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Integration of Gastric POCUS

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NURS 785: DNP Project III

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DNP Scholarly Project Final Approval Form

UNIVERSITY of SAINT FRANCIS

DNP Scholarly Project Proposal Initial Approval

To: Matthew Aaron Harber, DNP-NAP Student

From: Dr. Susan Lown, Course Coordinator NURS 715

Re: DNP Project Proposal Review Council Endorsement

Date: 11-12-2020

DNP Scholarly Project Title: Integration of Gastric POCUS

DNP Scholarly Project Review Council:

DNP Project Advisor Signature:

Dr. Marsha King, Associate Professor Division of Nursing and Dean Crown Point Campus

DNP Project Proposal Review Council Member Signature:

Dr. Gregory Louck, Assistant Professor Division of Nursing and Assistant Director Nurse Anesthesia Program

DNP Project Proposal Review Council Member Signature:

Dr. Susan Lown, Associate Professor Division of Nursing

Date of initial approval by DNP Scholarly Project Review Council: Initial review 11-12-2020 – 12-6-2020 Required revisions noted:

1 - Student File
2 - Attached to Proposal

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Executive Summary

Problem

DNP Project Problem Statement

There is limited education and utilization of gastric point of care ultrasound (POCUS) in anesthesia practice for objective assessment of the gastric vault. Anesthesia-related gastric pulmonary aspiration is a rare yet severe complication with potentially life-threatening consequences (American Society of Anesthesiologists (ASA), 2017; Bynum & Pierce, 1976; Gagey et al., 2018; Nason, 2015). Nothing by mouth (NPO) guidelines, subjective patient NPO status assessment, and rapid sequence intubation (RSI) have limitations in attenuating pulmonary aspiration (Algie et al., 2015; ASA, 2017; Birenbaum et al., 2018, Putte et al., 2018). Utilization of gastric point of care ultrasound or POCUS can provide objective data allowing for adjustment in the anesthesia plan of care (Cieslak, Rice, Gadsden, & Vacchiano, 2020). Even with this evidence, there is limited education and utilization of gastric POCUS in anesthesia practice for objective assessment of the gastric vault (De Marchi, & Meineri, 2017).

PICO Question (Population (P), Intervention (I), Comparison (C), Outcome (O))

For SRNAs (P), would education (I-1.), and a G. POCUS workshop (I-2.), increase understanding and use of G. POCUS (O-1.), enable correct assessment of the gastric vault (O-2.), and increase planned future incorporation of G. POCUS into SRNA clinical residency or in future clinical practice (O-3), compared to no education and G. POCUS workshop (C)?

Background of the Problem

Nothing by mouth (NPO) fasting guidelines have limitations and are often inaccurate with specific diagnoses. Cricoid pressure may not be as effective as once believed to prevent gastric aspiration. Utilization of gastric POCUS can provide objective data allowing for adjustment in the anesthesia plan of care. Methods often used to decrease the occurrence of

pulmonary aspiration include NPO fasting guidelines, pharmacologic agent administration, and alternative rapid sequence intubation (RSI) anesthesia induction. There are limitations to NPO status, pharmacologic agent administration, and RSI. The patient-provided NPO status assessment is subjective, may be fabricated by the patient, and thus has limitations that can lead to false assumptions that the gastric vault is empty (Putte et al., 2018). The patient may have a known or unknown medical condition(s) that may delay gastric emptying and increase the time needed for an empty stomach (Jayaram et al., 1997; Zhou et al., 2019). The use of RSI involves the use of cricoid pressure; recent studies have shown that cricoid pressure may not be as effective as previously historically indicated to prevent gastric aspiration (Algie et al., 2015; Birenbaum et al., 2018). However, bedside gastric POCUS can provide objective data allowing for adjustment in the anesthesia plan of care.

Needs Assessment/ Practice/Knowledge Gap

As noted in the problem statement, there are limitations to current clinical practice methods for assessing fasting status and constraints to attenuating the potential pulmonary aspiration from a full stomach. There is significant data that gastric POCUS provides objective data and improves the assessment, yet it is rarely incorporated into education or clinical practice (De Marchi, & Meineri, 2017).

Gaps in the literature and practice are as follows. Gastric POCUS is not currently taught at the University of Saint Francis. There is no nationally standardized curriculum for POCUS in anesthesia, including gastric POCUS (De Marchi, & Meineri, 2017). However, this will soon begin to change as the COA (Council on Accreditation of Nurse Anesthesia Educational Programs) for nurse anesthesia programs will be including ultrasound in university education requirements. Also, no recommendations or guidelines currently exist regarding the utilization

of gastric POCUS from the American Society of Anesthesiologists or the American Association of Nurse Anesthetists. In April 2020 American Association of Nurse Anesthetists (AANA) Journal did contain an article recommending gastric ultrasound to be an ability of all anesthesia providers (Cieslak, Rice, Gadsden, & Vacchiano, 2020). While ultrasound does provide an objective assessment of the gastric vault, no studies exist that determine if it limits pulmonary aspiration; ultrasound data does allow for adjustment of anesthesia timing and techniques. Along with solid evidence of clinical gastric ultrasound utility, there is a recent movement towards integrating POCUS nurse anesthesia education by the COA and into clinical practice by the ANAA. However, like most nurse anesthesia programs, gastric POCUS is not incorporated into the Doctoral of Nursing Practice, Nurse Anesthesia curriculum at the University of Saint Francis.

DNP Project Overview

Statement of Project Design Type

The project was a quality improvement project design with a pretest and posttest with multiple interventions project design. Intentions were to show that both didactic education and psychomotor hand-on skills lab interventions will increase gain scores and achieve the intended aims and outcomes. Only quantitative measures were used. Gain Scores of baseline data comparison to post-implementation of data comparison were used.

Scope of Project

The purpose of integrating the gastric POCUS project was to increase its clinically relevant use in anesthesia education and anesthesia practice. A lack of education and clinical use of gastric POCUS remains despite solid evidence of the superior gastric vault assessment data it provides. The project ideally aimed to show how educational and workshop project interventions increased understanding of the underlying education for the use and purpose of

POCUS, enabling accurate assessment and increasing planned usage of POCUS among SRNAs in future clinical residency and practice. The substantial evidence, relevance to practice due to changes and tailoring the anesthesia plan in up to 71% of cases (Alakkad et al., 2015), a 95% accurate assessment of the gastric vault after education, including a scanning lab (Arzola et al., 2013, Terkawi et al., 2013), and ability to perform a scan in less than five minutes (El-Boghdadly, Kruisselbrink, Chan, & Perlas, 2016), will support the translation of evidence and encourage USF SRNA students to incorporate gastric POCUS into future practice. This gastric POCUS project can be extrapolated to other nurse anesthesia programs and practicing CRNAs or other anesthesia providers.

Stakeholders

Primary project stakeholders include members of the project team, the project manager, Aaron Harber, SRNA, project advisor; Dr. King, practice mentors; Dr. Osborne, Dr. Louck, academic advisor; Dr. Louck. The BSN-DNP nurse anesthesia program, the graduate and doctoral of nurse practice department, the Department of Nursing, the School of Health Sciences, University of Saint Francis, staff and students within these areas, and local customers/ patients. Possible stakeholders can be extended past micro and meso systems to the anesthesia community and the patients with which the gastric POCUS integration could impact.

Evidence of Training in Human Subject Protection

CITI training was completed by April 14th, 2020; certificates of completion are listed in Appendix A.

Letter of Support from Project Facility

Project site implementation occurred at the University of Saint Francis (USF) Fort Wayne. Project subject participants were the USF DNP-NAP students in the second year (A2s).

A letter of support was received in September 2020 from Dr. Harrel, Dean of College of Health Sciences, and Dr. Richey, Vice President for Academic Affairs, listed in Appendix B. There are no other sites of DNP project implementation.

Budget and Resources

Cost

Project cost is minimal; it will likely cost less than $75.00 total as most of the resources are inexpensive or are indirect costs with minimal direct costs. The total project cost for the project manager's cost will be less than $75.00. Indirect and in-kind costs include the salary of USF DNP Advisor Dr. King, USF Anesthesia Staff Dr. Osborne, and Dr. Louck, along with startup costs and materials and supplies costs. The budget table is listed in Appendix C.

Description of Resources

Resources are listed in Appendix C, D, E, F, G, and H. Resources include pre and post-survey/ quizzes, three ultrasound scanners, ultrasound scanning gel, sanitizing supplies and alcohol hand gel, personal protective equipment (PPE), USF room & infrastructure for the workshop, statistical product and service solutions (SPSS) software; along with USF DNP advisor Dr. King, practice mentors Dr. Osborne and Dr. Louck, a subject matter expert (Dr. Louck), three volunteers who are scanned, and the USF A2 cohort project participants.

Process and Outcomes

General Timeline

Project implementation took place on Thursday, February 4th, 2021, from 5:00 pm to 6:00 pm. The overall time frame for data collection was two months, starting January 28th to March. The initial data collection was a demographic survey. The timing of data collection occurred at two data points; before interventions (emailed PowerPoint education and workshop) and

immediately after the workshop intervention. The gastric POCUS project is dependent on the A2s already having an initial baseline understanding and experience with the use of ultrasound, the scanner, machine, concepts, etc. (but not any education or scanning related to gastric POCUS as this will be done by the DNP project manager). This baseline education and psychomotor skills occurred in the USF course "Nurs 610, Regional Anesthesia Techniques & Pain Management." It was required that the gastric POCUS project implementation begun after the Nurs 610 course was complete, allowing students to have had hands-on time to develop psychomotor skills. The timing of each data point for each variable examined are as follows; two data collection times will occur, the first in late January that included the demographic survey and online pre-survey/ quiz. The second occurred February 4th, 2021, after the workshop and included the post online survey/ quiz. Late January 2021 functioned to distribute and collect the online demographic survey data and the online pre-survey/ quiz, both via Microsoft Forms. Next, within one week, an online gastric POCUS education tutorial was emailed to all the A2s. The emailed gastric POCUS tutorial was the educational PowerPoint over gastric POCUS. The hand on skills workshop took place on February 4th, 2021; this is the workshop intervention. The workshop was immediately followed by an online post online survey/ quiz, which Microsoft Forms again recorded.

Project Setting

The gastric ultrasound project was accepted for implementation at the University of Saint Francis. It utilizes technology to enhance traditional methods, which results in improved assessment and treatment for care, advancing the practice of nursing. Its purpose aligns with various values, goals, missions, outcomes, and doctoral of nursing practice (DNP) essentials.

Participant Inclusion/Exclusion Criteria

As previously stated, the gastric POCUS project is dependent on the A2s already having an initial baseline understanding and experience with the use of ultrasound, the scanner, machine, concepts, but without any education or scanning specific to gastric POCUS. The ten A2 students of the USF 2022 cohort meet these inclusion criteria. All A2 students meet these criteria meets the exclusion criteria.

What the Participants Are Expected to Do

Subject participants were expected to take an anonymous demographic survey, which had randomly assigned private ID numbers for them to remember. Immediately following the demographic survey is the online pre-survey/ quiz via Microsoft Form that participants took anonymously with their private ID number. Within one week of the pre-survey, participants received a gastric POCUS educational PowerPoint for self-study. After self-study and on February 4th, a hands-on workshop was held where participants practiced psychomotor scanning abilities on at least one volunteer who has fasted for 8 hours, one volunteer that has recently eaten within 8 hours, and one volunteer that had drunk fluids within 2 hours of gastric ultrasound. These three volunteers were not study participants, and all three were A3 students. Immediately following the workshop, an online post-survey/ quiz via survey monkey was available to be done. This concludes the subject participant's involvement in the DNP project. Risks for the three scanning model volunteers are also minimal as the scanning is noninvasive and often less than five minutes per scan. All attending the workshop used the current social standard of personal protective equipment, including masks and gloves and handwashing.

Length of Time Required from Participants

The demographic survey, pre and post online survey/ quiz took less than 14 minutes to complete on average. The hands-on gastric POCUS workshop took about one hour. Self-study

on the provided gastric POCUS educational material took about less than 20 minutes, putting the total to 1 hour and 34 minutes.

Setting for Data Collection

Demographic data, pre and post online survey/ quiz data were all performed online via Microsoft Forms. The timing of these data collections are prior and post interventions. The demographic data and online pre-survey were done online. The post-survey was also completed online.

Risk Analysis, Informed Consent Procedures, Participant Protection

Risk Analysis

Gastric ultrasound is a rapid, noninvasive exam that does not cause any immediate or long-term risk to volunteers being scanned or to A2 subject participants. Social distancing guidelines were maintained along with the use of masks and gloves as needed, alcohol gel, and access to a sink and soap; this met guidelines to mitigate possible risks of COVID-19 transmission. To maintain modesty, the scanning volunteers were appropriately covered besides the area of the abdomen being scanned. Informed consent was obtained from scanning volunteers and subject participants. Study deception is not required and will not be used in this project. No audio, video or any other forms of recording were used for this project. The informed consent A2 participants and volunteers are listed in Appendix D, E, respectively.

Methodology

Implementation Methods

Aim one was to increase understanding of the underlying education for the use and purpose of gastric POCUS and increase confidence in the hands-on use of gastric POCUS**.**

Outcome/ indicator 1a was; the subject participant's understanding of the underlying education for the use and purpose of gastric POCUS and confidence in the hands-on use of gastric POCUS will increase from baseline to post-project interventions and before mid-spring 2021. This is an interval level of measurement. The statistical test used gain scores and was be obtained by pre and post Likert scale scores. Gain score benchmarks were set at a 70% increase.

Aim two was to enable the correct assessment of the gastric vault. Outcome/ indicator 2a was; the subject participants were able to correctly assess the gastric vault and its contents with increases from baseline to post-project interventions and before Mid-spring 2021. The level of measurement is nominal. The statistical test used gain scores and was obtained by pre and post-nominal scale scores. Final benchmarks for all students were set at 90% (correct answers). Gain score benchmarks were set at a 50% increase.

Outcome/Indicator 2b was; based on the gastric POCUS the subject participants ability to determine if the patient is classified as a full stomach with increases from baseline to post-project interventions and before Mid-spring 2021. The level of measurement is nominal. The statistical test used gain scores and were obtained by pre and post-nominal scale scores. Final benchmarks for all students will set at 90% (correct answers). Gain score benchmarks were set at a 50% increase.

Aim three was to increase the planned future incorporation of gastric POCUS into SRNA clinical residency or in future clinical practice. Outcome/Indicator 3a was; the subject participants plan to incorporate gastric POCUS in clinical residency as students, with increases from baseline to post-project interventions and before Mid-spring 2021. The outcome/ indicator 3b was; the subject participants plan to incorporate gastric POCUS post-graduation into clinical practice as CRNAs from with increases from baseline to post-project interventions and before

Mid-spring 2021. This level of measurement is interval. The statistical test used gain scores and were obtained by pre and post Likert scale scores. Gain score benchmarks were set at a 70% increase.

The intervention plan was to have two interventions. After the demographic survey and presurvey/ quiz, pertinent gastric POCUS education was disseminated via PowerPoint and email for participants to read and self-study, this education is the first intervention. The second intervention was a hands-on gastric POCUS workshop that allowed observation, demonstration, and practice of psychomotor abilities and application of didactic education to psychomotor scanning skills. Scanning took place on three volunteers who have different NPO status, one who has fasted for eight hours, one that has recently eaten within eight hours, and one that has drunk fluids within 2 hours of gastric ultrasound.

Measures/Tools/Instruments

Demographic and pre and post-survey/ quiz data were collected via Microsoft Forms and transcribed to paper and to SPSS (Statistical Product and Service Solutions). This allowed a backup of data and statistical analysis of data. A Likert scale and score were assigned to answers, and a gain score was used to analyze changes from online pre-survey/ quiz and online post-survey/ quiz. To ensure confidentiality, subject participants are given a private ID number and are asked not to share this. This ID number will link to demographic/ and pre and post-survey/ quiz data while maintaining anonymity. The anonymous demographic questionnaire, and pre and post online survey/ quiz, are listed in Appendix F, G, respectively.

Evaluation Plan

Methods of collection of data, confidentiality, data access, data storage, and data analysis have already been discussed to some extent. For further clarity of the “Measures/ Tools/

Instruments" section, a random ID number was assigned when the participant first takes the anonymous survey; this was the only method of tracking for data. Subject participants were instructed not to share this private information. These ID numbers were not available after all data analysis is complete. These methods protected the participant's responses and maintained confidentiality. Data was collected and analyzed only internally by the project manager. Data was recorded and stored initially by Microsoft Forms, then on SPSS software and a paper data/answers log. Data was removed from Microsoft Forms once data was transferred to SPSS and a paper data/answers log. This anonymous data was stored on my password-protected computer; the physical record was kept locked in my residence. At the initiation of the initial survey (the demographic survey) anonymity is established and maintained for the remaining data collection. The data linked to the ID was stored beginning at the start of project data collection until August 31st, 2021. Disclosure of feedback or debriefing will be available to the subject participants as is to the general public and at the same time as project release. The project is not experimental, so manipulation was not used.

Additional Information

Although unlikely, it is possible the USF DNP NAP faulters before being entirely taught out. In that case, the gastric POCUS DNP project could have been adapted to another nurse anesthesia program. It was also essential to consider the unprecedented impact of COVID-19 as it halted many organizations, including schools. Many schools shifted to online or hybrid formats during this project, and many functioned with new social distancing guidelines. In the COVID-19 restricted social environment, the workshop could have been performed virtually as a backup option. These were the worst-case scenarios that seem unlikely; even still, project completion in these settings were possible with adaptability and tenacity.

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Integration of Gastric POCUS

Chapter One: Introduction

Problem

Problem Statement

There is limited education and utilization of gastric point of care ultrasound (POCUS) in anesthesia practice for objective assessment of the gastric vault. Anesthesia-related gastric pulmonary aspiration is a rare yet serious complication with potentially life-threatening consequences (American Society of Anesthesiologists (ASA), 2017; Bynum & Pierce, 1976; Gagey et al., 2018; Nason, 2015). Nothing by mouth (NPO) guidelines, subjective patient NPO status assessment, and rapid sequence intubation (RSI) have limitations in attenuating pulmonary aspiration (Algie et al., 2015; ASA, 2017; Birenbaum et al., 2018, Putte et al., 2018). Utilization of gastric point of care ultrasound or POCUS can provide objective data allowing for adjustment in the anesthesia plan of care (Cieslak et al., 2020). Even with this evidence, there is limited education and utilization of gastric POCUS in anesthesia practice for objective assessment of the gastric vault (De Marchi & Meineri, 2017).

PICO Question (Population (P), Intervention (I), Comparison (C), Outcome (O))

For SRNAs (P), would education (I-1.) and a gastric POCUS workshop (I-2.) increase understanding and use of gastric POCUS (O-1.), enable correct assessment of the gastric vault (O-2.), and increase planned future incorporation of gastric POCUS into SRNA clinical residency or in future clinical practice (O-3), compared to no education and no gastric POCUS workshop (C)?

