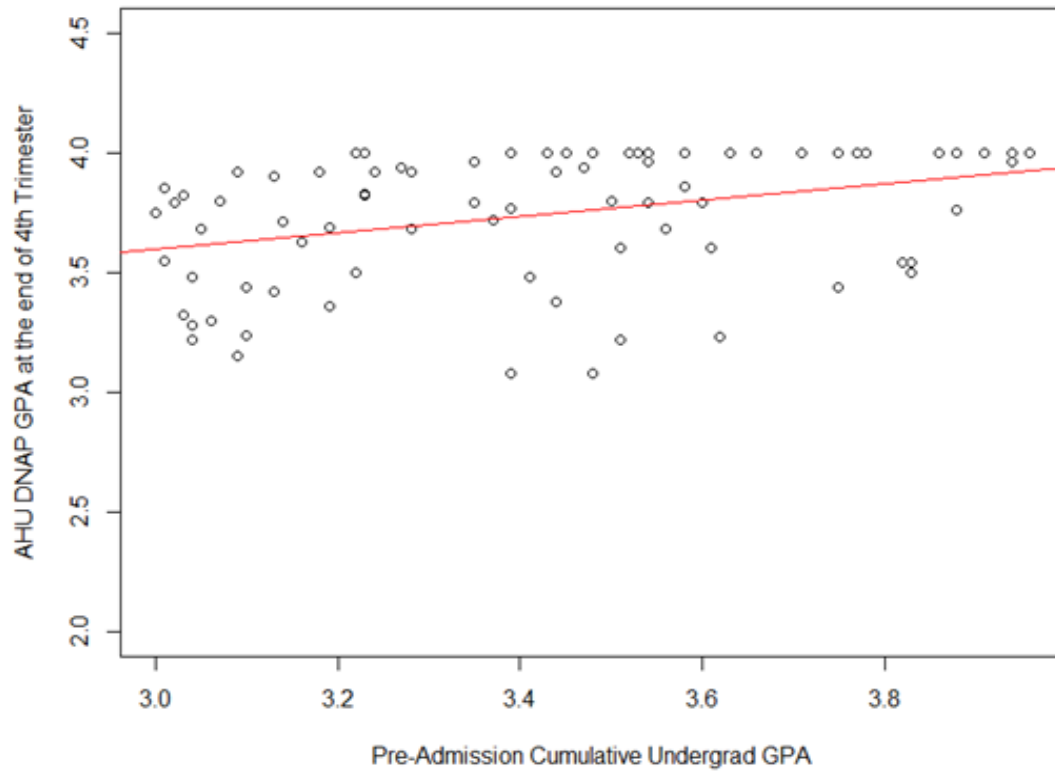
SEE total score of 443.1 (SD: 35.4) correlates with a passing performance on the first-time NCE attempt (NBCRNA, 2021). However, the AHU DNAP Program first-time SEE total score mean of 420.39 for year-two SRNAs was below the SEE total score that correlates with a passing performance on the first-time NCE attempt.

### **Objective 1**

The Spearman's Rho Correlation Test identified statistical significance between cGPA with NAPGPA. Data analysis identified a significant moderate positive relationship between cGPA with NAPGPA ( $r = 0.437$ ,  $p < 0.001$ ). However, there was no statistical significance between sGPA, total GRE score, and HSRT overall score with NAPGPA, as evidenced by a fair positive relationship between sGPA with NAPGPA ( $r = 0.217$ ,  $p = 0.116$ ), a weak positive relationship between GRE with NAPGPA ( $r = 0.013$ ,  $p = 0.912$ ), and a weak positive relationship between HSRT with NAPGPA ( $r = 0.029$ ,  $p = 0.797$ ) was found. A linear regression analysis was conducted between cGPA with NAPGPA, which identified a cGPA of 3.00 correlating with an NAPGPA of 3.65, a cGPA of 3.10 correlating with an NAPGPA of 3.76, and a cGPA of 3.20 correlating with an NAPGPA of 3.83.