Background of the Problem

NPO fasting guidelines have limitations and are often inaccurate with certain diagnoses.

Cricoid pressure may not be as effective as once believed to prevent gastric aspiration. Utilization of gastric POCUS can provide objective data allowing for adjustment in the anesthesia plan of care. Methods often used to decrease the occurrence of pulmonary aspiration include NPO fasting guidelines, pharmacologic agent administration, and alternative RSI anesthesia induction. There are limitations to NPO status, pharmacologic agent administration, and RSI. The patient-provided NPO status assessment is subjective, may be fabricated by the patient, and thus has limitations that can lead to false assumptions that the gastric vault is empty (Putte et al., 2018). The patient may have known or unknown medical conditions that may delay gastric emptying and increase the time needed for an empty stomach (Jayaram et al., 1997; Zhou et al., 2019). The use of RSI involves the use of cricoid pressure; recent studies have shown that cricoid pressure may not be as effective as historically indicated to prevent gastric aspiration (Algie et al., 2015; Birenbaum et al., 2018). However, bedside gastric POCUS can provide objective data allowing for adjustment in the anesthesia plan of care.

The Practice and Knowledge Gap and Needs Assessment

As noted in the problem statement, there are limitations to current clinical practice methods for assessing fasting status, along with limitations to methods in attenuating the potential pulmonary aspiration from a full stomach. There is significant evidence that gastric POCUS provides objective data and improves the assessment, yet it is rarely incorporated into education or clinical practice (De Marchi & Meineri, 2017).

Gaps in the literature and practice are as follows. Gastric POCUS is not currently taught at the University of Saint Francis. There is no nationally standardized curriculum for POCUS in anesthesia, including gastric POCUS (De Marchi & Meineri, 2017). However, this will begin to change as the Council on Accreditation of Nurse Anesthesia Educational Programs (COA) will

be including ultrasound in university education requirements. Also, no recommendations or guidelines currently exist regarding the utilization of gastric POCUS from the American Society of Anesthesiologists or the American Association of Nurse Anesthetists. In April 2020, the American Association of Nurse Anesthetists (AANA) Journal did contain an article recommending all anesthesia providers be trained in gastric ultrasound (Cieslak et al., 2020). While ultrasound does provide an objective assessment of the gastric vault, no studies exist that determine if it limits pulmonary aspiration; ultrasound data does, however allow for adjustment of anesthesia timing and techniques. Along with strong evidence of clinical gastric ultrasound utility, there is a recent movement towards integrating POCUS techniques into nurse anesthesia education by the COA, and into clinical practice by the ANAA. However, like most nurse anesthesia programs, gastric POCUS is not incorporated into the Doctorate of Nursing Practice, Nurse Anesthesia curriculum at the University of Saint Francis.

DNP Project Overview

Scope of Project

The overall time frame for data collection was one to three months, starting in January 18th, 2021, and ending in February 2021. Twelve A2 participant consents and three A3 ultrasound scanning model consents were sent out on January 18th 2021. At the University of Saint Francis, Nurse Anesthesia Program (USF NAP), A2s are juniors, and A3s are senior NAP students. The timing of data collection occurred two times, before interventions (emailed PowerPoint education and workshop) and immediately after the workshop intervention. This gastric POCUS project was dependent on the A2s already having an initial baseline understanding and experience with the use of ultrasound, the scanner, machine, concepts, etc., but not any education or scanning related to gastric POCUS as this training was completed by the

DNP project manager. This baseline education and psychomotor skills occurred in the USF course "NURS 610: Regional Anesthesia Techniques & Pain Management." The gastric POCUS project implementation began after students have had hands-on time to develop psychomotor skills. The timing of each data collection point for each variable examined was as follows: the first occurring in early February included the demographic survey and online pre-survey/quiz, and the second occurring later in February 2021 after the workshop and included the online post-survey/quiz. In early February 2021, the project manager distributed and collected the online demographic survey data and the online pre-survey/quiz, both via Microsoft Forms. Next, within one week, an online gastric POCUS education tutorial delivered via PowerPoint was emailed to all the A2s. The timing of the hands-on skills workshop took place in February 2021 and was adjusted to accommodate the clinical site rotations and the A2's schedules. This was the workshop intervention. The workshop will be immediately followed by the online post-survey/quiz, which Microsoft Forms again collected.

Project Setting

The gastric ultrasound project was accepted for implementation at the University of Saint Francis. Demographic data and online pre- and post-survey/quiz data was collected online via Microsoft Forms. The timing of these data collections was both before and after interventions. The demographic data and online pre-survey were completed synchronously in a USF classroom after one of the A2s courses. The online post-survey was be done in the same USF regional classroom after each of the A2s finish the workshop. The workshop location was performed in the basement of the USF Dormer building in a larger classroom.

Participant Inclusion/Exclusion Criteria

As previously stated, the DNP gastric POCUS project depended on the A2s already

having an initial baseline understanding and experience in ultrasound, including psychomotor abilities with the ultrasound probe, ultrasound machine, and ultrasound concepts, but without any education or scanning specific to gastric POCUS. The twelve A2 NAP students of the USF 2022 cohort met these inclusion criteria. Anyone that did not meet these criteria was excluded from participation. The audience for this project was any nurse anesthesia student, including those at USF, SRNAs at other universities, and any practicing CRNAs. The gastric POCUS quality improvement project aimed to show how educational and workshop interventions increased understanding of the underlying knowledge for the purpose and use of POCUS, enabled accurate assessment, and increased planned usage of POCUS among SRNAs in future clinical residency and practice, because of this aim, the project can be extrapolated to any SRNA at other anesthesia programs and practicing CRNAs who are new to gastric ultrasound.

A2 NAP participants completed an anonymous online demographic survey, which randomly assigned a private ID number for A2s to remember. The private ID established immediate anonymity and moving forward in the project. Immediately following the demographic survey was the online pre-survey/quiz that A2s took anonymously with their private ID number. Within one week of the online pre-survey/quiz, A2 participants received a gastric POCUS educational PowerPoint for self-study. After self-study and at a later date, a hands-on workshop was completed where A2 participants practiced psychomotor scanning abilities on at least one volunteer who had fasted for eight hours, one volunteer that had recently eaten within eight hours, and one volunteer that had drunk fluids within two hours of gastric ultrasound. The three ultrasound scanning model volunteers were not study participants, all three were senior A3 NAP students. Immediately following the workshop, an anonymous online post-survey/quiz via Microsoft Forms was completed by each of the A2s. This concluded the A2

participants' involvement in the DNP project. Risks for A2 participants and A3 volunteers were minimal as gastric POCUS scanning is noninvasive, and often less than five minutes per scan. All attending the workshop used the current social standard of personal protective equipment, including masks and gloves and handwashing. The demographic survey, pre- and post-online survey/quiz took about twenty minutes. The hands-on gastric POCUS workshop took about thirty-five minutes. Self-study on the provided gastric POCUS educational material took less than twenty minutes, putting the total to one hour and fifteen minutes.

The purpose of the integration of the gastric POCUS project was to increase its clinically relevant use in anesthesia education and anesthesia practice. A lack of education and clinical use of gastric POCUS remains despite the strong evidence of superior gastric vault assessment data it provides. The strong evidence, relevance to practice due to changes and tailoring the anesthesia plan in up to 71% of cases (Alakkad et al., 2015), a 95% accurate assessment of the gastric vault after education including a scanning lab (Arzola et al., 2013, Terkawi et al., 2013), and ability to perform a scan in less than five minutes (El-Boghdadly et al., 2016), supports the translation of evidence and encourage USF SRNA students to incorporate gastric POCUS into future practice. This can be extrapolated to other nurse anesthesia programs and also practicing CRNAs or other anesthesia providers.

Stakeholders

Primary project stakeholders included members of the project team; the project manager; myself, Aaron Harber, SRNA, project advisor; Dr. King, practice mentors and subject experts; Dr. Osborne, Dr. Louck, and academic advisor; Dr. Louck. Along with the USF BSN-DNP NAP, the graduate and doctoral of nurse practice department, the department of nursing, the School of Health Sciences, University of Saint Francis, staff and students within these areas, and

local customers/patients. This can be extended further past micro and meso systems to the anesthesia community and the patients that the gastric POCUS integration project could impact.

Budget and Resources

Cost

Project cost is minimal; the cost was less than an estimated $75.00 in total as most of the resources are inexpensive or are indirect costs with minimal direct costs. The total project cost for the project manager's cost was less than an estimated $75.00. Indirect and in-kind costs include the salary of USF DNP Advisor Dr. King, USF Anesthesia Staff Dr. Osborne, and Dr. Louck, along with startup costs and materials and supplies costs. The budget table is listed in Appendix C.

Description of Resources

Resources are listed in Appendix B, C, D, E, F, and includes pre- and post-survey/quiz handouts, two to three ultrasound scanners, ultrasound scanning gel, sanitizing supplies and alcohol hand gel, personal protective equipment (PPE), USF room and infrastructure for the workshop, statistical product and service solutions (SPSS) software; along with USF DNP advisor Dr. King, practice mentors Dr. Osborne and Dr. Louck, a subject matter expert, A3 scanning model volunteers, and the USF A2 cohort.

Process and Outcomes

General Timeline

Project implementation occurred after approval from the IRB and DNP faculty. The overall time frame for data collection was one to three months, starting from January 18th, 2021, to February 2021. Besides the A2s and A3s consents, the timing of data collection occurred at two data points; before interventions (emailed PowerPoint education and workshop) and

immediately after the workshop intervention. Month two to three allowed for statistical data analysis. The gastric POCUS project was dependent on the A2s already having an initial baseline understanding and experience using ultrasound, the scanner, machine, concepts, etc. (but not any education or scanning related to gastric POCUS as this was done by the DNP project manager). This baseline education and psychomotor skills occurred in the USF course "Nursing 610, Regional Anesthesia Techniques & Pain Management." The gastric POCUS project implementation must begin after this course was completed and after students had hands-on time developing psychomotor skills. The timing of each data point for each variable examined was as follows; two data collection times occurred, the first in late January to February 2021, and included the demographic survey and online pre-survey/quiz. The second occurred in February 2021 after the workshop and included the post online survey/quiz. Late January to February 2021 functioned to distribute and collect the online demographic survey data and the online pre-survey/quiz, both via Microsoft Forms. Next, within one week, an online education tutorial PowerPoint over gastric POCUS was emailed to all the A2s. Implementation of the hands-on skills workshop was timed and adjusted to accommodate the A2s and A3s residency and didactic schedules and took place in February 2021. The workshop was immediately followed on the same date by the post online survey/quiz, recorded by Microsoft Forms.

The Gantt timeline table is listed in Appendix H. DNP courses and project development started in semester two 2019. Year one development included Initial PICOT question development, exploration of potential DNP projects & PICOT questions, and exploration of potential DNP Projects & PICOT questions. The following was completed in year two: the potential gastric POCUS DNP project topic was discovered, problem statement development began, PICOT question was updated, review of literature was performed, the knowledge gap was

identified, proposed recommendation for change to CRNA practice were made, proposed algorithm for use of gastric POCUS was created, gastric POCUS evidence based practice poster was presented, initiation of ongoing scholarly project progress meetings with DNP advisor Dr. King, formulation of a clinical question, analyze a guideline/clinical process to ID areas for change/ID a problem, further data to support clinical question, updated PICO, updated project plan, location, and purpose statement, comprehensive literature search and review, updated gap analysis and framework, residency presentation on synthesis of literature and preliminary gap analysis on gastric POCUS, draft of informed consent, multiple drafts of synthesis of literature, organizational assessment, strengths, weaknesses, opportunities, and threats analysis, risk assessment, budget, timeline development, formation of proposed plan for project aims, outcomes, & procedure, project recognized as quality improvement plan, creation of procedure plan, data collection plan, demographic survey, pre and post survey, preliminary data set, data dictionary development, intervention delivery plan, data analysis plan, preliminary data set, and evaluation plan. The following was accomplished in year three; the executive summary, IRB application, initial proposal examination, approval of chapters one, two, three, implementation of chapter five, results, analysis, conclusion, dissemination, chapters four, six, and seven.

Target Population and Setting

The project is based on twelve student registered nurse anesthetists or SRNAs from the third-generation USF junior cohort, the A2s. The target population was the USF NAP A2s. The target population also included any other SRNA of any other nurse anesthesia program or certified registered nurse anesthetist or other anesthesia providers with a baseline ultrasound education and hands-on ultrasound skills. In other words, the target population applies to student anesthesia providers or practicing anesthesia providers with some ultrasound experience but do

not yet have education and experience in gastric ultrasound.

The gastric ultrasound project was accepted for implementation at the USF. It utilizes technology to enhance traditional methods, which results in improved assessment and treatment for care, advancing the practice of nursing. Its purpose aligns with various values, goals, missions, outcomes, and Doctoral of Nursing Practice (DNP) Essentials. Overall, the culture and assessment of the USF present a supportive and committed positive environment for DNP project development and deployment. The program's strengths outnumber the program's weaknesses.

Expected Outcomes

Aim one was to increase understanding of the underlying education for the use and purpose of gastric POCUS, and increase confidence in the hands-on use of gastric POCUS**.** Aim two was to enable the correct assessment of the gastric vault, including the vault's contents and classification of a full or safe vault volume. Aim three was to increase the planned future incorporation of gastric POCUS into SRNA clinical residency or future clinical practice. Corresponding outcome/indicators, timeline of intervention and measures, level of measure, form of statistical test/tool, and percentage goal increases in outcomes are listed in chapter three, methodology.

Risk Analysis, Informed Consent Procedures, Participant Protection

Risk Analysis

Gastric ultrasound is a rapid, noninvasive exam that does not cause any immediate or long-term risk to A3 scanned model volunteers being scanned or to A2 participants. Social distancing guidelines will be maintained along with the use of masks and gloves as needed, alcohol gel, and access to a sink and soap; this helped mitigate possible risks of COVID-19

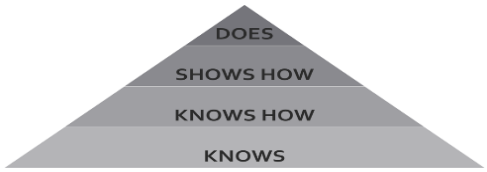
transmission. To maintain modesty, the scanning volunteers were appropriately covered besides the abdominal areas that were scanned. Informed consent forms were used to gain consent for A3 scanning volunteers and A2 participants. Study deception is not required and was not used in this project. No audio, video or any other forms of recording were used for this project. The informed consents for A2 participants and A3 volunteers are listed in Appendix D, E, respectively.

Chapter Two: Synthesis of Supporting Evidence and Project Framework

Relevant Theory and Model

Currently, there is no standardized curriculum for POCUS and no guidelines for the use of gastric POCUS from the ASA or AANA. There is a lack of education on gastric POCUS for CRNAs and SRNAs. This effectively creates a practice gap between facility practice and integration of gastric POCUS. Gastric ultrasound is not a requirement for anesthesia curriculum. Due to this lack of education and exposure to the topic, it is reasonable to assume this may be a contributing factor on why anesthesia providers are unfamiliar with the topic and do not incorporate it into clinical practice. According to Millers education, four essential phases must take place and include “knows”, “knows-how”, “shows-how”, and “does”. All four of these phases must be completed before education can be integrated into clinical practice. Millers model is relevant to this project because SRNAs were provided with education or the “know”. SRNAs then “know-how” and “show-how” in the gastric POCUS workshop by utilizing education with psychomotor abilities. This will allow the SRNAs to consider incorporation of gastric POCUS into clinical residency and into practice or the “does”.

Figure 1
Millers Educational Model



Theory

A relevant theory for the implementation of this project is the Promoting Action on Research Implementation in Health Services (PARIHS). The PARIHS theory has been utilized to help empower the learners of gastric POCUS. The PARIHS framework was originally crafted in 1998 by Kitson, Harvey, and McCormack (Rycroft-Malone, 2004). A large project team has since worked the PARIHS framework in its ongoing development that was led by Jo Rycroft-Malone (Rycroft-Malone, 2004). Possibly the simplest visual representation of this would be a three-circled Venn diagram. Figure 2 is a diagram example of the PARIHS framework shown on the next page. Each circle represents a concept of either the evidence, the facilitation, or the environment. Moving inward there is an overlap of the three circles (elements), each having their own axis (White, Dudley-Brown, & Terhaar, 2016). The further inward the stronger that individual element is and the more it overlaps with the other elements.

Figure 2

Venn Diagram of The PARIHS Framework

Note. The three major concepts of the PARIHS framework.

The first major concept of the PARIHS framework is evidence, which is defined as a blend of research, clinical experience, patient experience, and regional information (Sudsawad, 2007). There is a range of higher-quality evidence and lower quality evidence. A higher-quality would include a quality valued evidence, it is well understood, delivered well, with a strong clinical decision, strong relevance, with the incorporation of regional data evaluation (White, Dudley-Brown, & Terhaar, 2016). For example, gastric ultrasound has strong evidence, would require use by an educated SRNA's, the patient experience would be incorporated, and local data or education on the topic would need to be understood.

Context is the second major concept of this framework. Context pertains to the translation of gastric point of care ultrasound or POCUS implementation. This includes physical locations, various characteristics, boundaries, processes, patterns of power and authority, culture, resources, and translation feedback and evaluation (Sudsawad, 2007). For gastric POCUS, context would include the actual site of the project which is USF. Context for residency or practice; would include perioperative locations, anesthesia care models, leadership, and anesthesia policies.

The final third concept is facilitation and is a notable concept for the gastric POCUS integration project. Facilitation is defined as methods made by an educator to make things easier for others (Sudsawad, 2007). This would include education and simulation on gastric POCUS but includes purpose, roles, skills, or the why and the how. This facilitation empowers the SRNAs involved in the translation of evidence. Concept three has a major relationship to the DNP portion of the Gastric POCUS educational project. The gastric POCUS project was a workshop to assess, educate, empower and reassess the SRNAs or CRNAs. Evidence and

context concepts are also as mentioned above, yet the translation of this evidence to practice shows the importance of major concept three, facilitation.

Additional Concepts

There are also relevant underlying foundational and supportive concepts from the DNP education and the American Association of Colleges of Nursing (AACN's) essentials of doctoral education for advanced nursing practice. DNP practices involves the scholarship of teaching, and is an essential component of the project (Holly, 2018). DNP practices also involves the scholarship of implementation, it is practical and seeks to solve problems, such as the implementation of the integration of gastric POCUS project (Holly, 2018). The DNP is a terminal degree for the advanced practice registered nurse (APRN). APRNs including CRNAs are highly educated and prepared providers. This education prepares APRNs with unique abilities that are useful in addressing this and other gaps. The DNP education and the AACN's essentials of doctoral education for advanced nursing practice will enable APRNs to be the link to implement various healthcare improvements, such as the translation of gastric POCUS (Zaccagnini & White, 2017). APRNs are ideally positioned to be a leader in multidisciplinary teams to assess and overcome barriers to successfully implement solutions (Zaccagnini & White, 2017). Along with DNP essentials, scientific underpinnings, APRNs have developed other attributes such as nursing intuition. Nursing intuition includes traits such as pattern of recognition, similarity recognition, common sense and understanding, skilled know-how, sense of salience, and deliberate rationality, which will be useful in the implementation and translation of gastric POCUS project (Holly, 2018).