### cGPA with NAPGPA Results (Table 1)



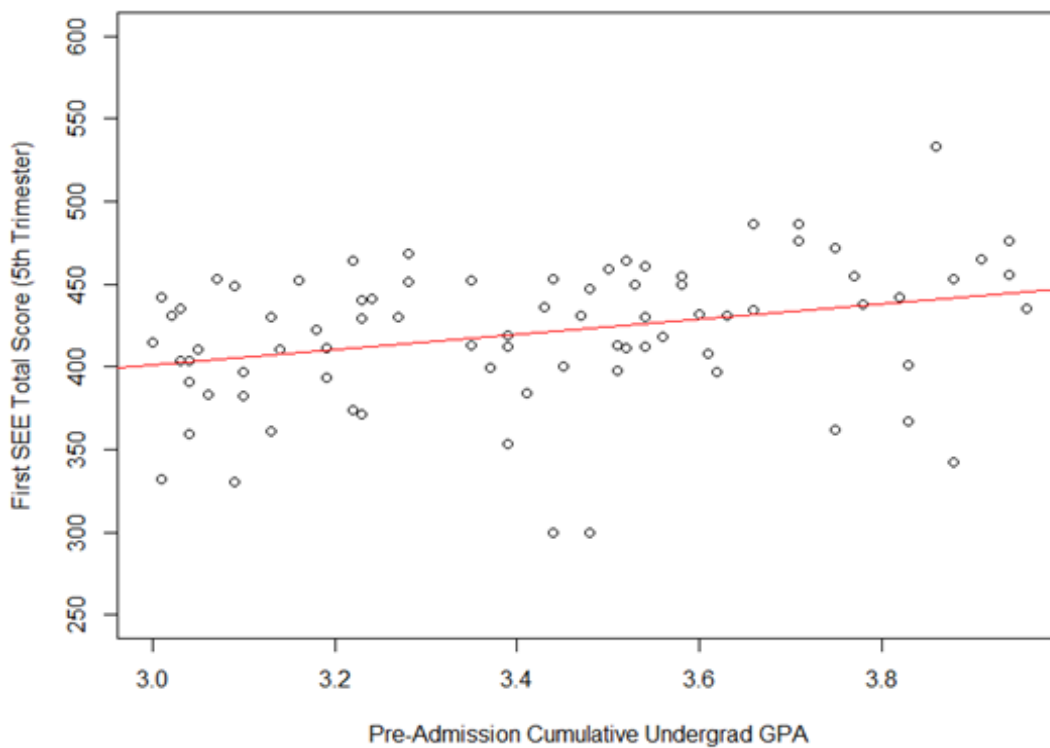
### cGPA with NAPGPA Linear Regression (Table 2)

cGPA	NAPGPA	Lower CI	Upper CI
2.9	3.51	2.88	3.79
3.0	3.65	3.30	3.83
3.1	3.76	3.56	3.87
3.2	3.83	3.72	3.90
3.3	3.88	3.81	3.92
3.4	3.92	3.87	3.94
3.5	3.94	3.91	3.96
3.6	3.96	3.93	3.98
3.7	3.97	3.95	3.99
3.8	3.98	3.96	3.99
3.9	3.99	3.97	4.00
4.0	3.99	3.98	4.00

## Objective 2

The Spearman's Rho Correlation Test identified statistical significance between cGPA and sGPA with the SEE total score. Data analysis identified a significant moderate positive relationship between cGPA with SEE total score ( $r = 0.359$ ,  $p=0.001$ ) and a significant moderate positive relationship between sGPA with SEE total score ( $r = 0.329$ ,  $p=0.015$ ). However, there was no statistical significance between the total GRE score and HSRT overall score with the first SEE total score, as evidenced by a fair positive relationship between GRE score with SEE total score ( $r = 0.151$ ,  $p=0.188$ ) and a weak positive relationship between HSRT overall score with SEE total score ( $r = 0.093$ ,  $p=0.414$ ). Two separate linear regression analyses were conducted between cGPA with SEE total score and between sGPA with SEE total score. The cGPA with SEE total score linear regression identified a cGPA of 3.00 correlating with a SEE total score of 402, a cGPA of 3.10 correlating with a SEE total score of 408.3, and a cGPA of 3.20 correlating with a SEE total score of 414.4. The sGPA with SEE total score linear regression identified a sGPA of 3.00 correlating with a SEE total score of 406.8, a sGPA of 3.10 correlating with a SEE total score of 409.8, a sGPA of 3.20 correlating with a SEE total score of 412.8, and a sGPA of 3.30 correlating with SEE total score of 415.9.

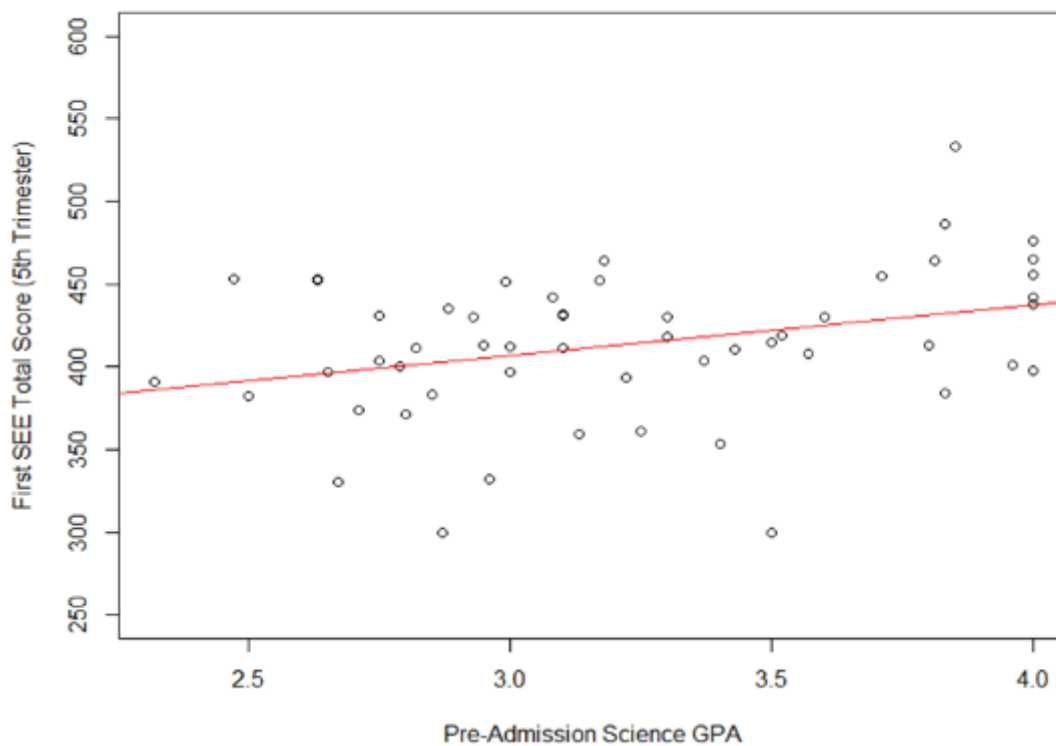
### cGPA with SEE Total Scores Results (Table 3)



### cGPA with SEE Total Scores Linear Regression (Table 4)

cGPA	SEE	Lower CI	Upper CI
2.9	395.4	369.9	417.5
3.0	402.0	381.2	420.3
3.1	408.3	391.7	423.3
3.2	414.4	401.2	426.5
3.3	420.2	409.4	430.3
3.4	425.9	416.3	434.8
3.5	431.3	421.7	440.2
3.6	436.4	425.9	446.2
3.7	441.4	429.3	452.5
3.8	446.2	432.1	458.8
3.9	450.8	434.7	464.9
4.0	455.2	437.1	470.7