Literature Review

Major Topics and Sub-Topics

To better understand the significance that gastric POCUS has on an improved assessment of the gastric vault it is important to understand related factors and limitations of common methods used in current practice to mitigate pulmonary aspiration or its effects. This includes NPO guidelines, subjective patient NPO status assessment, and RSI. Research of literature was performed on multiple relevant topics on gastric ultrasound. Literature search terms included at least; Ultrasound Gastric Anesthesia, Gastric Volume Ultrasound, Anesthesia Induction Aspiration, Anesthesia Induction Gastric Ultrasound, Anesthesia Induction Pulmonary Aspiration, Anesthesia Induction Aspiration Incidence, Pulmonary Aspiration Complications, Gastric point of care ultrasound, and Gastric POCUS. Multiple literature databases and guideline searches were used and included; Cochrane Database of Systematic Reviews, Dynamed, TRIP Database, Emcare, CINAHL Plus, National Institute of Health and Clinical Excellence, the American Association of Nurse Anesthetists, and the American Society of Anesthesiologists.

Anesthesia Safety

Anesthesia safety has progressively increased from the 1970s to 1995, further improvements can still be made. Closed claim cases from the 1970s included 667 claims or 12% of the 5,480 cases recorded (Posner, 2001). The 1980s resulted in 2,935 cases or 54% of closed claim cases (Posner, 2001). Most closed claim cases that occurred in the 1990s were before 1995, there were 1,784 cases in the 1990s or 33% (Posner, 2001). Of the 1970s claims 64% were permeant, disabling or caused death, 56% were due to brain damage or death (Posner, 2001). In the 1990s 57% of cases were temporary and non-disabling, with death and brain

damage dropping to 32% from 56% (Posner, 2001). Now and historically anesthesia safety has been improving, but improvements can still be made.

In the 1990s esophageal intubation, difficult intubation, and inadequate ventilation decreased to 14% of claims from 36% of claims in the 1970s (Posner, 2001). Cardiovascular events, medication errors, and equipment failure claims remain nearly the same. Other recorded injures in the 1990s included nerve injury at 21%, airway injury at 8%, burns and skin inflammation at 6%, awareness and emotional distress at 5%, eye injury at 5%, backache at 5%, headache at 4%, pneumothorax at 4%, aspiration pneumonitis at 3%, and newborn injury 1.5% (Posner, 2001). Consequences from aspiration pneumonitis can be minor to severe, including death.

Pulmonary Aspiration

Anesthesia-related pulmonary aspiration is rare, occurring in 0.03-0.05% of cases and 0.15% of emergency surgical cases (Neilipovitz & Crosby, 2007). Though rare, anesthesia-related gastric pulmonary aspiration is a serious complication with potentially life-threatening consequences (Bynum & Pierce, 1976; Gagey et al., 2018; Nason, 2015; ASA, 2017).
From a retrospective study, 50 patients were found to have similar clinical signs and symptoms all related to the aspiration of gastric contents. Some of these signs and symptoms included fever, tachypnea, diffuse rales, and serious hypoxemia (Bynum & Pierce, 1976). One-third of cases presented with cough, cyanosis, wheezing, and apnea (Bynum & Pierce, 1976). Early hypoxemia, apnea, and shock were the most concerning signs (Bynum & Pierce, 1976). Patient outcomes can be divided into three paths. Pathway one, 62% had quick clinical and radiographic improvement within four and a half days (Bynum & Pierce, 1976). Pathway two, 26% had quick improvement but then worsened clinically and radiographically, of this 26%, greater than 60%

died (Bynum & Pierce, 1976). Pathway three, once gastric aspiration and chemical pneumonitis occurred, up to 12% of patients died (Bynum & Pierce, 1976).

Increased volume and decreased acidic pH pulmonary aspirates are more harmful. Known as Mendelson criteria, a pH less than 2.5 or aspirate volume greater than 2 ml/kg or about 25 ml will cause pulmonary acid-aspiration syndrome (Roberts & Shirley, 1974). These values were obtained and translated from animal studies (Roberts & Shirley, 1974). To reduce the complications of pulmonary gastric acid aspiration from occurring, treatment is centered around aspiration prevention and reduction of gastric volume and acidity.

Effectiveness of NPO Fasting Guidelines

Current anesthesia practice guidelines recommend a fasting period and consideration of pharmacologic agents to reduce the risk for nausea and vomiting and decreased gastric volume and pH (ASA, 2017). When viewing the current ASA pharmacologic agents and NPO fasting guidelines the reader will notice there are limitations due to exclusion of patients with multiple comorbidities, such as conditions that delay gastric emptying or fluid volume, patients with potentially difficult airways, and emergent populations (ASA, 2017). Unfortunately, some of these patient populations have an increased risk of pulmonary aspiration and would benefit from a follow-up study including these populations. The ASA recommendations are intended for healthy patients that are undergoing elective procedures. ASA recommendations are not intended for patients in labor, and they do not assure total gastric emptying (ASA, 2017).

Numerous studies have indicated that the gastric vault may not be empty despite following NPO guidelines. Postpartum women may still have gastric food particles and that there is a slowed gastric emptying of solid food in the postpartum time (Jayaram et al., 1997). In another study of 116 patients aged 2-17 requiring sedation, gastric POCUS was used to observe

the relationship between fasting times and gastric content. Gastric POCUS classified many of these patients as full stomach even after fasting guidelines were adhered to (Leviter et al., 2019). Meaning that fasting times are not a reliable indicator of an empty stomach (Leviter et al., 2019). The use of gastric POCUS may change the provider's risk vs benefit view for procedural sedation (Leviter et al., 2019). In another study in 2011, two-hundred patients followed the standardized ASA fasting protocol. Using preoperative gastric POCUS, one-hundred-and-seven patients were found to have no or almost no gastric content, one was found to have minimal amounts of gastric content, seven patients had amounts past safe limits, and one of these seven experienced significant aspiration (Anahi et al., 2011).

A common disease that delays gastric emptying is type two diabetes mellitus (DM). In a study of fifty-two DM type two patients and fifty non-DM patients; delayed gastric emptying was investigated in patients getting elective surgery with gastric POCUS. It was noted that DM type two patients have longer gastric emptying times (Zhou et al., 2019). Almost half of them had emptying times lasting longer than the standard NPO guidelines (Zhou et al., 2019). Based on these findings, preop gastric POCUS is suggested in type two DM patients, especially those with DM related eye disease (Zhou et al., 2019).

Cricoid Pressure

Cricoid Pressure History. Cricoid pressure also has limitations. The literature will be reviewed on the following incorrect or unproven assumptions; cricoid pressure compresses the esophagus, cricoid pressure reduces the risk of pulmonary aspiration, landmark technique can accurately identify cricoid cartilage, cricoid pressure should almost always be administered during RSI. The first reported data of using something like cricoid pressure or CP occurred in a letter written by Dr. Collin in 1776. Dr. Collin described what is effectively known as CP to

reduce or stop stomach insufflation of air during lung reinflation in drowning victims. A Dr. Monroe noted that by providing CP air that is blown into the mouth by bellows or by mouth is not allowed into the gulled; proper pressure on the cricoid cartilages should be applied as to not obstruct the dorsal larynx (Matioc, 2016). This method would later also be known as the Sellick maneuver, which is CP adapted for use during induction of anesthesia. CP and Sellick maneuver are terms often used interchangeably. Some current airway societies view CP more importantly as a method to mitigate gastric insulation during emergent ventilation.

In a study of twenty-six high-risk patients, patients were intubated using CP, twenty-three of the patients had no gastric regurgitation or vomiting before during or after intubation (Sellick, 1961). Three patients had gastric or esophageal content in the oral pharyngeal area post releasing CP (Sellick, 1961). Also, with several volunteers, they showed that CP obstructed the esophageal lumen. This was demonstrated with a soft contrast filled latex tube that was placed in the patient's esophagus at 100 cm of water (Sellick, 1961). Standardized CP and training were limited (Sellick, 1961). The conclusion was that CP consistency prevents aspiration and should be considered in all high-risk patients and should be taught to providers of airway management (Sellick, 1961). It is important to understand the assumption that the esophagus is dorsal to the cricoid ring so CP will completely occlude the esophageal lumen and prevent gastric aspiration.

Cricoid Pressure Mechanism. In a 2003 observational study using an MRI, only one of twenty-two subjects showed the esophagus at the cricoid thyroid C6-7 level (Smith et al., 2003). In eighteen subjects the cricoid thyroid muscle was found to be at the level of cricopharyngeal muscle which is about 1 to 1.5 cm higher than the esophagus (Smith et al., 2003). Without CP about half of the patient's esophagi were lateral to cricoid ring, and with two-handed CP 91% of the patient's esophagus was displaced laterally (Smith et al., 2003). This implies that the

esophagus is not occluded with CP (Smith et al., 2003).

In a 2009 study of twenty-four adults, imaging with and without cricoid pressure was utilized in the sniffing neutral position and extended neck position. The study demonstrated that there is no lateral movement post cricoid hypopharynx and esophagus was not present at the level of the cricoid cartilage, showing consistency with the previous 2003 study (Rice et al., 2009). They showed viable compression post cricoid hypopharynx even though the hypopharynx rings are lateral to the vertebral body (Rice et al., 2009). With CP there is compression of the hypopharynx and interruption of the lumen from the stomach to oropharynx (Rice et al., 2009). Imaging also showed that the cricoid ring and hypopharynx are an anatomical unit irrespective of neck position (Rice et al., 2009).

While what is occurring during CP may not exactly be what Dr. Sellick hypothesized was occurring, effectively CP still appears to occlude the lumen between the oropharynx and the gastric lumen. In 2014, 79 patients were induced with anesthesia (Zeidan et al., 2014). While using a video laryngoscope with CP at 30 newtons of force, an oral gastric tube was attempted to be passed (Zeidan et al., 2014). CP did not allow the gastric tube to be passed no matter the relative position of the esophagus to the cricothyroid, showing that the CP was effective (Zeidan et al., 2014). Though CP prevented the tube from passing oropharyngeal to the gastric lumen, it may be unclear if this suffices in the representation of the prevention of aspiration (Zeidan et al., 2014).

Cricoid Pressure Accuracy and Consistency. There is a concern if the cricoid landmark is correctly being identified for proper CP. A multicenter prospective cohort study of the accuracy of conventional landmark technique for cricoid localization using ultrasound scanning of 100 patients found that 41% of the time the qualified anesthetic assistant using the

cricoid cartilage landmark technique was off by greater than five millimeters. This may result in an ineffective CP maneuver (Lee et al., 2018). A further study would need to prove this is why CP may be ineffective. Authors of the study speculate that claims of ineffectiveness of cricoid pressure may be due to incorrect identification (Lee et al., 2018). If cricoid pressure is being contemplated, ultrasound should be considered (Lee et al., 2018).

Another concern is how does one know if they are providing 30 newtons of CP during RSI. There is a lack of consistency in training, but there is an inexpensive method for the provider to develop this psychomotor skill. The 50-milliliter syringe as an inexpensive training aid in the application of cricoid pressure starts with a syringe at 40ml, occlude it and compress it to about 33ml this is roughly about 30 newtons (Flucker et al., 2018). Before training, only 30% of subjects applied a force between 20-40 newtons (Flucker et al., 2018).

Cricoid Pressure Efficacy. Significant recent studies show that CP may not be superior to placebo intervention and that CP does not provide a difference in aspiration. In 2019 JAMA Surgery journal released results on the large IRIS randomized clinical trial. Including 3,472 subjects, results had a failure to show the non-inferiority of placebo or sham group versus cricoid pressure group to reduced pulmonary aspiration (Birenbaum et al., 2018). In a Cochrane systematic review of 493 records, only one study of 20 patients met the criteria for inclusion (Algie et al., 2015). The purpose was to evaluate all randomized controlled trials of elective or emergent airway management with the use of cricoid pressure vs not using cricoid pressure (Algie et al., 2015). There were no differences in aspiration rates with the use of cricoid pressure (Algie et al., 2015). Based on randomized controlled trials or RCT, cricoid pressure may not be needed for safe rapid sequence intubation, further RCT are suggested (Algie et al., 2015).

Gastric POCUS

Purpose. Fasting time should decrease gastric content. If the patient does not have any medical comorbidities, fasting should correlate to an empty gastric vault. Ultrasonographic measurement of the antral cross-section area may be of notice for the diagnosis of the preoperative gastric status (Bouvet, 2009). Studies showed a significantly smaller gastric area in fasting patients (Bouvet, 2009). Results should be corroborated with further studies (Bouvet, 2009).

Verbal assessment of NPO fasting is noninvasive, bedside gastric ultrasound is also noninvasive but provides objective data on gastric content and volume. Bedside two-dimensional gastric ultrasound can be a noninvasive useful tool to assess gastric content and volume (Perlas, Chan, et al., 2009). Benefits of gastric ultrasound stem not only from its ability to objectively quantify the amount of residual volume in the gastric vault, but to also identify gastric vault content characteristics such as solids and fluid transparency. This qualitative data may be useful to reduce the risk of aspiration, and even more so if the prandial status is questionable (Cubillos et al., 2012). Ultrasound is valuable in detecting gastric fluid (Koening et al., 2011). This may be beneficial to reduce the risk of clinically consequential aspiration (Koening et al., 2011). No patients had complications from scanning and the scans took less than two minutes to complete (Koening et al., 2011). Gastric ultrasound is also very accurate, as it is highly sensitive and specific to detect and rule out a full stomach (Kruisselbrink et al., 2019).

Applicable Patient Population. Gastric POCUS can be performed quickly and on various patient populations. Gastric ultrasound is a quick technique to provide objective data for change in anesthetic management, it is also feasible on pregnant, obese, and pediatric patients (El-Boghdadly, et al., 2016). Gastric ultrasound was studied early in the parturient population as

they are known to develop gastroparesis (Carp et al., 1992). Gastric ultrasound is effective in assessing gastric contents of parturient and volunteers (Carp et al., 1992). A study with 42 pregnant patients determined there is a correlation between obesity and gastric emptying in the pregnant patient (Riveros-Perez et al., 2019). Body mass index (BMI) is an independent predictor of gastric vault size and gastric volume in term pregnant patients (Riveros-Perez et al., 2019). NPO fasting times should be increased for obese and morbidly obese pregnant patients (Riveros-Perez et al., 2019).

Implications to Practice. Point of care gastric ultrasound can be utilized to provide objective data to define gastric content and allow adjustment in anesthesia timing, technique, and potential reduction in surgical delays, morbidity, or mortality (Alakkad et al., 2015). Gastric POCUS provides information on the risk of aspiration and leads to changes in anesthetic management in many patients that did not follow fasting for elective procedures (Alakkad et al., 2015). Post gastric POCUS, changes to timing or induction of anesthesia occurred in 71% of patients (Alakkad et al., 2015). Post gastric POCUS, there was also a net reduction in surgical delays (Alakkad et al., 2015). If the patient requires an urgent surgery but may not meet fasting criteria, it would be reasonable to delay this surgery until the fasting guideline time has passed. However, a rapid bedside gastric ultrasound may reveal that the gastric vault has cleared, and thus would be safe and ideal to proceed with surgical intervention (Falyar & Kantzavelos, 2018).

The use of preoperative gastric POCUS allows the anesthesia provider to decide the most appropriate induction plan of care. In another study, preoperative gastric POCUS was used with 144 children requiring various forms of surgery, some emergent, some non-emergent; the anesthetic plan changed in 67 or 47% of the patients (Gagey et al., 2018). Further studies are recommended to see the effects of gastric POCUS on aspiration rates (Gagey et al., 2018).

Gastric ultrasound may be useful in dubious NPO compliance for tailored care to that individual patient. Anesthesia providers often face dubious fasting adherence (Putte et al., 2018). Gastric POCUS offers data on the gastric contents (Putte et al., 2018). In 37 patients requiring induction for general surgery, 24 cases or 64.9% of the anesthetic management changed with the use of gastric POCUS (Putte et al., 2018). There was also an insignificant delay in cases (Putte et al., 2018). POCUS during pregnancy has a high therapeutic impact on patients as it does in other patient populations (Zieleskiewicz et al., 2018). Further studies are recommended to see the effects of POCUS related to maternal morbidity and mortality (Zieleskiewicz et al., 2018). Viewing the gastric area in the 3rd trimester is more difficult (Zieleskiewicz et al., 2018). The tradition of treating pregnant patients as full stomachs may be aided and challenged by the use of gastric POCUS (Zieleskiewicz et al., 2018).

Measuring Methods. There are various methods to measure gastric volumes in the gastric vault. As previously mentioned, Mendelson criteria is a pH less than 2.5 or aspirate volume greater than 2 ml/kg or about 25 ml will cause pulmonary acid-aspiration syndrome (Roberts & Shirley, 1974). In one study an establishment of a formula method was created to estimate gastric content with the use of gastric ultrasound (Fujigaki, et al., 1993). In another study, the proposed use of a three-point grading system based only on the gastric ultrasound that predicts gastric volume (Perlas, Davis, et al., 2011). The current mathematic model to determine gastric volume based on gastric ultrasound still performs well in the severely obese population with a BMI greater than 35% (Kruisselbrink et al., 2017).

Learning Gastric POCUS. Fortunately, anesthesia providers are often already familiar with ultrasound equipment and interpretation for regional ultrasound-guided blocks. With increased experience in abdominal ultrasonography evaluation of the gastrointestinal tract

becomes easier (Sporea, & Popescu, 2010). Gastric POCUS can be rapidly learned. An anesthesiologist can obtain about a 95% success rate after about 33 examinations (Arzola et al., 2013). With gastric ultrasound education including lab simulation, anesthesia providers can expect a 95% success with correct assessment of the gastric vault (Terkawi et al., 2013). Despite the rapid learning curve and utility of ultrasound for various procedures in anesthesia, POCUS lacks a nationally standardized curriculum for use in the perioperative setting (De Marchi, & Meineri, 2017).

Gaps in the Literature

There are multiple gaps in the literature. As recently stated, there is not a standardized curriculum for POCUS in anesthesia including gastric POCUS (De Marchi, & Meineri, 2017); the COA will be changing this in the future. Though a 2020 AANA journal did recommend gastric POCUS to be an ability of all anesthesia providers; there are no official guidelines that currently exist regarding the utilization of gastric POCUS from the ASA or the AANA. Lastly, while many studies provide data proving gastric POCUS provides clinically relevant objective data, no studies are showing if gastric POCUS reduces the occurrence of gastric pulmonary aspiration.