### sGPA with SEE Total Scores Results (Table 5)



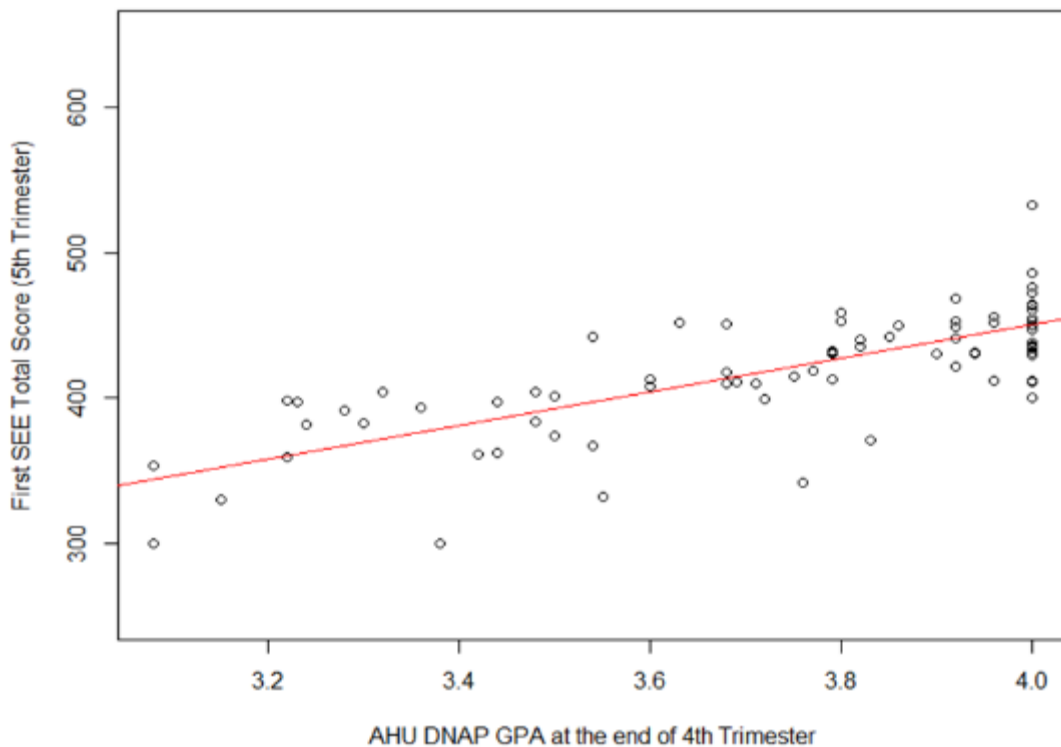
### sGPA with SEE Total Scores Linear Regression (Table 6)

sGPA	SEE	Lower CI	Upper CI
2.9	403.8	389.7	417.8
3.0	406.8	393.9	419.6
3.1	409.8	397.8	421.8
3.2	412.8	401.3	424.4
3.3	415.9	404.2	427.5
3.4	418.9	406.6	431.1
3.5	421.9	408.6	435.1
3.6	424.9	410.3	439.5
3.7	427.9	411.7	444.2
3.8	431.0	413.0	449.0
3.9	434.0	414.1	453.9
4.0	437.0	415.1	459.0

### Objective 3

The Spearman's Rho Correlation Test identified statistical significance between the NAPGPA with SEE total score. Data analysis identified a significant strong positive relationship between NAPGPA and SEE total scores ( $r = 0.76$  and  $p < 0.001$ ). A linear regression analysis was conducted between NAPGPA with SEE total score, which identified a mean NAPGPA of 3.5 correlated with a SEE total score of 395.5 and a mean NAPGPA of 3.6 correlated with a SEE total score of 407.7.

#### NAPGPA with SEE Total Scores Results (Table 7)



### SEE with NAPGPA Linear Regression (Table 8)

NAPGPA	SEE	Lower CI	Upper CI
3.5	395.5	386.1	404.6
3.6	407.6	400.0	415.0
3.7	419.2	412.6	425.5
3.8	430.3	423.9	436.4
3.9	440.9	434.0	447.6
4.0	451.1	443.2	458.7

### Discussion/Recommendations

This scholarly project aimed to determine if AHU's DNAP Program pre-admission cGPA, sGPA, total GRE score, or the HSRT overall score had a correlation with NAPGPA at the end of the fourth trimester or the first SEE total score during the fifth trimester. There were four statistically significant correlations in the data: cGPA with NAPGPA, cGPA with SEE total score, sGPA with SEE total score, and NAPGPA with SEE total score.

The moderate positive relationships between cGPA with NAPGPA, cGPA with SEE total score, and sGPA with SEE total score could support substantial weighting of the pre-admission cGPA and sGPA in AHU's DNAP Program pre-admission process. According to NBCRNA's NCE and SEE Annual Report for Calendar Year 2021, the average SEE total score for second-year SRNAs was 410.0. The most current data collected from the 2020 SEE Evaluation Report regarding the SEE total score that correlated with passing the NCE on the first attempt spanned from September 1, 2019 to December 31, 2020, and the minimum SEE total score correlating to passing the NCE on the first attempt was 443.1 (SD: 35.4) (NBCRNA, 2021). Using one standard deviation below the minimum SEE total score that correlated to a passing performance on the first-time NCE attempt, a SEE total score of 407.7 is used as a benchmark for academic recommendations. Data from this study's linear regression model showed a cGPA of 3.10

correlated with a NAPGPA of 3.76, and a NAPGPA of 3.76 correlated with a SEE total score of 419.2. Data from this study's linear regression model showed a pre-admission sGPA of 3.10 correlates with a SEE total score of 409.8. As a result of this study's findings and in combination with NBCRNA's strong positive correlations between the SEE and performance on the first-time NCE attempt, this study recommends that AHU should increase the minimum cGPA requirement from 3.00 to 3.10. Additionally, this study recommends adding sGPA into the pre-admission requirements, with a minimum sGPA of 3.10 for AHU DNAP Program applicants.

The relationship between the HSRT with NAPGPA and SEE total score are both weakly positive; as a result, the usefulness of the HSRT is unclear. The relationship between the total GRE score and NAPGPA showed a weak positive correlation, and the total GRE score with SEE total score showed a fair positive correlation. Thus, the HSRT does not seem strong enough to replace the GRE as a standardized testing method for academic predictors for SRNA success. However, the HSRT does not claim to be an academic predictor, but rather a measure of critical thinking and practical applications. This study recommends not to use the HSRT as a replacement for the GRE. Additionally, further study is recommended regarding the use of the HSRT for predicting program success. This study recommends that AHU faculty consider minimal weight for the total GRE score in the pre-admission determination, as no significant correlations were found with NAPGPA or SEE total score.

The strong positive correlation between NAPGPA and SEE total score could support the program's enforcement of high programmatic academic performance requirements. Data from the linear regression model showed a mean NAPGPA of 3.60 correlates with a SEE total score of 407.6. As a result of this study's findings and in combination with NBCRNA's strong positive correlation between second- and third-year SRNAs' SEE total scores and passing performance

on the first NCE attempt, this study recommends maintenance of a threshold NAPGPA of 3.60 instead of 3.00 for progression during the program. This study also recommends the AHU faculty implement an academic performance improvement plan if the NAPGPA falls below the 3.60 threshold during any of the first four trimesters of AHU's DNAP Program. Additionally, if AHU's DNAP Program-required second-year SEE total score of 410 cannot be achieved after unlimited attempts by the end of the sixth trimester, this study recommends dismissing the SRNA from the program to minimize the financial strain that comes with academic dismissal later in the program or failure to pass the NCE.

### **Conclusion**

The purpose of this study was to determine if pre-admission cGPA, sGPA, total GRE score, or the HSRT overall score had a significant correlation with NAPGPA at the end of the fourth trimester or the first SEE total score during the fifth trimester. The pre-admission variables of SRNAs who enrolled in AHU's DNAP Program in 2018-2020 were compared to the corresponding NAPGPA and the first SEE total score. The objectives of this scholarly project were to determine if there were any correlations between the pre-admission independent variables (cGPA, sGPA, total GRE score, and HSRT overall score) with the dependent variables (NAPGPA and SEE total score). This study then assessed whether a correlation existed between NAPGPA and the first SEE total score. With these results, this study made evidence-based recommendations for AHU DNAP Program faculty regarding the pre-admission variables that may influence the selection of optimal candidates to succeed within the program, on the first SEE, and thus later during the initial NCE attempt. The data analysis yielded four statistically significant correlations: cGPA with NAPGPA, cGPA with SEE total score, sGPA with SEE total



score, and NAPGPA with SEE total score. In summary, this study made four recommendations for pre-admission requirements and three recommendations regarding program progression.

Pre-admission recommendations:

- Increase the minimum cGPA requirement from 3.00 to 3.10.
- Add sGPA into the pre-admission requirements with a minimum sGPA of 3.10 for AHU DNAP Program applicants.
- Do not use the HSRT as a replacement for the GRE.
- Consider minimal weighting of the total GRE score in the admission rubric.