Summary of Supportive Evidence

An unsafe stomach volume is always a consideration in anesthesia practice. Information on stomach volume and potential for dangerous gastric pulmonary aspiration causes adjustments in anesthesia care. Some of these methods to mitigate the effects of pulmonary aspiration occurrence or its effects have inconclusive evidence. Gastric ultrasound provides objective data, while standard patient interview for NPO status assessment is subjective, and is often inaccurate

with certain health conditions. Gastric POCUS competency is learned quickly, and when used, anesthesia providers more often than not changed their original plan of care.

Chapter Three: Project Design

Methodology

Project Design

This project was a quality improvement (QI) project with a pretest and posttest with multiple interventions. Interventions included gastric POCUS educational PowerPoint that was emailed to project participants and a hands-on gastric ultrasound workshop. Improvements from pre to post-assessments will show that both didactic education and psychomotor hands-on skills lab interventions will increase gain scores and achieve the intended aims and outcomes. Quantitative measures were used. Gain Scores of baseline data were compared to post-implementation.

Ethical Considerations

Gastric ultrasound is a rapid noninvasive exam that does not cause any immediate or long-term risk to A3 volunteers being scanned or to A2 participants. Social distancing guidelines were maintained. Additionally, mask and gloves were used, alcohol gel was available, and participants had access to a sink and soap. These guidelines helped mitigate possible COVID-19 transmission. To maintain modesty, the scanning volunteers were appropriately covered besides the area of the abdomen being scanned. An informed consent was constructed and used to gain consent from scanning volunteers and subject participants. Study deception was not required and therefore not used in this project. No audio, video, nor any other forms of recording were used for this project.

Project Schedule

This is can be viewed in chapter one, page twelve, in the process and outcomes and general timeline section.

Implementation Methods and Process Analysis

There were three major aims of this project. Each aim was be met by implementations, and each of the three aims will be evaluated. There will be two interventions. After the demographic survey and pretest, pertinent gastric POCUS PowerPoint was then disseminated (or distributed) via a PowerPoint by email to the A2s. Participants read and self-studied this PowerPoint. This education is the first intervention. The second intervention was a hands-on gastric POCUS workshop that would allow observations, demonstrations, practice of psychomotor abilities, and application of didactic education to psychomotor scanning skills. Three volunteers were scanned that had different NPO status; one who had fasted for eight hours, one that had recently eaten within eight hours, and one that had drank fluids within two hours of gastric ultrasound.

Aim One focused on increasing the knowledge of the underlying education for the use and purpose of gastric POCUS and increasing confidence in the hands-on use of gastric POCUS**.** Outcome/Indicator 1a measured the participants' understanding of the education for the use and purpose of gastric POCUS and their confidence in the hands-on use of gastric POCUS. This was an interval level of measurement. The statistical test used gain scores and will be obtained by pre and post Likert scale scores. Gain score benchmarks were set at a 70% increase. The Outcome/Indicator 1a was measured by increases from baseline to post interventions by mid-spring 2021.

Aim Two focused on enabling the correct assessment of the gastric vault.

Outcome/Indicator 2a measured the participants' ability to correctly assess the gastric vault and its contents. The level of measurement was nominal. The statistical test used gain scores and was be obtained by pre- and post-nominal scale scores. Final benchmarks for all students were set at 90%. Gain score benchmarks will be set at a 50% increase. The Outcome/Indicator 2a was measured by increases from baseline to post interventions by mid-spring 2021.

Outcome/Indicator 2b measures the participants ability to use gastric POCUS to determine if the patient is classified as a full stomach. The level of measurement was nominal. The statistical test used gain scores and was obtained by pre- and post-nominal scale scores. Final benchmarks for all students were set at 90%. Gain score benchmarks were set at a 50% increase. The Outcome/Indicator 2b was measured by increases from baseline to post interventions by mid-spring 2021.

Aim Three focused on increasing planned future incorporation of gastric POCUS into SRNA clinical residency or in future clinical practice. The Outcome/Indicator 3a measured the participants' plan to incorporate gastric POCUS in clinical residency as students. The Outcome/ Indicator 3a was measured by increases from baseline to post interventions by mid-spring 2021. The Outcome/Indicator 3b will measured the participants' plan to incorporate gastric POCUS post-graduation into clinical practice as CRNAs. The Outcome/Indicator 3b was measured by increases from baseline to post interventions by mid-spring 2021. This level of measurement was interval. The statistical test used gain scores and was be obtained by pre and post Likert scale scores. Gain score benchmarks were set at a 70% increase.

Measures/Tools/Instruments

Demographic and pre- and post-survey/ test data was collected via Microsoft Forms and transcribed to paper and then to SPSS (Statistical Product and Service Solutions), which allowed

for backup of data and statistical analysis. Scores will be assigned to answers, and a gain score was used to analyze changes from online pre-survey/ test to online post-survey/ test. To ensure confidentiality, subject participants were given a private ID number which they were asked not to share this. This ID number was linked to pre- survey and post-survey/ test data which allowed participants to maintaining anonymity. The anonymous demographic questionnaire, pre, and post online survey/ quiz, and SPSS data set table, are listed in Appendix F and G, respectively.

Evaluation Plan

Methods of collection of data, confidentiality, data access, data storage, and data analysis have already been discussed to some extent. For further clarification on the "Measures/ Tools/ Instruments" section, a random ID number was be assigned when the participant first takes the anonymous survey. This will be the only method of data tracking. Subject participants were instructed not to share this private information. These ID numbers were not available after all data analysis was completed. These methods protected the participants' responses and maintained confidentiality. Data was be collected and analyzed only internally by the project manager. Data was recorded and stored initially on Microsoft Forms, then on SPSS software and a paper data/answers log. After data was transferred to SPSS and a paper log, data was removed from Microsoft Forms. This anonymous data was stored on the project manager's password-protected computer. The physical log was kept locked at the residence of the project manager. At the initiation of the initial survey anonymity was established and maintained for the remaining data collection. The data linked to the ID was stored beginning at the start of the project data collection until August 31, 2021. Disclosure of project results was available to the participants at the same time as project release. The project was not experimental so manipulation was not used.

Additional Information

Although unlikely, it is possible the USF DNP NAP falters before being completely taught out. In this case, the gastric POCUS DNP project could be adapted to another nurse anesthesia program. It is also important to consider the recent unprecedented impact of COVID-19 as it halted regular functions at many organizations including schools, which impacted clinical residencies and onsite education. Some schools are currently still online or hybrid and all are functioning with new social distancing guidelines. It is likely even with current social parameters that the workshop can be performed, but virtual backup options are also possible. These are the worst-case scenarios. However, project completion under these circumstances was possible with adaptability and tenacity.

Dissemination Plan

The gastric POCUS project is available in the USF library. The completed project was presented at various mandatory intervals as required by the USF doctoral nursing department. A written executive summary was submitted to the Internal Review Board at USF and is available for stakeholders. Approval feedback was provided from the Internal Review Board in November.

Chapter 4: Results and Outcomes Analysis

Data Collection Techniques

Initially consents were obtained from project participants and from scanning volunteers. Once all consents were obtained, a demographic survey and then a presurvey/ quiz was given to assesses the project participant population and baseline knowledge in gastric ultrasound. Then a PowerPoint education intervention was emailed to participants to increase knowledge in gastric ultrasound. Post the emailed PowerPoint education the second intervention took place on a later

date, project participants practiced in a hands-on workshop intervention. The workshop intervention allowed participants to apply education and practice hands on techniques in gastric ultrasound scanning. After the two interventions methods a postsurvey/ quiz was given to project participants. The informed consents, demographic survey, pre-survey/ quiz, and post-survey/ quiz were all collected by the project manager. These data collection techniques were all collected via an online format, the demographic survey, pre-survey/ quiz, and post-survey/ quiz utilized Microsoft Forms for data collection.

Measures/Indicators

Participant Demographics

All twelve total SRNAs participated in the entire project as project participants, a 100% participation rate. The most common age of participants was age 30-34 (n = 5; 41.7%). Most participants had 4-6 years of experience as a RN (n = 7; 58.3%). Ten participants (83.3%) had worked as a RN in an ICU or ER. No participants (0%) were previously a sonographer or other specialty with ultrasound use. Three participants (25%) had prior ultrasound experience or education as an RN, these participants previously utilized ultrasound with “midline insertion” (n = 1, 8.3%), “IV access/placement” (n = 2, 16.6%). All participants (n = 12, 100%) had completed the required USF ultrasound related course “Nursing 610, Regional Anesthesia Techniques and Pain Management”. Most students (n = 5, 41.7%) had approximately twenty-one or more hours of hands-on ultrasound scanning (all forms: interventional, noninterventional, simulation, clinical). The anonymous demographic complete results with questions, results, percentages and pie charts are available in appendix J, titled Anonymous Demographic Questionnaire.

Pre and Post-Interventions Survey and Quiz Data

Survey question one assessed for aim one: increasing the knowledge of the underlying education for the use and purpose of gastric POCUS and increasing confidence in the hands-on use of gastric POCUS, with the related outcome/indicator 1a. Question one used an interval level of measure that used Likert-scale pre vs post intervention gain scores for statistical measure. Survey questions two, three, four, five, six-a, six-b, assessed for aim two: increasing the correct assessment of the gastric vault, with the related outcome/indicator 2a and 2b. Outcome/Indicator 2a measured the participants' ability to correctly assess the gastric vault and its contents. Outcome/Indicator 2b measures the participants ability to use gastric POCUS to determine if the patient is classified as a full stomach. Survey questions two, three, four, five, six-a, and six-b, used nominal level of measure with pre vs post intervention gain scores for statistical measure. Survey questions seven and eight assessed for aim three: increasing planned future incorporation of gastric POCUS into SRNA clinical residency or in future clinical practice, with the related outcome/indicators 3a and 3b. Survey questions seven and eight used an interval level of measure that used Likert-scale pre vs post intervention gain scores for statistical measure. The questions and results of the pre- and post-interventions survey/ quiz data are listed in appendix K, titled Results and Analysis of Pre and Post-Interventions Survey/Quiz. The left column lists the question number, the pre survey/ quiz results are listed in the prior row with the post survey/ quiz results in the following row. Listed in the following row is related bench mark and gain score results. The last two columns are on the right display results in percentages and pie charts.

Data Analysis Inferences

From the Pre-Interventions Survey/Quiz question-one results, it was inferred that some SRNAs understand underlaying education for the use and purpose of gastric ultrasound, and are confident in the hands-on use of gastric ultrasound prior to interventions. Although (mode n = 5, 41.7% students) most students selected they disagree with understanding these areas. These pre interventions results were higher than expected as none of the SRNAs had prior education or use of gastric ultrasound. The initial goal was to have gain scores to increase by 70% was not met, gain score actually increased by 29.41%. In the Post-Interventions Survey/Quiz question-one results, five SRNAs selected they strongly agree (mode n = 5, 41.7% students) and four selected the agree (33.37% students), and three (25%) of students stated they strongly disagree. Said another way, 75% at least agreed, and 25% strongly disagreed. Overall, in question-one, for the aim-one goal of increasing the knowledge of the underlying education for the use and purpose of gastric POCUS and increasing confidence in the hands-on use of gastric POCUS, there was an improvement in gain scores by 29.41%. These results did not meet goals, but showed improvements for aim one in understanding and use of gastric ultrasound. It can be inferred that not meeting goals was at least partial due to higher-than-expected initial scores, which also do not correlate with prior demographic survey results.

Survey questions two, three, four, five, six-a, six-b, assessed for aim two: increasing the correct assessment of the gastric vault, with the related outcome/indicator 2a and 2b. In question two, 8.3% or one of participants were able to ID an empty gastric vault prior to interventions. In question two, 91.7% or eleven participants were able to ID an empty gastric vault post interventions. Gain scores showed an 83.34% increase, initial goal was set for a 50% increase. The benchmark for correct assessment was set at 90%, this was also met at 91.7% correct

assessment. These results met and exceeded goals, showing improvements for aim two in correct assessment of the gastric vault.

In question three, 25% or three of participants were able to ID a liquid filled gastric vault prior to interventions. In question three, 91.7% or eleven participants were able to ID a liquid filled gastric vault post interventions. Gain scores showed an 66.7% increase, initial goal was set for a 50% increase. The benchmark for correct assessment was set at 90%, this was also met at 91.7% correct assessment. These results met and exceeded goals, showing improvements for aim two in correct assessment of the gastric vault.

In question four, 16.7% or two of participants were able to ID a food/ solid filled gastric vault prior to interventions. In question four, 83.3% or 10 participants were able to ID a liquid filled gastric vault post interventions. Gain scores showed an 66.6% increase, initial goal was set for a 50% increase. The benchmark for correct assessment was set at 90%, this was not meet at 83.3% correct assessment.

In question five, 25% or three of participants were able to ID a full stomach/ non-empty gastric vault prior to interventions. In question five, 91.7% or eleven participants were able to ID a liquid filled gastric vault post interventions. Gain scores showed an 66.7% increase, initial goal was set for a 50% increase. The benchmark for correct assessment was set at 90%, this was also met at 91.7% correct assessment. These results met and exceeded goals, showing improvements for aim two in correct assessment of the gastric vault.

Aim-two outcome/ indicator 2b measures the participants ability to use gastric POCUS to determine if the patient is classified as a full stomach. In question six-a, 8.3% or one of participants were able to ID the correct formulas and calculations for Antral Cross- Sectional Area (CSA), Gastric Vault Volume (GV), and Unsafe/Safe GV level prior to interventions. In

question six-a, 66.7% or eight participants were able to ID the correct formulas and calculations post interventions. Gain scores showed an 58.4% increase, initial goal was set for a 50% increase. The benchmark for correct assessment was set at 90%, this was not met at 66.7% correct assessment.

In question six-b, 33.3% or four of participants were able to were able to classify the stomach based on calculated volume prior to interventions. In question six-b, 58.3% or seven participants were able classify the stomach level post interventions. Gain scores showed an 58.4% increase, initial goal was set for a 50% increase. The benchmark for correct assessment was set at 90%, this was not met at 58.3% correct assessment.

In question seven, prior to interventions it was inferred that the majority of SRNAs planned to incorporate gastric POCUS in clinical residency as a SRNA if the opportunity is available. One SRNA selected they strongly disagree (8.3%), one other stated they were neutral (8.3%). Seven (58.3%) SRNAs agreed, and three (25%) strongly agreed. Post interventions it was again inferred that the majority of SRNAs planned to incorporate gastric POCUS in clinical residency. One SRNA selected they strongly disagree (8.3%), two others stated they were neutral (16.7%). Five (41.7%) SRNAs agreed, and four (33.3%) strongly agreed. Similar to question one, the pre interventions results were higher than expected. The initial goal was to have gain scores to increase by 70% was not met, gain score actually did not change at all (0%).

In question eight, prior to interventions it was inferred that the majority of SRNAs after graduation planned to incorporate gastric POCUS into their clinical practice as a CRNA if the opportunity is available. One SRNA selected they disagree (8.3%), one other stated they were neutral (8.3%). Five (41.7%) SRNAs agreed, and five (41.7%) strongly agreed. Post interventions it was again inferred that the majority of SRNAs planned to incorporate gastric

POCUS into their clinical practice. One SRNA selected they strongly disagree (8.3%), one was neutral (8.3%). Five (41.7%) SRNAs agreed, and four (41.7%) strongly agreed. Similar to question one and seven, the pre interventions results were higher than expected. The initial goal was to have gain scores to increase by 70% was not met, gain score actually decreased by 1%. It can be inferred that not meeting gain goals was at least partial due to higher-than-expected initial scores. Though the goal gain increases were not met for question seven and eight, high initial results were approximately maintained after intervention.

Gaps

All twelve project participants and volunteers competed consents. All twelve project participants completed the demographic survey, this was the first step in data collection, and establish participant anonymity moving forward. All twelve project participants completed the pre intervention survey/quiz. All twelve project participants received the electronic PowerPoint education on gastric POCUS. All twelve project participants attended and participated in the hands-on gastric POCUS workshop. All twelve project participants completed the post intervention survey/quiz. There were no identifiable gaps.

Unanticipated Consequences, Threats, Unforeseen Circumstances, and Corrective Actions

The biggest perceived project threat would have been the inability to implement the gastric POCUS workshop portion due social isolation guidelines from COVID-19. The backup plan for corrective action was to have a Zoom or Microsoft Teams online format for the workshop implementation. However, the USF onsite workshop was able to be implemented. Social distancing guidelines were maintained along with the use of masks and gloves as needed, alcohol gel, and access to a sink and soap, were available and helped mitigate possible risks of COVID-19 transmission. In the project developmental stages, the selected participant population

changed, initially a single hospital anesthesia group or INANA (Indiana Association of Nurse Anesthetists) CRNAs and USF SRNAs and Marion SRNAs, were going to be included in the population. The workshop would have been larger and held at an onsite INANA conference where CRNA and SRNA could participate. However, since COVID-19 has occurred, an onsite INANA meetings have not occurred, and would have been risky to hold such a workshop at a more populated event. Corrective actions were to change the population to only USF A2 students.

Unforeseen circumstances that occurred prior to project approval that caused delays in project advancement were unknown software failure, where recipients did not receive the submitted files. For corrective action, the USF IT department was contacted and able to locate the previously submitted electronic files, this occurred at least twice. The day of the project workshop implementation, there was significant snow accumulation that started a little before the workshop. The project workshop was able keep scheduled time, ending on time, allowing participants to leave before more snow accumulation. Keeping to the scheduled project time served as corrective action.

The timeline for project implementation decreased. Timeline project implementation was affected from prior tech delays, and the primarily online/ offsite format for USF A2 and A3 DNP-NAP students. Flexibility was required and the project implementation timeline was shortened to a DNP residency day where both A2 and A3 students would be onsite, allowing a larger project population, while taking advantage of everyone already being onsite at USF. The later DNP residency date was not chosen as it would have delayed the implantation for weeks.

Expenditures

For more detail expenditures are addressed in the budget and resources section under cost and description of resources. Extensive additional supplies were not required for project implementation. Indirect and in-kind resources, and existing infrastructure were primarily used. Unanticipated purchase of SPSS software was required, this cost the project manager $69.00, an additional $6.00 was used for alcohol gel, and ultrasound scanning gel. In-kind costs with USF subject matter experts for consultation and project involvement along with additional resources totaled to approximately $1,200.

Chapter 5: Leadership and Management

Organizational Culture

Organizational culture can be a supportive or limiting factor in the implementation of a project. Organizational culture along with motivation, mission, leadership, finical stability, management, leadership effectiveness, vision, strategic plan, and history, among other areas are all essential, all are important components to understand and assess when assessing an organization (Moran, Burson, Conrad, 2020). When an organization believes a change will have a positive effect, the culture is often more supportive of the change, and workers are more likely to commit to the change (Ingersoll, Kirsch, Merk, & Lightfoot, 2000). For innovation to occur by change, it is essential that the organization support and commitment to allow workers to inquire and question an organization's methods and problems to facilitate the organization's missions, objectives, enhancing patient care, and nursing practice (Joseph, 2015). Discussed later in the organizational motivation section are the organization's history, mission statement, president's message, religious building blocks, and values that set a positive, welcoming, organizational culture that will support and enhance innovative changes such doctoral projects.

Due to the nature of the gastric ultrasound project, it has been accepted for implementation at the University of Saint Francis. It utilizes technology to enhance traditional methods, which results in improved assessments, changes to the anesthesia plan of care, advancing the practice of nursing. Its purpose aligns with various values, goals, missions, outcomes, and doctoral of nursing practice (DNP) essentials.

There are various organizational assessment frameworks or format tools that can be utilized to provide a guide in establishing a comprehensive assessment. The Universalia Institutional and Organizational Assessment (IOA) Model or framework has been utilized for the assessment of the University of Saint Francis and its Doctoral of Nursing Practice (DNP) Nurse Anesthesia program. Figure 1 is a visual representation of the IOA Model, showing for assessment concepts are related. The visual representation of the IOA Model is shown as a Venn schematic with three overlapping outer circles and a fourth overlapping centered circle. The three outer circles areas are organizational environment, organizational motivation, and organizational capacity. The three areas have embedded factors, that all contribute to the center circle area that is organizational performance.

Figure 1

IOA Model, (Universalia, n.d.).

Organizational Motivation

The University of Saint Francis has a rich and established educational and religious history. The University of Saint Francis was initially founded in 1890 in Lafayette, Indiana (USF, n.d.b). It was founded by the Sisters of St. Francis of Perpetual Adoration that is a congregation of the Roman Catholic Church (USF, n.d.b). The school moved to in 1944 and was known as Saint Francis College (USF, n.d.b). Graduate school was established in 1960, later Cougar's athletics and athletic buildings were added along residency halls (USF, n.d.b). Incorporation of Lutheran College of Health Professions increased enrollment in the nineties, and in 1998 the college was retitled as the University of Saint Francis (USF, n.d.b). In staying modern the University of Saint Francis started online virtual education, and in 2015 celebrated its 125th anniversary (USF, n.d.b). In 2018 the USF opened the doctoral nursing practice nurse anesthesia program; this program will be sunsetting in 2022 but has committed to its values and will righteously teach-out all three cohorts to graduate in 2020, 2021, and 2022 (USF, n.d.c).

The USF has a strong mission, values, and culture that provide organizational motivation. The mission is to lead and serve while having involvement in the community, that is guided by traditional faith and reason (USF, n.d.). Saint Franciscan values provide guiding words and meaning in lives. Saint Francis believed that because God created the earth, nature, and animals, that these natural things were a reflection of God (Brady, & Cunningham, 2019; Brunforte, 2011; Robinson, 1909). Franciscan values include (n.d.a), "Revere the unique dignity of each person, encourage a trustful, prayerful community of learners, serve one another, society, and the church, foster peace and justice, and respect creation" (Franciscan values section). The culture among the campus is one of support and inclusion to the students. The Dr. Paul porter is the director of diversity and inclusion, he supports across campus inclusion, an open campus culture, academic

achievement, retention, individual development, and a diverse population (USF, n.d.e). Together with this educational and religious bedrock, strong community involvement, mission to lead and serve, with cultural support, ensures academic, personal, and professional incentives and rewards. These establish a ground for organizational motivation.

Organizational Capacity

The doctoral nursing practice nurse anesthesia program is structured alongside the graduate nursing department, which also has a master's degree program (USF, n.d.f). The nursing department and nursing programs are structured within the school of health sciences that is within the University of Saint Francis structure. Yet the nurse anesthesia program is also affiliated with the department of nursing and the University of Saint Francis graduate school (USF, n.d.f). At the head of the Division of nursing, is the dean of the school of health sciences and the chief nurse administrator (USF, n.d.f). Besides the School of Health Sciences, there are three other professional schools, the Keith Busse school of business and entrepreneurial leadership, the school of creative arts, the school of liberal arts and sciences (USF, n.d.e). There are also special programs, and over seventy academic programs structured within the educational system of the University of Saint Francis (USF, n.d.e). Within the School of Health Sciences, there are twenty-six different program tract variations for those involved in bachelor of science in health services, an associate of science in nursing, bachelor of science in nursing, master of science in nursing, doctoral nursing practice degree, physical therapist assistant, physician assistant studies, radiologic technology, social work, and surgical technology (Yoder & Arnold, 2019).

The individual Divisions are managed by their directors. Dr. Louck is the graduate NAP director, this position was held by Dr. Osborne who transitioned to a supportive role. Dr. Cotrell

is the assistant director, and Dr. Pashia is an assistant anesthesia professor. Dr. Clark is the Graduate program director of both the doctoral and master's programs. Within the School of Health Sciences, there are a total of one-hundred-thirty faculty members and eight staff members. Human resources of staff members are utilized on boards or committees, project stakeholders, and as instructors, often functioning in multiple roles. For example, Dr. King is the dean of the Crown Point Saint Francis campus, instructs in courses, and also assists students as an academic advisor.

The Dormer building is the home of the School of Health Sciences and the nurse anesthesia program, located at the hundred-acre Fort Wayne campus (USF, n.d.b). Dormer, along with other sites have proper facility management that includes lighting, clean water, electricity, technology management, which includes information systems, equipment, and computer hardware and software. There is a nearby library, many disbursed study areas, chapel, recreation, and exercise areas. The nurse anesthesia students also have anytime access to the Dormer building, this allows the use of shared spaces, classrooms, computers, printers, locked operating room simulation area, and locked nursing laboratory areas. University and program guidelines are transparent and well established in program-specific student handbooks and mentions that any faculty may be contacted for assistance (USF, n.d.f).

External Environment

USF's administrative, legal, social, cultural, and political issues are managed within their appropriate respective areas and in relation to the external macrosystem environment. These areas are rapidly changing in healthcare and nursing. An ever-changing healthcare environment has helped expose a need for improved quality of care with reduced costs, and improved access to care. Advanced practice nurses (APN) are assisting in meeting this need by increasing their

leadership roles, facilitating improvement by working on collaborative teams, and advancing nursing practice. Advancing nursing practice is DNP essential number eight, and it is imperative (AACN, 2006). Historically medically educated physicians were primary providers, however, APRNs have and continue to be taking on these roles in a variety of areas. From an employers' perspective Rob Colcord, CRNA stated, "this program, though new, is built on the University's strong reputation for excellence in nursing education. I eagerly await the time when the first cohort of students graduate and I can hire USF-educated nurse anesthetists (USF, n.d.c).

All of the USF programs meet or exceed the state statues and independent accreditations bodies standards. The University of Saint Francis is accredited by the Higher Learning Commission, Open Pathway along with the Indiana Department of Education, and Indiana State Board of Nursing (USF, n.d.i). Specifically, the doctoral nursing practice nurse anesthesia program received maximum initial accreditation by meeting and exceeding requirements set by the Council on Accreditation for Nurse Anesthesia Education Programs (COA) (Yoder & Arnold, 2019). A site follow-up in 2019 retained these findings for the nurse anesthesia program. The BSN-DNP (bachelors of science in nursing-doctoral nursing practice) nursing anesthesia program curriculum is designed is also in accordance with the Standards on Accreditation of Nurse Anesthesia Educational Programs along with the requirements by the National Board for Certification and Recertification of Nurse Anesthetists (NBCRNA) (USF, n.d.f). The nurse anesthesia program will also provide clinical experiences that meet case requirements established by the NBCRNA (USF, n.d.f).

Project Setting Summary

Overall the culture and assessment of the University of Saint Francis present a supportive and committed positive environment for DNP project development and deployment. There were

some weaknesses and threats including closer of programs and sunsetting of nurse anesthesia program, that showed potential financial instability, no current nurse anesthesia graduate data, online and hybrid formats due to current COVID-19, current COVID-19 environment, protest and the civil unrest environment, no AANA or ANA or USF gastric POCUS guidelines. Potential opportunities include the integration of gastric POCUS into the USF curriculum, integration of gastric POCUS into SRNA practice, integration of gastric POCUS into USF graduate CRNA practice, and integration of gastric POCUS into CRNA practice. Strengths include Catholic Foundation, Franciscan values, rich history, established, mission statement, overall strong culture, commitment to COA, NBCRNA, Standards on Accreditation of Nurse Anesthesia Educational Programs, strong university motivation, organizational capacity, well-established organization, the flexibility of human resources, commitment to students, transparent communications, human and equipment resources for a project can be sourced from USF, support for DNP Advisor, support from DNP project team, strong university graduation pass rates, certification pass rates, and employment rates, strong gastric POCUS evidence for use, increased awareness of gastric POCUS from recent AANA journal article. The worst-case scenario from weakness and threats would be an unplanned program closure resulting in uprooting the DNP project to another anesthesia program, or another unforeseen issue causing project failure. These are unlikely, there is a strong positive culture and environment, and the program strengths outnumber the program's weaknesses.

Change Strategy

The integration of gastric POCUS project is a QI project with substantial evidence. Change is required when attempting to implement an evidence-based practice or a QI initiative (Zaccagnini & White, 2017). As a DNP SRNA change agent this author utilized the classic

Lewin's force field analysis model to facilitate change. The Lewis model conceptualizes driving force for change and opposing forces to resist change, whatever the driving forces may be, they must be greater that the opposing forces for the change to take place (Zaccagnini & White, 2017). Within the Lewis model there are also the stages of unfreezing, moving, and refreezing (Zaccagnini & White, 2017). In application to the gastric POCUS project, unfreezing requires assessing and preparing the A2s to move towards the improvement, moving requires additional driving forces to motivate and empower such as education, EBP data, and a workshop, while removing opposing forces. In order to refreeze, the A2s need to secure the change as in consider integrating gastric POCUS into SRNA clinical residency and future CRNA clinical practice.

Leadership Style

Common forms of leadership include transformational, democratic, laissez-faire, autocratic, servant (Frandsen, 2014). Often areas of concepts and leadership overlap, in this project the author relied supporting the SRNA A2 students by empowering and motivating them with self-directed education and a hands-on workshop, or in a vastly transformational leadership method. Although an outline of education to cover and a timeline was given to A2s, they could study the PowerPoint education and use the workshop as they fit. The PowerPoint education could be said to also have a laissez-faire approach, being more hands off. These methods are in contrast to autocratic methods. Transformational leadership also aligns well with the Promoting Action on Research Implementation in Health Services (PARIHS) framework mentioned in chapter two, which empowers the learners. University of Saint Francis, DNP project advisor Dr. King, and the author and project team leader primarily utilize transformational leadership.

It is important to mention concepts that are essential in quality leadership. Concepts such as emotional intelligence, empowerment, leading throughout one's career, gender perspectives,

innovative technology for sustainable change, provide a deeper but also more complete dive into leadership and advanced nursing practice. These concepts together with the concepts of appreciative inquiry, leadership, management vs leadership, systems thinking, mindfulness, hope, chaos, reflection, meditation, collaboration, innovation, and leaning-in, facilitate analysis and synthesis for understanding the multidimensional complex application of leadership into the practice with the current complex healthcare structures, and across various systems and frameworks of healthcare and nursing. Quantum leadership theory acknowledges healthcare complexity by working from chaos theory where everything is occurring in an uncoordinated manner, but with more practical understanding and application (Grossman & Valiga, 2013, Purnell, 2013). An analogy of quantum theory is that of multiple water streams flowing in a nonlinear direction but eventually coming together as one. Each stream is a separate system or occurrence that will not be linear but will function together with other systems. Chaos often does set the scene for an opportunity in leadership and followership, change and innovation (Grossman & Valiga, 2013). During the DNP project development and implementation there often seemed to many aspects and to-do's that eventually came together.

Interprofessional Collaboration

Interprofessional collaboration among team members of various specialties is essential to successful care. Unfortunately, the this is made difficult by the increasingly complex healthcare system in the United States. Interprofessional collaboration was also needed for project implementation. Communication, coordination, or collaboration was required with the USF DNP Internal Review Board, the USF School of Health Sciences, DNP project advisor, DNP course professors, A2 participants, and A3 volunteers. Interprofessional collaboration is the teamwork of various providers of different specialties; such as an infectious disease physician,

intensive care unit (ICU) registered nurses, management, an intensivist, an anesthesia provider, and a cardiologist, who all work together to improve ideal care delivery of an individual patient, within a hospital department, or on a larger scale such as national or global populations (White, 2016). While this project did primarily utilize nursing collaboration, the nursing collaboration was among nursing professionals at various professional occupations, abilities, roles, and expertise, facilitating project development and implementation. Literature review did include literate from various professions such as APRNs, CRNAs, emergency medicine physicians, physician anesthesiologists, and sonographers. In collaboration, individual team members contribute their specialized experiences, education, perspectives to better facilitate improvement towards care or other goals (White, 2016).

An important element in interprofessional collaboration is teamwork and a team. Teamworking and team membership integrates various providers to facilitate collaboration to promote efficient patient focused care by overcoming problems (White, 2016). Though interprofessional team members may have different specialties, backgrounds, with different specific roles and responsibilities, each member contributes so the team delivers safe quality care (White, 2016). These individual team member specialists offer area proficiency that is assimilated with others proficiency areas, along with evidence-based practice (EBP) for optimized patient care (White, 2016).

Communication is an essential element of a team needed to produce teamwork. Also, interprofessional communications includes methods that professionals communicate with other team members, other professionals, and also the patient's family and the patient (White, 2016). Self-recognition of a team members specialty can improve an individual's contribution to the team (White, 2016). Healthcare professionals improve communication with active listening of

others thoughts and views, this is aided by use of interaction techniques and communication tools (White, 2016). Effective communication is needed within a team and promotes primary, secondary, and tertiary prevention (White, 2016). Communication failures are a tremendously common cause of medical errors; system design, standardized tools, standardized behaviors, training and simulations, use of critical-language, are effective methods to improve communications and outcomes (Li, Warner, Lang, Huang, & Sun, 2009). Under root cause analysis to determine what system failed, a lack of effective communication was often involved. Approximately 70% of reported events were due to ineffective communication, 75% of these patients expired (Rayan, Hemdan, & Shetaia, 2019). By electronic means, effective communication was maintained throughout the DNP project development with project team members and other resources. Feedback was taken constructively and integrated into project.

Language is only a component of culture, but is a useful way to see broad cultural diversity. Mandarin is the most commonly spoken language in the world, spoken by about 13%, English and Spanish only account for about 5% each, the next seven most common languages each account for less than 3%, however, the remaining 90 plus languages accounts for a significant 39% of language diversity (Purnell, 2003). The United States is very extremely culturally diverse, this is also true for members of the healthcare system (O'Daniel & Rosenstein, 2008). Healthcare team member communication can be less effective due to member cultural differences (O'Daniel & Rosenstein, 2008). Verbal and non-verbal communication is less effective with cultural differences (O'Daniel & Rosenstein, 2008). Cultural differences did not appear to be relevant in results of the project.in the DNP project.

There are continually evolving changes to APRN and CRNA practice. COVID 19 has caused states and federal adjustments to enable ARPNs and CRNAs to practice at the top of their

licenses and often across state boarders. Though this an emergency order, similar changes in legislation via lobbing can improve ARPN and CRNA scope of practice, enabling equality and removing the barrier of established physician hierarchy, thus improving interprofessional collaboration. Utilizing facility cultural recourses can help overcome cultural differences that limit collaboration. Understanding culture with tools like Purnell's cultural framework can also enable the team member to better collaborate.

Conflict Management

Thus far there has been no person-to-person conflicts to resolve within the gastric integration project. Conflict can be defined in many ways, but definitions often include disagreement, negative emotions, interference, disturbance, but can also lead to constructive resolution and enhanced results (Zaccagnini & White, 2017). Changes did occur, such as having the project include the Marion SRNAs, USF SRNAs, and Indiana Association of Nurse Anesthetists (INANA) CRNA's, to only including USF A2 SRNAs, this was due to COVID-19 and the strict social restrictions. This required communication and collaboration with project team members and the USF IRB approval, which did not result in any conflict. Being flexible allowed this and the remaining unforeseen circumstances to be non-conflict issues. There were unforeseen circumstances which did require prior planning to avoid issues, and improvised solutions as unpredictable occurrences happened. A backup plan was to have a Zoom or Microsoft teams' online format for the workshop implementation. However, the USF onsite workshop was able to be implemented. Unforeseen circumstances that occurred and caused delays in project advancement were unknown software failure, where recipients did not receive the submitted files. For corrective action, the USF IT department was contacted and able to locate the previously submitted electronic files, this occurred at least twice.

The day of the project workshop implementation, there was significant snow accumulation that started a little before the workshop. The project workshop was able keep scheduled time, ending on time, allowing participants to leave before more snow accumulation. The timeline for project implementation decreased. Timeline project implementation was affected from prior tech delays, and the primarily online/ offsite format for USF A2 and A3 DNP-NAP students. Flexibility was required and the project implementation timeline was shortened to a DNP residency day where both A2 and A3 students would be onsite, allowing a larger project population, while taking advantage of everyone being already at USF. The later DNP residency date was not chosen as it would have delayed the implantation for weeks. Again, with proper communication and collaboration conflict was mitigated and the project proceeded efficiently.

Chapter 6: Discussion

Impact of Project

Most directly and immediately the SRNA project participants will have acquired the underlying education for the use and purpose of gastric POCUS, along with increasing confidence in the hands-on use of gastric POCUS. The majority of participants can now correctly assess/ identify various gastric vault status, and determine if the gastric vault is at a safe level for non-emergent/ elective anesthesia for surgery. Participants now have had experience with hands-on scanning, assessing, and identification of various gastric vault statuses. Participants are now also aware of the current limitations in both ASA NPO fasting guidelines, and cricoid pressure for attenuating pulmonary gastric aspiration. Participants are also now more aware of patient conditions or comorbidities that increase the likelihood an un-empty/ unsafe gastric vault. Gastric POCUS education will supplement participants clinical judgment, possibly impacting the SRNAs timing of anesthesia and anesthesia plan. The SRNAs exposure to the

gastric POCUS education may also disseminate through clinical residency networking to other SRNAs and anesthesia providers.

Decisions and Recommendations

Recommendations are that participant SRNAs consider integrating gastric POCUS knowledge and clinical skills when clinically appropriate as SRNA and as future CRNAs. Recommendations are also for participant SRNAs to engage in clinical residency dissemination of gastric POCUS knowledge and clinical skills, participants can refer other providers to the related literature. Gastric POCUS provides an improved assessment of the gastric vault by providing rapid bedside objective results. This objective data can supplement the patient assessment and potentially change the anesthesia/surgery timing or anesthesia plan, with the purpose of better tailoring the anesthesia for the patient and providing the safest plan of anesthesia possible. Further recommendations include that gastric POCUS and related literature be utilized in a way that supplements current best practice methods and standards of practice.