Program progression recommendations:

- Increase the threshold NAPGPA to 3.60 instead of 3.00.
- Implement an academic performance improvement plan if NAPGPA falls below the 3.60 threshold during any of the first four trimesters of AHU's DNAP Program.
- Dismiss the SRNA from the program if AHU's required second-year SEE total score of 410 cannot be achieved after unlimited attempts by the end of the sixth trimester, to minimize the financial strain that comes with academic dismissal later in the program or failure to pass the NCE.

These recommendations may lead to changes in AHU's DNAP Program as pre-admission criteria to help select candidates who may have the highest probability of completing the program and passing the NCE on the first attempt and/or to changes in AHU's DNAP program's progression requirements.

### **Dissemination Plan**

Dissemination is planned for Fall 2022 to Spring 2023. A PowerPoint and poster presentation were created and presented to the key audiences for this scholarly project at AHU

on Thursday, March 30<sup>th</sup>, 2023, including the nurse anesthesia program administrator and assistant program administrator. A poster presentation was submitted for the Florida Association of Nurse Anesthetists (FANA) annual meeting but was not selected for presentation.

Additionally, a poster presentation was submitted for the AANA Assembly of Didactic and Clinical Educators (ADCE) annual meeting but was not selected for presentation. Scholarly project dissemination for AHU DNAP faculty will take place on April 6, 2023. This scholarly project will be stored and made accessible for students and faculty in the AdventHealth University library archives.

### **Budget/ Grants**

There was a \$25 application fee associated with applying for poster presentation through the AANA Foundation for the 2023 ADCE. No research grants were requested for this scholarly project.

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## Appendix A – Matrix Tables

Cox, W. C., & McLaughlin, J. E. (2014). Association of Health Sciences Reasoning Test scores with academic and experiential performance. American journal of pharmaceutical education, 78(4), 73. <a href="https://doi.org/10.5688/ajpe78473">https://doi.org/10.5688/ajpe78473</a>					
Cox, W. C., Persky, A., & Blalock, S. J. (2013). Correlation of the Health Sciences Reasoning Test With Student Admission Variables. American Journal of Pharmaceutical Education, 77(6), 118. <a href="https://doi.org/10.5688/ajpe776118">https://doi.org/10.5688/ajpe776118</a>					
Purpose	Variables	Setting/Subjects	Measurement and Instruments	Results	Evidence Quality
<p><b>Study One:</b> To assess the association of scores on the Health Sciences Reasoning Test (HSRT) with academic and experiential performance in a Doctor of Pharmacy curriculum.</p> <p><b>Study two:</b> To assess the association between scores on the Health Sciences Reasoning Test (HSRT) and pharmacy student admission variables.</p>	<p><b>Study One:</b> Primary outcomes: To determine the correlation between typical cognitive admission criteria and HSRT scores</p> <p><b>Study Two:</b> Primary Outcomes: Assess the association between HSRT performance and cognitive student admission criteria</p>	<p><b>Study One:</b> HSRT was administered to 329 of 459 (71.6%) P1 students enrolled at the UNC Eshelman School of Pharmacy from fall 2007 to fall 2009.</p> <p><b>Study Two:</b> HSRT was administered to 329 first-year PharmD students between 2007 and 2009.</p>	<p><b>Study One:</b> Performance on HSRT and its subscales were compared with academic performance in 29 courses throughout the curriculum and with performance in advanced pharmacy practice experiences (APPEs); Pearson Correlation was used to determine relationship between HSRT and all continuous variables.</p> <p><b>Study Two:</b> Correlations between HSRT scores and cognitive date, previous degree, and gender were examined; Bivariate relationships were examined using Pearson correlation</p>	<p><b>Study One:</b> Significant positive correlations were identified between HSRT overall scores and course grades in 8 courses</p> <p><b>Study Two:</b> 3 variables were significantly associated with HSRT scores: percentile rank on reading comprehension (<math>p &lt; 0.001</math>), verbal (<math>p &lt; 0.001</math>), and quantitative (<math>p &lt; 0.001</math>) subsections of the PCAT</p>	<p><b>Study One:</b> <b>Methodological flaws:</b> sample and time of test <b>Inconsistency:</b> HSRT was administered to some early in the spring and later to some in the fall, critical thinking ability could have improved <b>Indirectness:</b> none <b>Imprecision:</b> sample was limited to a single institution <b>Publication bias:</b> none</p> <p><b>Study Two:</b> <b>Methodological flaws:</b> did not capture the entire cohort of students within each year, administered during a course with variable attendance <b>Inconsistency:</b> test was not administered during a consistent point in the first year <b>Indirectness:</b> none <b>Imprecision:</b> multiple PCAT scores, highest scores were used for analysis <b>Publication bias:</b> none</p>
Design					
<p><b>Study One:</b> Evaluation Study; Pearson correlation was used to determine the relationship between HSRT scores and all continuous variables</p> <p><b>Study Two:</b> Evaluation Study; Bivariate Analysis between HSRT scores and predictor variables using Pearson correlations for numerical predictors; Multivariate analyses predicting HSRT scores</p>					
	<p><b>Implications</b></p> <p><b>Study One:</b> Use of HSRT may be limited by lack of moderate to strong correlation between scores and course performance in the first through third years and with APPEs, other approaches should also be considered</p> <p><b>Study Two:</b> Scores on reading comprehension, verbal, and quantitative sections of the PCAT were significantly associated with HSRT scores.</p>				