Limitations of the Project

Immediately and directly the project only included SRNAs at USF, this limits its impact and dissemination to SRNAs who will remain SRNAs until that cohort graduates in August 2022. The narrow SRNA project participant population limits potential clinical residency integration of gastric POCUS to only anesthesia preceptors and clinical residency sites are receptive. While the benefits of gastric ultrasound evidence are strong, and there is a gradual movement towards standardizing ultrasound education in CRNA programs, and movements towards recommendations for gastric POCUS integration, there are no official recommendations or standards for use of gastric ultrasound by the ASA or AANA. Not having an official recommendation may deter anesthesia providers from integration. Specific to the project results

limitations, the pre interventions results were higher than expected for question one, seven, and eight, resulting in limited gain score improvements. These results did not meet goal gain score, but showed improvements for aim one or were approximately maintained after intervention, for further details please refer to chapter four: results and outcomes analysis. In regards to six questions addressing aim two: increasing the correct assessment of the gastric vault, nine of twelve indicators were met. By not ensuring adequate education review or by not allowing adequate time for SRNAs to review education, delivery and effectiveness may have been further improved.

Strategies for Maintaining and Sustaining, and Application to Other Settings

Lessons Learned

During project development there were many obstacles affecting continued project development. These obstacles included time constraint obstacles such as initial project topic identification, an initial topic needed to be identified prior to further project development. Unknown technology submission faults caused delays and slowed successive portions of the project approval process. A narrowed project date implementation window occurred due to COVID-19 social restrictions. The evening of the gastric POCUS workshop implementation there was limited time for project implantation because of snow storm. COVID-19 also caused the original larger and more diverse intended project participant population (CRNAs and SRNAs from multiple Universities) to be changed to a narrowed USF SRNA population only. The overall lesson learned from these obstacles was to maintain flexibility, seek solutions to keep the project moving successive project goals. Planning for the unexpected is beneficial, having backup plans ensured project momentum. An example of this was the alternative plan for a virtual workshop if COVID-19 social restrictions would have become increasingly restrictive.

In the data analysis section, it is discussed that the Likert-style questions did not meet the intended gain score, this at least partially due to high pre-intervention score. In hindsight it would have been reasonable to set a lower acceptable goal gain score of maintaining (0%) / improving (>0%). Some aim identifiers were also not met, suggesting that something could have been done to improve these areas. As previously mentioned, due to COVID-19 onsite University constraints, and limited dates for project implementation where all required workshop participants were available, the project implementation window was decreased. It is possible that a longer time for review of the PowerPoint educational material may have contributed to better results. A longer workshop that was not limited by an uncontrollable snow storm may have contributed to increased gastric POCUS educational conversations, question and answers, and possibly better results.

American Association of Colleges of Nursing (AACN) DNP essentials are fundamental to project development, the DNP essentials, and extrapolated DNP essentials related concepts, were both triangulated to the gastric POCUS project itself. After project completion, lessons learned related to DNP essentials were accentuated. DNP essential III: "Clinical Scholarship and Analytical Methods for Evidence-Based" is prominent in the development and structure of this quality improvement education related project (AACN, 2006). DNP essential III includes an enlarged perspective and paradigms of scholarship, including more than only new-knowledge, including discovery, synthesis, correlation of facts, integration into practice, problem solving, and dissemination (AACN, 2006). DNP practices involves the scholarship of teaching, and is an essential component of the project (Holly, 2018). DNP practices also involves the scholarship of implementation, it is practical and seeks to solve problems, such as the integration of gastric pocus for improved assessment of the gastric vault (Holly, 2018). DNP essential IV involves the

use of technology for patient care for the transformation and improvement of health care (AACN, 2006). Gastric POCUS is the use of technology at the bedside that transforms and improves the assessment of the gastric vault. DNP essential I is the "Scientific Underpinnings for Practice" (AACN, 2006). The gastric ultrasound and related literature for its use is strong and can be encompassed by the scientific foundation principles of DNP essential I. DNP essential V is titled "Healthcare Policy for Advocacy in Health Care" (AACN, 2006). DNP essential VI is the "Interprofessional Collaboration for Improving Patient and Population Health Outcomes" (AACN, 2006). Related to DNP essential V and VI, gastric POCUS empowers the SRNAs to be change agents to advocate and potentially change local policy related to NPO assessment, while also potentially improving patient specific anesthesia plans. Advancing nursing practice is DNP essential VIII (AACN, 2006). Gastric POCUS supplements DNP education. DNP education and the American Association of Colleges of Nursing's (AACN's) essentials of doctoral education for advanced nursing practice will enable APRN's to be the link to implement various healthcare improvements (Zaccagnini & White, 2017).

Chapter 7: Conclusion

Potential Project Impact on Health Outcomes Beyond Implementation Site

When administering anesthesia, the status of the gastric vault is always of concern. So, in any anesthesia case, including sedation and general anesthesia, there is the potential for integration of gastric ultrasound or gastric point of care ultrasound for an improved and objective assessment of the gastric vault. While improvements could be made to project, results in most areas support that a didactic and hands-on workshop education support the understanding, hands on psychomotor ability, and assessment of varied gastric vault states. The USF SRNAs now have the ability to use this education in clinical residency and in future clinical practice. Also,

these project methods or similar tailored means could be utilized for integration of gastric ultrasound at other anesthesia programs, other nurse anesthesia programs, or with already practicing anesthesia providers.

Health Policy Implications of Project, and Proposed Future Direction for Practice

Even with quality evidence, translation of research to practice is often about 20 years. Early gastric ultrasound research, showing that ultrasound may be useful in assessing the gastric vault started about 20 years ago. With successive research, more utility and quality evidence was built, eventually supporting gastric ultrasounds use for objective assessment data of NPO status. Recently there has been increased interest and support in standardized ultrasound education for CRNA programs, along with multiple AANA journal articles recommending gastric ultrasounds use. If available, logistically feasible, and clinically indicated, there are definite advantages to utilizing gastric POCUS for objective assessment of the gastric vault for NPO status correlation. Currently gastric POCUS can be used to supplement, objectify, and improve the standard current methods of NPO status assessment. In the future it is possible that the AANA, ASA and other anesthesia related organizations may have an official supportive position on gastric POCUS, this would support its integration into practice.

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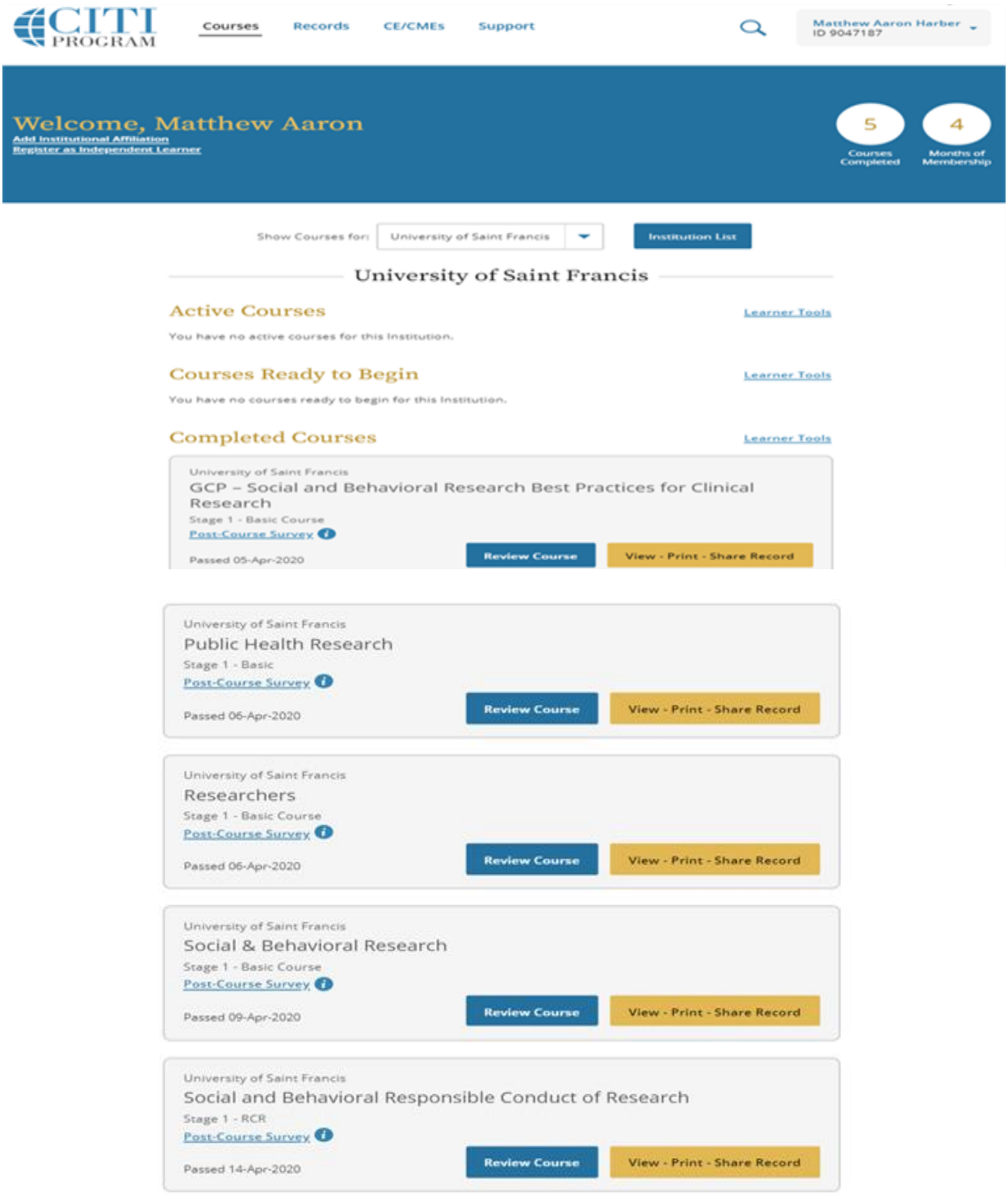
Appendix A


CITI PROGRAM
Courses
Records
CE/CMEs
Support
Matthew Aaron Harber
ID 9047187
Welcome, Matthew Aaron
Add Institutional Affiliation
Register as Independent Learner
5
Courses Completed
4
Months of Membership
Show Courses for:
University of Saint Francis
Institution List
University of Saint Francis
Active Courses
Learner Tools
You have no active courses for this Institution.
Courses Ready to Begin
Learner Tools
You have no courses ready to begin for this Institution.
Completed Courses
Learner Tools
University of Saint Francis
GCP – Social and Behavioral Research Best Practices for Clinical Research
Stage 1 - Basic Course
Post-Course Survey
Passed 05-Apr-2020
Review Course
View - Print - Share Record
University of Saint Francis
Public Health Research
Stage 1 - Basic
Post-Course Survey
Passed 06-Apr-2020
Review Course
View - Print - Share Record
University of Saint Francis
Researchers
Stage 1 - Basic Course
Post-Course Survey
Passed 06-Apr-2020
Review Course
View - Print - Share Record
University of Saint Francis
Social & Behavioral Research
Stage 1 - Basic Course
Post-Course Survey
Passed 09-Apr-2020
Review Course
View - Print - Share Record
University of Saint Francis
Social and Behavioral Responsible Conduct of Research
Stage 1 - RCR
Post-Course Survey
Passed 14-Apr-2020
Review Course
View - Print - Share Record

Appendix B

September 16, 2020

University of Saint Francis Institutional Review Board:

This letter is being written in support of University of Saint Francis NAP/DNP student Matthew Aaron Harber's Doctor of Nursing Practice Scholarly Project entitled *Integration of Gastric Point of Care Ultrasound*. We understand that the aims of the DNP Scholarly Project are to demonstrate how educational and workshop project interventions increased understating of underlying education for the use and purpose of gastric point of care ultrasound, enable accurate assessment, and to also increase planned usage of point of care ultrasound amount student nurse anesthesia students.

The College of Health Sciences and the University of Saint Francis is supportive of the aims of the project. We believe that this project will be beneficial to the students and program as well as provide information that will be beneficial to other CRNA educational programs. We support Mr. Harber's efforts related to point of care ultrasound and nurse anesthesia students. Should this proposal receive approval from the IRB, to whose judgment we defer, we look forward to hearing the results of his project.

Sincerely,

Dr. Angela Harrell
Dean, College of Health Sciences
aharrell@sf.edu

Dr. Lance Richey
Vice President for Academic Affairs
lrichey@sf.edu

2701 Spring Street
Fort Wayne, Indiana 46808
Phone: 260-399-7999
Fax: 260-399-8156
sf.edu

Appendix C

Integration of Gastric POCUS DNP Project Budget

Key/Legend:

Direct Costs
Indirect Costs (Facilities & Administrative Cost)
In-Kind Costs
Revenue
(Potential Cost Savings)
G.POCUS (gastric point of care ultrasound)

DNP Project Expenses				
Salaries and Wages	**Description**	**Year 1, 2020**	**Year 2, 2021**	**Total**
USF DNP-SRNA Project Manager	Myself: Aaron Harber	0	0	0
USF DNP Advisor	Dr. King	*(Salary)*	*(Salary)*	*(Salary)*
USF Anesthesia Staff	Dr. Osborne & Dr. Louck	*(Salary)*	*(Salary)*	*(Salary)*
3 Volunteers Who Are Scanned	TBD	0	0	0
USF A1's Subject Participants	All USF A2 DNP-SRNAs	0	0	0
Total Salary Costs		0	0	0
Startup Costs	**Description**	**Year 1, 2020**	**Year 2, 2021**	**Total**
POCUS Course at USF	Education for project manager, and Practice Mentors Dr. Osborne & Dr. Louck.	0		0
Creation of Email G.POCUS Education	G. POCUS education via power point.	0		0
Creation Pre-Post-Survey/ Quiz	Questions to be loaded up survey monkey.	0		0
Email Disseminated G.POCUS Education	G. POCUS education power point will be sent via email.	0		0
G.POCUS Workshop	USF rooms, and Supplies & Materials listed below.	0		0
Total Start Up Costs		0	0	0
Supplies and Materials	**Description**	**Year 1, 2020**	**Year 2, 2021**	**Total**
Pre-Post-Survey/ Quiz Handouts	Pre is done online, Post is done on paper.	20		20
Ultrasound Scanners (x2 - 3)	Available from USF Anesthesia Department.	0		0
Ultrasound Scanning Gel	2 bottles	5		5

Sanitizing Supplies & Alcohol Hand Gel	To clean equipment & hands.	20		20
Personal Protective Equipment (PPE)	Gloves & Mask (masks to be supplied by USF)	15		15
USF Room & Infrastructure for Workshop	Room(s) to perform workshop	0		0
Total Supplies and Materials		60	0	60
Capital Costs (costs >2,000)	**Description**	**Year 1, 2020**	**Year 2, 2021**	**Total**
Capital Costs	n/a			0
				0
Total Capital Costs				0
Total Expenses		60	0	60
Project Revenue	**Description**	**Year 1, 2020**	**Year 2, 2021**	**Total**
Revenue	n/a	0	0	0
(Average ICU Mechanical Ventilation Cost)	*(Potential per patient cost savings of $47,157)*			*0*
Total Project Revenue		0	0	0
Project Benefit/Loss				
Total Revenue		0	0	0
Less Expenses		60	0	60
Total Project Benefit/Loss		-60	0	-60

Appendix D

Incorporation of POCUS Informed Consent Form for *A2 Participants*, *(page 1 of 3).*

Introduction and Explanation of The Purpose of Project and Interventions.

Hello, I am Aaron Harber, I am a senior SRNA (student registered nurse anesthetist) at the University of Saint Francis, Fort Wayne, Indiana. I am conducting a project for my doctoral of nurse practice (DNP) degree, and I am seeking your participation in this study. I will be receiving support and guidance from my Doctoral project advisor Dr. King.

The purpose of participation and the project will ideally show how educational and workshop project interventions increased understanding of the underlying education for the use and purpose of point of care ultrasound (POCUS), enabling accurate assessment, and to also increase planned usage of POCUS among SRNAs in future clinical residency and practice.

Explanation of Procedures:

1. An online initial anonymous relevant demographic survey will be made available to participants. Participants will be randomly assigned a private ID number for them to remember at this time to protect their anonymity and data. They are not to share this ID number. This should take about 4 minutes to complete.
2. Immediately following the demographic survey, a pre survey/ quiz, will be completed. This will take about 8 minutes. This survey, the demographic survey will both be done online via Microsoft Forms. (1. and 2. will take place in January – February 2021)
3. Within one-week dissemination by email of relevant education in PowerPoint format will be sent to the participants for self-study on their own time, but is to be completed before the workshop. The amount of time to read this will vary but will take about 20 minutes.
4. In February 2021 a hands-on lab skills workshop will be held, allowing participant SRNAs to apply the education to psychomotor skills. The amount of time may vary, but will be about 35 minutes.
5. Immediately following the workshop, the post survey/ quiz completed online via Microsoft Forms.
6. The total amount of participation time required is about 1 hours and 15 minutes, time is divided into the pre survey, self-study, the workshop and the post survey.
7. The duration of intermittent subject participant involvement will be less than 4 months.
8. There will be 12 participants in this project.

Alternative Procedures.

Three volunteers will be noninvasively scanned with ultrasound. To obtain information for this project, there are no alternatives to including SRNAs.

Explanation of The Risks and Benefits of The Research.

1. Currently, there are no foreseeable risks or discomforts, that may be caused by project time requirements, costs, or sensitive questions.
2. There will be no compensation for this project. The participants will benefit from the presentation of data, education, and a workshop; but this is not considered compensation.

(page 2 of 3).

Explanation of The Safeguards.

Full details of the protocols to protect the identity of the project participants:

1. Participants will not be able to be identified directly or indirectly through identifiable information linked to subjects. The initial survey will assign an anonymous ID individual identifier, all the following surveys will also be completed anonymous by using this ID. Microsoft Forms will only have access to this ID, and Participants will use this ID for the remaining data collection.
2. The project manager, myself: Aaron Harber, SRNA will receive the anonymous data assigned only via anonymous ID. Anonymous data will be kept locked in my residence, then deleted or shredded when no longer needed.
3. No identifying data will be included in the project publication.
4. The publish date is to be determined but should be before September 2021.
5. Social distancing guidelines will be maintained along with the use of masks and gloves as needed, alcohol gel, and access to a sink and soap, this will help mitigate possible risks of COVID-19 transmission.
6. To maintain modesty the scanning volunteers will be appropriately covered besides the area of the abdomen being scanned.

Freedom to Withdraw.

1. Participation in the study is entirely voluntary, at any time and for any reason, any participant may choose to withdrawal from the project without any consequences.
2. Scanned Volunteer identity will be kept anonymous by not including their name in the project.
3. The choice to participate, not participate, or withdraw will not change treatment, cause consequences, or loss of benefits that the subject is already entitled to. Withdrawal by student participants will have no impact on their grades or their educational programs. If the subject wants withdrawal from the project, they may choose to not have their data used in the project and the data will be destroyed. With subject permission, the data may continue to be used in the project.
4. Discovery of false data, sharing of individual private ID identifier, or dishonest practices may result in inaccurate data. If appropriate, this may result in the subject’s removal from the project, without the subject's need to consent.

(page 3 of 3).

Offer to Answer Inquiries.

After completion of this project, results can be shared with the participants.

If you have any questions, please contact us at:

Aaron Harber (project manager)
3560 Academic Place Apartment 104
Fort Wayne, IN 46835-5321
USA

As a participant in this project, please call or write to the following contact with any complaints about your treatment.

IRB Chairperson,
University of Saint Francis,
Fort Wayne, IN 46808,
USA
irb@sf.edu

I have received an explanation of this project and agree to participate. I understand that my participation in this project is strictly voluntary.

Name *(Print and Sign)***: _____ Date:_____**

This DNP project has been approved by the University of Saint Francis' Institutional Review Board for the Protection of Human Subjects for a one-year period.

Appendix E

Incorporation of POCUS Informed Consent Form for *Scanning Volunteer,* *(page 1 of 2).*

Introduction and Explanation of The Purpose of Project and Interventions.

Hello, I am Aaron Harber, I am a senior SRNA (student registered nurse anesthetist) at the University of Saint Francis, Fort Wayne, Indiana. I am conducting a project for my doctoral of nurse practice degree, and I am seeking your volunteering as an ultrasound scanning model in this project. I will be receiving support and guidance from my Doctoral project advisor Dr. King.

The purpose of participation and the project will ideally show how educational and workshop project interventions increased understanding of the underlying education for the use and purpose of point of care ultrasound (POCUS), enabling accurate assessment, and to also increase planned usage of POCUS among SRNAs in future clinical residency and practice.

Explanation of Procedures for Scanning Volunteer:

1. In February 20221 a hands-on lab skills workshop will be held, allowing participant SRNAs to apply the education to psychomotor skills on scanning volunteers.
2. The amount of time may vary, but will be about 35 minutes.
3. Each of the three scanning volunteers will have followed different guidelines for scanning, one who has fasted for 8 hours, one who has drank clear liquids within 2 hours, and one who has recently eaten (within 2 hours).
   -These volunteers should not volunteer if they cannot tolerate fasting for 8 hours.
   -Snacks and drinks will be available to the volunteers if they feel as though they can no longer fast.

Alternative Procedures.

Three volunteers will be noninvasively scanned with ultrasound. To obtain information for this project, there are no alternatives to including SRNAs.

Explanation of The Risks and Benefits of The Research:

1. Currently, there are no foreseeable risks or discomforts, that may be caused by project time requirements, costs, or sensitive questions.
2. There will be no compensation for this project. The volunteers will benefit from the exposure to education and a workshop; but this is not considered compensation.
3. Social distancing guidelines will be maintained along with the use of masks and gloves as needed, alcohol gel, and access to a sink and soap, this will help mitigate possible risks of COVID-19 transmission.
4. To maintain modesty the scanning volunteers will be appropriately covered besides the area of the abdomen being scanned.

Explanation of The Safeguards.

Full details of the protocols to protect the identity of the project participants:

1. Volunteers identity will be kept anonymous by not including their name in the project.
2. No identifying data will be included in the project publication.
3. The publish date is to be determined but should be before September 2021.

(page 2 of 2).

Freedom to Withdraw.

2. Participation in the project is entirely voluntary, at any time and for any reason, any participant may choose to withdrawal from the project without any consequences.
3. The choice to participate, not participate, or withdraw will not change treatment, cause consequences, or loss of benefits that the volunteer is already entitled to. Withdrawal by the volunteer will have no impact on their grades or their educational programs. If the volunteer wants withdrawal from the project, they may choose to not have their data used in the project and the data will be destroyed. With the volunteer permission, the data may continue to be used in the project.
4. Discovery of false data, or dishonest practices may result in inaccurate data. If appropriate, this may result in the volunteer's removal from the project, without the volunteer's need to consent.

Offer to Answer Inquiries.

After completion of this project, results can be shared with the subjects and volunteers.
If you have any questions, please contact us at:

Aaron Harber (project manager)
3560 Academic Place Apartment 104
Fort Wayne, IN 46835-5321
USA

As a participant in this project, please call or write to the following contact with any complaints about your treatment:

IRB Chairperson,
University of Saint Francis,
Fort Wayne, IN 46808
USA
irb@sf.edu

I have received an explanation of this project and agree to participate. I understand that my participation in this project is strictly voluntary.

Name *(Print and Sign)***: _____ Date:_____**

This DNP project has been approved by the University of Saint Francis' Institutional Review Board for the Protection of Human Subjects for a one-year period.

Appendix F

Anonymous Demographic Questionnaire, *(page 1 of 2).*

1. What is your age?
   a. 20-24 years.
   b. 25-29 years.
   c. 30-34 years.
   d. 35-39 years.
   e. 40 or greater.

2. Years of experience as a Registered Nurse?
   a. 1-3 years.
   b. 4-6 years.
   c. 7-9 years.
   d. 10 or greater years.

3. Years of experience as a Registered Nurse working in ICU or ER (any form of ICU)?
   a. 1-3 years.
   b. 4-6 years.
   c. 7-9 years.
   d. 10 or greater years.
   e. 0 years.

4. Were you previously a sonographer, or any other specialty with ultrasound use?
   a. Yes. (if yes please write what specialty here: _____)
   b. No.

5. As an RN do you have ultrasound experience or education before "Nurs 610, Regional Anesthesia Techniques & Pain Management"?
   (example: Involvement in IV team or PICC team, etc, with Ultrasound use)
   a. Yes. (if yes please write what experience or education here: _____)
   b. No.

6. Have you received an education course in ultrasound "Nurs 610, Regional Anesthesia Techniques & Pain Management"?
   a. Yes.
   b. No.

7. Approximately how much time have you had hands-on with ultrasound scanning? (all forms: interventional, noninterventional, simulation, clinical)?
   a. An hour or less.
   c. Eleven to twenty hours.
   b. Two to ten hours.
   d. Twenty-one or more hours.

(page 2 of 2).

8. *Your private random ID number is (# 10, 20, 30, 40, 50, 60, 70, 80, 90, or 100). Please do not share this number with anyone and remember it as it will be used later to maintain anonymity for the pre and post online survey/ quiz and tracking study data.*
   Please remember and record this number in a private secure location, it is needed for the two remaining surveys.

Thank you for your participation and time!

Appendix G

Pre and Post Online Survey/ Quiz, *(page 1 of 2).*

Please write your ID number: ___.

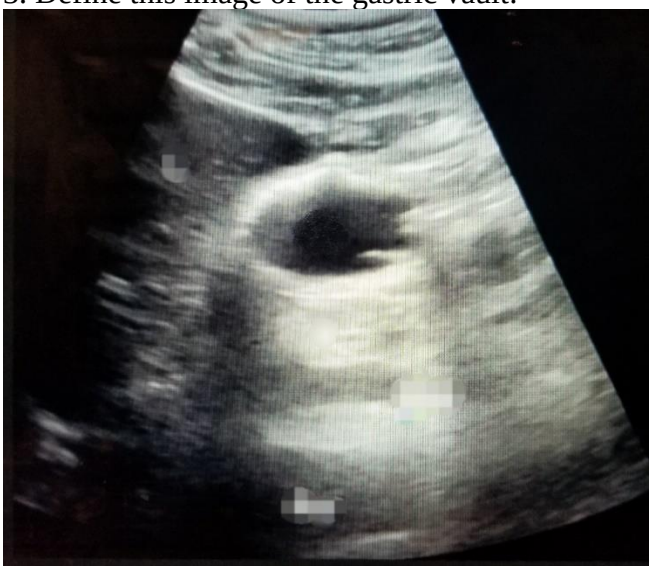
1. Do you understand the underlying education for the use and purpose of gastric ultrasound, and are confident in the hands-on use of gastric ultrasound?

a. strongly disagree
b. disagree
c. neutral
d. agree
e. strongly agree

2. Define this image of the gastric vault:

This gastric vault is:
a. Empty
b. liquid filled/ non-empty
c. food/solids filled/ non-empty
d. this is not a gastric ultrasound
e. I am unsure.

3. Define this image of the gastric vault:



This gastric vault is:
a. Empty
b. liquid filled/ non-empty
c. food/solids filled/ non-empty
d. this is not a gastric ultrasound
e. I am unsure.

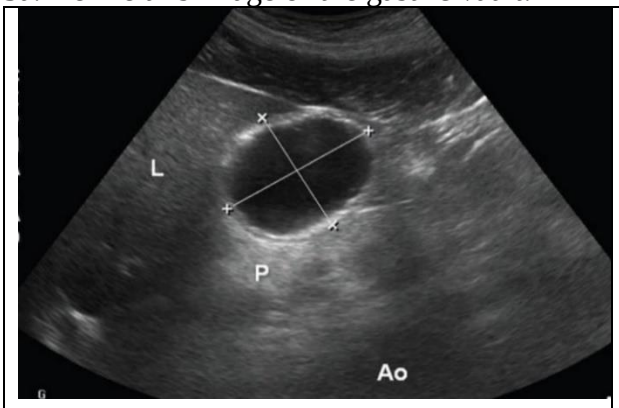
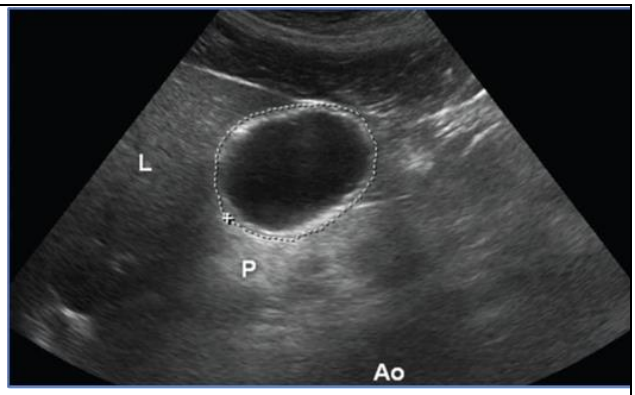
4. Define this image of the gastric vault:

This gastric vault is:
a. Empty
b. liquid filled/ non-empty
c. food/solids filled/ non-empty

d. this is not a gastric ultrasound
e. I am unsure.

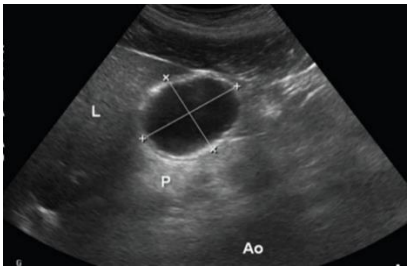
(page 2 of 2).

5a. Define this image of the gastric vault:

	
Method: two perpendicular diameters; cranio-caudal and antero-posterior	Method: free-tracing

The above gastric vault is:
a. Empty
b. liquid filled/ non-empty
c. food/solids filled/ non-empty
d. this is not a gastric ultrasound
e. I am unsure.

5b. The prior image was a liquid filled/ non-empty stomach (same picture shown again below). Select the correct formulas to calculate the antral Cross-Sectional Area, gastric vault volume, and unsafe/safe GV level.



AP= 5cm, CC=5cm. Patient: 20 years old, weight: 80kg.

a.

Step 1: Calculate antral Cross-Sectional Area (CSA): (CSA) = (AP×CC×π)/4 (antral Cross-Sectional Area) = (Antero-Posterior diameter x CranioCaudal diameter x 3.14) / 4	=19.63
Step 2: Calculate Gastric Volume (GV) GV (mL)= 27.0 + 14.6 x Right Lateral CSA – 1.28 x Age (years)	=288ml

Step 3: Calculate unsafe/safe GV in milters. Unsafe gastric volumes greater than 1.5ml/kg pose significant aspiration potential. GV= 1.5ml X patient weight in kg.	=120ml

b.

Step 1: Calculate antral Cross-Sectional Area (CSA): (CSA) = (AP×CC×π) (antral Cross-Sectional Area) = (Antero-Posterior diameter x CranioCaudal diameter x 3.14)	=78.5
Step 2: Calculate Gastric Volume (GV) GV (mL)= 27.0 + 14.6 x Right Lateral CSA – 1.28 x Age (years)	=1,1475ml
Step 3: Calculate unsafe/safe GV in milters. Unsafe gastric volumes greater than 2.0ml/kg pose significant aspiration potential. GV= 2.0ml X patient weight in kg.	=160ml

c.

Step 1: Calculate antral Cross-Sectional Area (CSA): (CSA) = (AP×CC×π)/2 (antral Cross-Sectional Area) = (Antero-Posterior diameter x CranioCaudal diameter x 3.14) / 2	=39.25
Step 2: Calculate Gastric Volume (GV) GV (mL)= 30.0 + 16.0 x Right Lateral CSA – 1.5 x Age (years)	=574.45ml
Step 3: Calculate unsafe/safe GV in milters. Unsafe gastric volumes greater than 1.5ml/kg pose significant aspiration potential. GV= 1.5ml X patient weight in kg.	=120ml

d.

Step 1: Calculate antral Cross-Sectional Area (CSA): (CSA) = (AP×CC×π) x 0.4 (antral Cross-Sectional Area) = (Antero-Posterior diameter x CranioCaudal diameter x 3.14) x 0.4	=3.14
Step 2: Calculate Gastric Volume (GV) GV (mL)= 27.0 + 14.6 x Right Lateral CSA – 1.28 x Age (years)	=47.24ml
Step 3: Calculate unsafe/safe GV in milters. Unsafe gastric volumes greater than 2.0ml/kg pose significant aspiration potential. GV= 2ml X patient weight in kg.	=160ml

e. I am unsure.

5c. Based on the prior calculations the correct calculated gastric volume is 288ml. Knowing gastric volumes greater than a certain ml/kg could pose increased aspiration potential, you can now define this gastric vault as?
Patient is 80kg, calculate to classify vault.
a. Full, the volume is above safe limit recommendations
b. Not empty/ “Safe”, the volume is below safe limits recommendations
c. Empty/ “Safe”, the volume is well below safe limits.
d. I am unsure.

6. If the opportunity is available, do you plan to incorporate gastric POCUS in clinical residency as a SRNA (student registered nurse anesthetist)?
a. strongly disagree
b. disagree
c. neutral
d. agree
e. strongly agree

7. If the opportunity is available after graduation, do you plan to incorporate gastric POCUS into your clinical practice as a CRNA?
a. strongly disagree
b. disagree
c. neutral
d. agree
e. strongly agree

Thank you for your participation and time!

Appendix H

The following Gantt timeline table has been organized by columns by year, semester, and month. The leftmost column lists individual rows with either a DNP related event, DNP course, or DNP project-specific task. DNP project-specific tasks are marked in red as "DNP PROJECT:" These date columns and DNP project rows converge and are marked by colored boxes.

Gantt Timeline

Year #1	Semester #1, Fall 2018					Semester #2, Spring 2019					Semester #3, Summer 2019			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
-University of Saint Francis BSN to DNP in Nurse Anesthesia matriculation														
-Ongoing scientific underpinnings in anesthesia & nursing science courses														

NURS 648 Transition to Doctoral Nursing Practice: Leading EBP Change, Dr. Winegarden														
EDUCATION ▪Scholarly literature & evidence ▪DNP essentials ▪PICOT question ▪Translation ▪EBP														
DNP PROJECT:														
▪Initial PICOT Question Development														
NURS 515 Frameworks & Mmdels for examining nursing practice, Dr. DeKoninck														
EDUCATION ▪Nursing history ▪Theoretical														
Year #1 continued	Semester #1, Fall 2018					Semester #2, Spring 2019					Semester #3, Summer 2019			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
frameworks & models ▪Nursing & related theory ▪Advanced nursing practice problems ▪Concepts related to dissemination & implementation														
DNP PROJECT:														
▪Exploration of Potential DNP Projects & PICOT Questions														

▪Exploration of Potential DNP Projects & PICOT Questions														

Year #2	Semester #4, Fall 2019					Semester #5, Spring 2020					Semester #6, Summer 2020			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
Ongoing Scientific Underpinnings in Anesthesia & Nursing Science Courses														
NURS 524 Translational Science, Dr. Mueller.														
EDUCATION ▪Synthesize ethics, statistics, theory, ▪Advanced nursing practice research ▪Best EBP ▪Analyses of research														
Year #2 continued	Semester #4, Fall 2019					Semester #5, Spring 2020					Semester #6, Summer 2020			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
▪Appraise evidence ▪Information technology														
DNP PROJECT:														
▪G. POCUS Topic Discovered														
▪Problem Statement Development														
▪PICOT Question Changed														
▪Review of Literature														
▪Knowledge Gap														

▪Recommendation for Change to CRNA Practice														
▪Proposed Algorithm for Use of G.POCUS														
▪EBP Poster														
Meeting with DNP Advisor Dr King									With Dr. King, April 15th, 1hr, 15min. Along w/ additional email commun -ications		With Dr. King & Dr. Osborne, May 22nd, 20 min.			
NURS 569 Population Health, Dr. Clark.														
EDUCATION ▪Population health ▪Epidemiological principles ▪Population health systems ▪Ecological models ▪Health risks ▪Disparities ▪Influences on population Health outcomes ▪EBP for health														
Year #2 continued	Semester #4, Fall 2019					Semester #5, Spring 2020					Semester #6, Summer 2020			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
promotion & prevention ▪Intervention models														
NURS 638 Methods for Evidence Based Nursing Practice, Dr. Mueller.														
EDUCATION ▪CITI training ▪Synthesize evidence to ID healthcare problem														

▪Leadership by dissemination of evidence ▪Types of DNP scholarship ▪Translation models & methods ▪Ethics & compliance														
DNP PROJECT:														
▪Formulate Clinical Question														
▪Analyze a guideline/ clinical Process to ID Areas for Change / ID Problem														
▪Further Data to Support Clinical Question.														
▪Updated PICO														
▪Updated Plan														
▪Updated Location														
▪Updated Purpose Statement														
▪Comprehensive Literature Search & Review														
Year #2 continued	Semester #4, Fall 2019					Semester #5, Spring 2020					Semester #6, Summer 2020			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
▪Updated Gap Analysis														
▪Updated Framework														
▪Residency Presentation on Synthesis of Literature & Preliminary Gap Analysis on Gastric POCUS														
▪Draft of Informed Consent														