Kelsch, M. P., & Friesner, D. L. (2014). The Health Sciences Reasoning Test in the Pharmacy Admissions Process. *American Journal of Pharmaceutical Education*, 78(1), 9. <https://doi.org/10.5688/ajpe7819>

Caldwell, M. (2015). *The Relationship Between Success or Failure in First Semester Nurse Anesthesia Courses and Success or Failure on the Certification Examination and Attrition*. (Electronic Thesis or Dissertation). Retrieved from <https://etd.ohiolink.edu/>

Purpose	Variables	Setting/Subjects	Measurement and Instruments	Results	Evidence Quality
<p><b>Study One:</b> To evaluate the impact of the Health Science Reasoning Test (HSRT) in the Doctor of Pharmacy admissions process compared with other criteria used.</p> <p><b>Study Two:</b> Student Registered Nurse anesthesia grades in any first semester related to student attrition or success on NCE</p>	<p><b>Study One:</b> Primary Outcome: Determine whether including a critical thinking tests adds unique information to the admission process.</p> <p><b>Study Two:</b> Independent variables: Chemistry and Physics of Anesthesia, Anesthesia Basics I, and</p>	<p><b>Study One:</b> HSRT was administered to all prepharmacy students selected for an interview: 122 students.</p> <p><b>Study Two:</b> 266 student registered Nurse Anesthetist at Western Reserve University</p>	<p><b>Study One:</b> Correlation between total HSRT scores and other measures used in the admission process were evaluated, students were ranked on score, and Spearman correlations were used to assess relationship between each of the ranking variables and admission criteria.</p> <p><b>Study Two:</b> Chi- score analysis</p>	<p><b>Study One:</b> The HSRT scores were significantly and highly correlated with applicants Pharmacy College Admission Test (PCAT) cumulative percentile scores.</p> <p><b>Study Two:</b> The two variables statistically significant (<math>\chi^2=39.902, p&lt;.001</math>). Twenty students left the program (5.7%) 94.3% of the remaining students passed the certification examination on the first attempt.</p>	<p><b>Study One:</b> <b>Methodological flaws:</b> Focused on criteria within candidates' ability to control rather than factors outside their control. <b>Inconsistency:</b> none <b>Indirectness:</b> Unable to divulge the colleges exact aggregation process used to establish candidate ranking. <b>Imprecision:</b> Data was collected from only 1 academic year's applicants from 1 pharmacy program, thus may not be generalized with other groups or institutions.</p>
<p><b>Design</b></p> <p><b>Study One:</b> Comparative study between HSRT and other evaluation criteria used in admission process</p> <p><b>Study Two:</b> Descriptive and Retrospective study</p>	<p>Pharmacological Strategies in Anesthesia Practice</p> <p>Dependent: NCE success and attrition rate</p>			<p><b>Implications</b></p> <p><b>Study One:</b> HSRT can be an effective method to evaluate critical-thinking ability as part of the admissions process into a PharmD program, however, its usefulness can be redundant with other evaluation criteria, such as the PCAT</p> <p><b>Study Two:</b> Significant relationship showed between first semester coursework and first attempt NCE pass rate.</p>	<p><b>Publication bias:</b> none</p> <p><b>Study Two:</b> <b>Methodological flaws:</b> Lacked pre-admission scores.</p> <p><b>Inconsistency:</b> Curriculum discrepancies limit multi-institutional information</p> <p><b>Indirectness:</b> None</p> <p><b>Imprecision:</b> None</p> <p><b>Publication bias:</b> None</p>

Burns S. M. (2011). Predicting academic progression for student registered nurse anesthetists. <i>AANA journal</i> , 79(3), 193–201. Ortega, K. H., Burns, S. M., Hussey, L. C., Schmidt, J., & Austin, P. N. (2013). Predicting success in nurse anesthesia programs: an evidence-based review of admission criteria. <i>AANA journal</i> , 81(3), 183–189.					
Purpose	Variables Search Strategies	Setting/Subjects Number and Type of Studies in the Review Including Sample Sizes	Measurement and Instruments	Results Conclusions	Evidence Quality
<p><b>Study One:</b> Determine if a relationship existed between admission criteria (GPA, science GPA, GRE scores, and critical care experience and academic progression (current academic status and GPA)</p> <p><b>Study Two:</b> Examined which factors may help predict student success in CRNA programs &amp; NCE</p>	<p><b>Study One:</b> Primary Outcomes: Determine if a relationship existed between admission criteria and academic progression</p> <p><b>Study Two:</b> <b>Data Bases:</b> PubMed, Cumulative Index to Nursing and Allied Health Literature (CINHAL), Trip, ProQuest, SumSearch, and Google Scholar</p> <p><b>Search Terms:</b> used alone and in combination, include “success in nurse anesthesia programs”, “attrition in nurse anesthesia”, “student registered nurse anesthetist success”, “student registered nurse anesthetist attrition”, “nurse anesthesia education”, “success”, and “national certification exam”.</p>	<p><b>Study One:</b> 914 de-identified student records, 406 represented male students and 508 represented female students</p> <p><b>Study Two:</b> 19 lower level evidence sources we located in the literature search. 8 sources involved solely graduate NAPs, 9 involved graduate nursing programs without SRNAs or did not indicate whether the programs included SRNAs, and 2 pertained to graduate nursing programs with SRNAs</p>	<p><b>Study One:</b> Analysis of the data was performed using the Statistical Package for Social Sciences software; Correlation statistics were used to test hypotheses set at the level of significance &lt;.05</p> <p><b>Study Two:</b> Most of the evidence was from descriptive studies. Overall the evidence was of low quality and usually contained small sample sizes from retrospective observational studies</p>	<p><b>Study One:</b> Relationship between admission science GPA and current GPA, admission GPA and current GPA, total GRE score and current GPA, significant inverse relationship between number of years of critical care experience and current GPA.</p> <p><b>Study Two:</b> Undergraduate GPA and undergraduate science GPA or nursing GPA are best supported by evidence to predict success in the nurse anesthesia and graduate nursing programs. The GRE is supported by some investigators, but the most recent investigators found it to be less predictive</p>	<p><b>Study One:</b> <b>Methodological flaws:</b> <b>Inconsistency:</b> variations in nursing education, coursework taken in a variety of settings; variance in critical care experience <b>Indirectness:</b> none <b>Imprecision:</b> Current GPA requested was represented at varying points in the NAP. <b>Publication bias:</b> none</p> <p><b>Study Two:</b> <b>Methodological flaws:</b> small sample sizes from retrospective observational studies <b>Inconsistency:</b> Literature suggest need for additional studies <b>Indirectness:</b> none <b>Imprecision:</b> opposing results with some studies <b>Publication bias:</b> none</p>
<p><b>Design</b></p> <p><b>Study One:</b> Quantitative correlational study</p> <p><b>Study Two:</b> Literature Review</p>	<p><b>Limits:</b> 1980 to 2011, English language, peer reviewed journals,</p> <p><b>Reviewers:</b> Evidence was evaluated and leveled according to the system proposed by Melnyk and Fineout-Overholt</p>			<p><b>Implications</b></p> <p><b>Study One:</b> Statistically significant relationship exists between the admission selection criteria and academic progression, also GPA and science GPA predicted academic progression.</p> <p><b>Study Two:</b> No consensus on the admission factors predicting success. Further studies should include more detailed assessment of each criterion required</p>	