▪Multiple Drafts of Synthesis of Literature														
▪Scholarly Project Progress Report														
NURS 649 Professional Aspects of Nurse Anesthesia Practice, Professor Louck.														
EDUCATION ▪ AANA wellness modules ▪Prodigy modules ▪CRNA history ▪CRNA billing ▪CRNA business ▪CRNA reimbursement ▪CRNA code of ethics ▪CRNA malpractice ▪CRNA profession advocacy & lobbing														
NURS 745 Health Care Economics, Policy, & Advocacy, Dr. Scalf.														
Year #2 continued	Semester #4, Fall 2019					Semester #5, Spring 2020					Semester #6, Summer 2020			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
EDUCATION ▪Health policy system impact ▪Legislative process ▪Federal register ▪Risk management ▪Workplace advocacy ▪Mock commentary & testimony														

•Legislative policy brief														
NURS 658 Project Management & Interprofessional Collaboration, Dr. King.														
EDUCATION •Interprofessional collaboration •Interprofessional competence •Transformational models •Organizational culture & change •Ethics & Legal Regulation														
DNP PROJECT:														
•Organizational Assessment														
•SWOT Analysis														
•Risk Assessment														
•Budget														
•Timeline														
NURS 710 Evaluation & Improvement of Nursing Practice Outcomes, Dr. Spath.														
Year #2 continued	Semester #4, Fall 2019					Semester #5, Spring 2020					Semester #6, Summer 2020			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
DNP PROJECT:														
•Proposed Plan for Project Aims, Outcomes, & Procedure. *QI Plan. *Aims to Increase Confidence, Planned Usage of G.POCUS, Correct ID of Gastric Vault *Procedure Plan: A Pre & Post														

Survey/Quiz, & G.POCUS Workshop													
▪Advisor Meeting #1 Summary													
▪Advisor Meeting #2 Summary													
▪Data Collection Plan: *A Pre & *Post Survey / Quiz													
▪Demographic Questionnaire Construction: *Integrate w/ Pre-Survey													
▪Data Dictionary Development													
▪ID Instruments or How Outcomes Are Met													
▪Plan Intervention / Delivery Mode: *#1 Email G.POCUS Education. *#2 G.POCUS Workshop.													
▪Data Analysis Plan													
▪Preliminary Data Set													
Evaluation Plan													
Meeting with DNP Advisor Dr King									With Dr. King, April 15th, 1hr, 15min. Along w/ additional email commun -ications		With Dr. King & Dr. Osborne, May 22nd, 20 min.		
▪Scholarly Project Progress Report													
NURS 660 Leadership & Innovation, Dr. Johnson.													
EDUCATION ▪Synthesize evidence in application to advanced nursing													

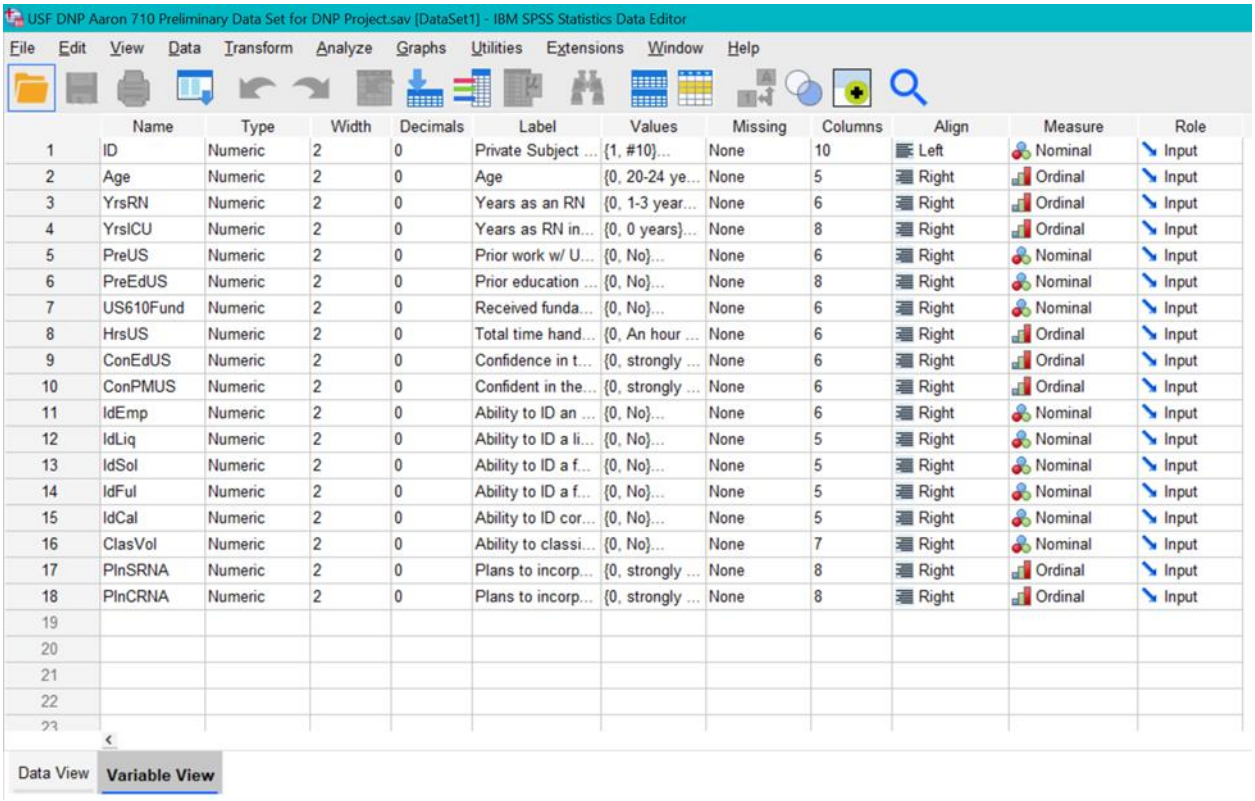
practice •Importance of innovation •Role of leader for innovation & sustainable change														

Year #3	Semester #7, Fall 2020					Semester #8, Spring 2021					Semester #9, Summer 2021			
	Aug 24th	Sept	Oct	Nov	Dec 3rd	Jan 11th	Feb	Mar	Apr	May 1st	May 3rd	June	July	Aug 20th
Ongoing Scientific Underpinnings in Anesthesia & Nursing Science Courses														
NURS 715 DNP Project 1,														
DNP PROJECT:														
•Executive Summary														
•IRB application														
•Initial Proposal Examination														
•Approval – Chap. 1, 2, 3														
NURS 735 DNP Project 2,														
DNP PROJECT:														
•Implementation														
•Chapter 5.														
NURS 785 DNP Project 3,														
DNP PROJECT:														
•Results														
•Analysis														
•Conclusion														
•Dissemination														
•Chap. 4, 6, 7														

Meeting with DNP Advisor Dr King														
-Scholarly Project Progress Report														

Appendix I

SPSS Data Set Table

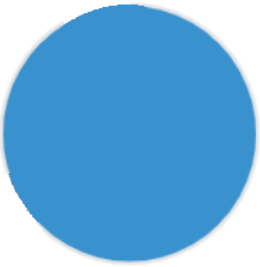


	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	ID	Numeric	2	0	Private Subject ...	{1, #10}...	None	10	Left	Nominal	Input
2	Age	Numeric	2	0	Age	{0, 20-24 ye...	None	5	Right	Ordinal	Input
3	YrsRN	Numeric	2	0	Years as an RN	{0, 1-3 year...	None	6	Right	Ordinal	Input
4	YrsICU	Numeric	2	0	Years as RN in...	{0, 0 years}...	None	8	Right	Ordinal	Input
5	PreUS	Numeric	2	0	Prior work w/ U...	{0, No}...	None	6	Right	Nominal	Input
6	PreEdUS	Numeric	2	0	Prior education ...	{0, No}...	None	8	Right	Nominal	Input
7	US610Fund	Numeric	2	0	Received funda...	{0, No}...	None	6	Right	Nominal	Input
8	HrsUS	Numeric	2	0	Total time hand...	{0, An hour ...	None	6	Right	Ordinal	Input
9	ConEdUS	Numeric	2	0	Confidence in t...	{0, strongly ...	None	6	Right	Ordinal	Input
10	ConPMUS	Numeric	2	0	Confident in the...	{0, strongly ...	None	6	Right	Ordinal	Input
11	IdEmp	Numeric	2	0	Ability to ID an ...	{0, No}...	None	6	Right	Nominal	Input
12	IdLiq	Numeric	2	0	Ability to ID a li...	{0, No}...	None	5	Right	Nominal	Input
13	IdSol	Numeric	2	0	Ability to ID a f...	{0, No}...	None	5	Right	Nominal	Input
14	IdFul	Numeric	2	0	Ability to ID a f...	{0, No}...	None	5	Right	Nominal	Input
15	IdCal	Numeric	2	0	Ability to ID cor...	{0, No}...	None	5	Right	Nominal	Input
16	ClasVol	Numeric	2	0	Ability to classi...	{0, No}...	None	7	Right	Nominal	Input
17	PlnSRNA	Numeric	2	0	Plans to incorp...	{0, strongly ...	None	8	Right	Ordinal	Input
18	PlnCRNA	Numeric	2	0	Plans to incorp...	{0, strongly ...	None	8	Right	Ordinal	Input
19											
20											
21											
22											
23											

Appendix J

Anonymous Demographic Questionnaire

1.	What is your age? More Details a. 20-24 years. 0 b. 25-29 years. 2 c. 30-34 years. 5 d. 35-39 years. 1 e. 40 or greater. 4	0% 16.7% 41.7% 8.3% 33.3%	
2.	Years of experience as a Registered Nurse? More Details a. 1-3 years. 1 b. 4-6 years. 7 c. 7-9 years. 0 d. 10 or greater years. 4	8.3% 58.3% 0% 33.3%	
3.	Years of experience as a Registered Nurse working in ICU or ER (any form of ICU)? More Details a. 1-3 years. 2 b. 4-6 years. 10 c. 7-9 years. 0 d. 10 or greater years. 0 e. 0 years. 0	16.7% 83.3% 0% 0% 0%	
4.	Were you previously a sonographer, or any other specialty with ultrasound use? More Details a. Yes. 0 b. No. 12	0% 100%	

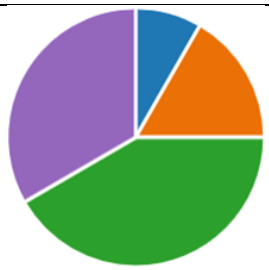
5.	If you Answered yes to the previous question: "Were you previously a sonographer, or any other specialty with ultrasound use?" (if yes please write what specialty below, if not write No) More Details a. Yes. 0 b. No. 12	0% 100%	
6.	As an RN do you have ultrasound experience or education before "Nursing 610, Regional Anesthesia Techniques & Pain Management"? (example: Involvement in IV team or PICC team, etc, with Ultrasound use) More Details a. Yes. 3 b. No. 9	25% 75%	
7.	If you Answered Yes to the previous question: "As an RN do you have ultrasound experience or education before "Nurs 610, Regional Anesthesia Techniques & Pain Management"? (example: Involvement in IV team or PICC team, etc, with Ultrasound use) (if yes please write what experience or education below, if not write No)		**Yes:** **"Midline insertion certificate"** **"IV access"** **"IV placement"**
8.	Have you completed an education course in ultrasound "Nursing 610, Regional Anesthesia Techniques & Pain Management"? More Details a. Yes. 12 b. No. 0	100% 0%	

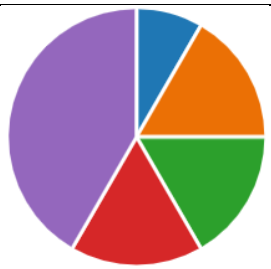
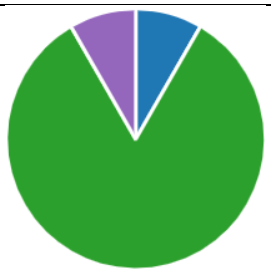
9.	Approximately how much time have you had hands-on with ultrasound scanning? (all forms: interventional, noninterventional, simulation, clinical)? More Details a. An hour or less. 1 c. Eleven to twenty hours. 2 b. Two to ten hours. 4 d. Twenty-one or more hours. 5	8.3% 16.7% 33.3% 41.7%	

Appendix K

Results and Analysis of Pre and Post-Interventions Survey/Quiz.

1. *Pre:*	Do you understand the underlying education for the use and purpose of gastric ultrasound, and are you confident in the hands-on use of gastric ultrasound? a. strongly disagree 1 b. disagree 5 c. neutral 2 d. agree 3 e. strongly agree 1	8.3% 41.7% 16.7% 25% 25%	
Post:	a. strongly disagree 3 b. disagree 0 c. neutral 0 d. agree 4 e. strongly agree 5	25% 0% 0% 33.3% 41.7%	
1). Gain scores showed a 29.41% increase. (Goal was for a 70% increase).			

2. *Pre:*	**One or 8.3% of participants were able to ID an empty gastric vault.** Define this image of the gastric vault: This gastric vault is: More Details a. Empty 1 b. liquid filled/ non-empty 2 c. food/solids filled/ non-empty 5 d. this is not a gastric ultrasou... 0 e. I am unsure. 4		
Post:	**Eleven or 91.7% of participants were able to ID an empty gastric vault.** a. Empty 11 b. liquid filled/ non-empty 0 c. food/solids filled/ non-empty 1 d. this is not a gastric ultrasou... 0 e. I am unsure. 0		
	1) 90% Benchmark was met. **2) Gain scores showed a 83.34% increase. (Goal was for a 50% increase).**		
3. *Pre:*	**Three or 25% of participants were able to ID a liquid filled gastric vault.** Define this image of the gastric vault: This gastric vault is: More Details a. Empty 4 b. liquid filled/ non-empty 3 c. food/solids filled/ non-empty 0 d. this is not a gastric ultrasou... 0 e. I am unsure. 5		
Post:	**Eleven or 91.7% of participants were able to ID a liquid filled gastric vault.** a. Empty 0 b. liquid filled/ non-empty 11 c. food/solids filled/ non-empty 1 d. this is not a gastric ultrasou... 0 e. I am unsure 0		
	1) 90% Benchmark was met. **2) Gain scores showed a 66.7% increase. (Goal was for a 50% increase).**		

4. *Pre:*	**Two or 16.7% of participants were able to ID a food/ solids filled gastric vault.** Define this image of the gastric vault: This gastric vault is: More Details a. Empty 1 b. liquid filled/ non-empty 2 c. food/solids filled/ non-empty 2 d. this is not a gastric ultrasou... 2 e. I am unsure. 5		
Post:	**Ten or 83.3% of participants were able to ID a food/ solids filled gastric vault.** a. Empty 1 b. liquid filled/ non-empty 0 c. food/solids filled/ non-empty 10 d. this is not a gastric ultrasou... 0 e. I am unsure. 1		
	1) 90% Benchmark was not met. **2) Gain scores showed a 66.6% increase. (Goal was for a 50% increase).**		
5. *Pre:*	**Three or 25% of participants were able to ID a full stomach/ non-empty gastric vault.** (a). Define this image of the gastric vault: This gastric vault is: More Details a. Empty 4 b. liquid filled/ non-empty 3 c. food/solids filled/ non-empty 1 d. this is not a gastric ultrasou... 1 e. I am unsure. 3		
Post:	**Eleven or 91.7% of participants were able to ID a full stomach/ non-empty gastric vault.** a. Empty 1 b. liquid filled/ non-empty 11 c. food/solids filled/ non-empty 0 d. this is not a gastric ultrasou... 0 e. I am unsure. 0		
	1) 90% Benchmark was met. **2) Gain scores showed a 66.7% increase. (Goal was for a 50% increase).**		

6a. *Pre:*	**One or 8.3% of participants were able ID the correct formulas & calculations for Antral Cross- Sectional Area (CSA), Gastric Vault Volume (GV), and Unsafe/Safe GV level.** (b). Identify the correct group of formulas (A, B, C, D, or E) to calculate the: <u>Antral Cross- Sectional Area (CSA),</u> <u>Gastric Vault Volume (GV),</u> <u>and Unsafe/Safe GV level.</u> *(Formulas A, B, C, D, and E are not shown)* A. 1 B. 0 C. 1 D. 2 E. 8		
Post:	**Eight or 66.7% of participants were able ID the correct formulas & calculations for Antral Cross- Sectional Area (CSA), Gastric Vault Volume (GV), and Unsafe/Safe GV level.** A. 8 B. 0 C. 1 D. 1 E. 2		
	1) 90% Benchmark was not met. **2) Gain scores showed a 58.4% increase. (Goal was for a 50% increase).**		

6b. *Pre:*	**Four or 33.3% of participants were able to Classify the stomach based on calculated volume.** (c). Based on the prior calculations you now know the gastric volume in milliliters. Knowing that gastric volumes greater than a certain ml/kg could pose increased potential aspiration complications, you can now define this gastric vault as? Patient is 80kg, calculate to classify vault. More Details a. Full, the volume is above saf... 4 b. Not empty/ "Safe", the volu... 1 c. Empty/ "Safe", the volume is... 1 d. I am unsure. 6		
Post:	**Seven or 58.3% of participants were able to Classify the stomach based on calculated volume.** a. Full, the volume is above saf... 7 b. Not empty/ "Safe", the volu... 2 c. Empty/ "Safe", the volume is... 0 d. I am unsure. 3		
	1) 90% Benchmark not met. **2) Gain scores showed a 58.4% increase. (Goal was for a 50% increase).**		
7. *Pre:*	If the opportunity is available, do you plan to incorporate gastric POCUS in clinical residency as a SRNA (student registered nurse anesthetist)? More Details a. strongly disagree 1 b. disagree 0 c. neutral 1 d. agree 7 e. strongly agree 3	**8.3%** **0%** **8.3%** **58.3%** **25%**	
Post:	a. strongly disagree 1 b. disagree 0 c. neutral 2 d. agree 5 e. strongly agree 4	**8.3%** **0%** **16.7%** **41.7%** **33.3%**	

1) Gain scores showed a 0.0% increase. (Goal was for a 70% increase).			
8. *Pre:*	If the opportunity is available after graduation, do you plan to incorporate gastric POCUS into your clinical practice as a CRNA? More Details a. strongly disagree 0 b. disagree 1 c. neutral 1 d. agree 5 e. strongly agree 5	**0%** **8.3%** **8.3%** **41.7%** **41.7%**	
Post:	a. strongly disagree 1 b. disagree 0 c. neutral 1 d. agree 5 e. strongly agree 5	**8.3%** **0%** **8.3%** **41.7%** **41.7%**	
1) Gain scores showed a 1.0% decrease. (Goal was for a 70% increase).			

Tables

Figures

Note: the end-of-program written scholarly product will include an executive summary of the DNP Project and a comprehensive paper in APA format which includes the following elements of the project: (a) background/significance, (b) synthesis of supporting evidence, (c) conceptual framework, (d) project design, (e) results and interpretation (f) limitations, and (g) conclusion.