Improving Pharmacologic Preparedness of First Year SRNAs Prior to Clinical

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Abstract

The Marian University Nurse Anesthesia program offers two pharmacology courses prior to students entering the clinical setting. The pharmacology I course provides students with foundational knowledge of medications used daily. This includes common doses, their mechanism of action, indications for use, contraindications, and special considerations for each. This knowledge is key for safe and successful practice of Anesthesia providers. The six-month gap between the completion of the pharmacology I course and the start of clinicals for Marian University SRNAs potentially risks students' ability to retain information learned. In an effort to prevent this, first year SRNAs at Marian University were provided a lecture covering most common pharmacologic agents used in the operating room aimed at enhancing both knowledge and confidence level. First, a literature review was conducted to help highlight the most efficacious ways of enhancing students' knowledge and confidence. A total of ten articles were selected and found to contribute to the purpose of the project; enhancing students' knowledge and confidence level. The educational intervention took place on May 10th, 2023 on the campus of Marian University. The presentation was composed of 41 slides and was presented throughout the duration of an hour and composed of a pre and post-test. Topics included, most common induction agents, vasopressors, vasodilators, neuromuscular blockers, reversal agents, and cardiac medications. The pre and post-test were composed of seven questions, five knowledge-based questions, one measuring quantifying confidence level, and one asking for the last four digits of their Marian University student ID number. After implementation, it was found that the mean confidence level of students increased from 5.1 to 7 (on a scale of 1-10). Furthermore, students improved overall average scores for knowledge-based questions from 78% to 96%.

Improving Pharmacologic Preparedness of First Year SRNAs Prior to Clinical

This project is submitted to the faculty of Marian University Leighton School of Nursing as partial fulfillment of degree requirements for the Doctor of Nursing Practice, Anesthesia track. First-year Student Registered Nurse Anesthetists (SRNAs) at Marian University undergo three semesters of didactic work prior to entering clinical rotations. As part of this first year, students are enrolled in a Pharmacology I course their second semester where they are educated on anesthetic agents and special considerations for each medication. This course is taken two semesters prior to students entering clinical. This gap in time between the Pharmacology I course and the start of clinical has the potential to decrease students' recollection of medications and considerations covered. This project aims to bridge this gap, improving first year students' familiarity with common anesthetic agents utilized in the clinical setting, concentration of these medications, doses administered, and unique considerations for each.

Background

SRNAs undergo a significant amount of stress throughout the duration of the three-year curriculum for schooling. Much of this stress can come as a result clinical rotations, working with preceptors, and various operating room staff. According to a study conducted by Bruun et al. (2021), SRNAs report their stress level at an average of 7.1 on a scale of one to ten. Considering this high level of stress, having a good understanding of medications used can provide students with a good foundation and augment stress experienced secondary to the clinical setting.

Furthermore, if students are provided a good foundation of information on medications administered, focus can be placed on flow of induction, maintenance, emergence, and the patient's response to surgical manipulation. This can allow students to quickly build rapport with

preceptors and operating room staff, as they realize students are able to provide safe patient care. For example, with induction students are faced with multiple tasks: applying monitors, administering oxygen and medications, communicating with the patient and preceptor, observing the patient's response, and adjusting doses of medications appropriately. Given that this often occurs simultaneously, students can place focus on the patient and effectively communicating with their preceptor instead of focusing on trying to remember the dose, concentration, and onset of medications used.

Insufficient knowledge of medications used also increases the risk of medication errors. According to Wahr et al. (2016), human error accounts for approximately 400,000 patient deaths every year. Of these errors, 5.3% of them involved patients that were in the operating room (Wahr et al., 2016). Furthermore, 70% of the errors that resulted in a patient's demise were considered preventable (Wahr et al., 2016). This underlines the importance of a strong understanding of medications utilized and the possible consequences of insufficient preparation.

Problem Statement

First year SRNAs are taught and tested on the most common medications used in the operating room 5 months prior to starting clinical rotations. This gap in time from fall semester to the following summer semester, makes students vulnerable to forgetting various considerations/characteristics of common medications. Providing first year SRNAs an educational lecture on most common medications used prior to entering clinical, can help improve students' knowledge and confidence level heading into the first semester of clinical.

Needs Assessment & Gap Analysis

To identify specific areas that need addressed, SRNAs from all cohorts at Marian University were provided a survey to assess areas they felt most weak when entering clinical.

This helped identify any areas of weakness between each cohort and highlighted topics that were most helpful for first year students. Surveys were provided to students via Qualtrics and entries remained anonymous. A total of forty responses were recorded from the three cohorts in the Nurse Anesthesia program. 93% of students felt an educational lecture covering common pharmacologic agents would be beneficial for first year students. Furthermore, 50% of participants stated that they felt most comfortable with induction agents while 75% of subjects felt they were most unfamiliar with antibiotics. Regarding overall confidence level on a scale of one to ten (ten being most confident and one being no confidence) the mean confidence level of subjects was 5.39. Based on the data obtained, a PowerPoint presentation was constructed covering most common intravenous and volatile agents utilized throughout all phases of care by anesthesia providers.

Review of the Literature

A literature review was conducted to analyze articles collected, assessing the importance of adequate knowledge of most common anesthetic agents utilized in the operating room. This review was conducted in November and December of 2022 using the databases PubMed and CINAHL complete. The review search was carried out using the keywords *student registered nurse anesthetist, pharmacology, medication safety, anesthetic agents,* and *operating room safety.* Searches on PubMed and CINAHL complete were carried out utilizing the BOOLEAN phrases *medication safety for nurse anesthetists AND student registered nurse anesthetists, pharmacology AND safety education for student registered nurse anesthetists, anesthesia education, and prevalence of medication errors.* The 201 results were narrowed down with the exclusion of studies conducted prior to 2018, took part outside the United States, Europe, and Malaysia, did not include full text of the article, not provided in English, and were not academic

journals. Inclusion criteria was composed of clinical trials, meta-analysis, randomized control trials, and systematic reviews. With use of this criteria, ten articles were selected as demonstrated in the PRISMA flow chart (Appendix A).

Results

The literature review was conducted and resulted in 201 articles. With implementation of inclusion and exclusion criteria, ten articles were found to pertain to improving pharmacologic preparedness of student registered nurse anesthetists. The criteria utilized is provided on the PRISMA flowchart. Details of each study, author, and topics covered is demonstrated in the literature review matrix located in Appendix B.

Classroom Curriculum

Of the articles utilized, four of the articles looked at the effectiveness of various teaching strategies in pharmacology courses (Murnane et al., 2019, Norazlina et al., 2019, Khan & Hood, 2018, and Kennedy, 2019). While this project is not necessarily looking to recreate the curriculum pharmacology courses at Marian University, the most effective delivery methods can be determined for providing information. In the study conducted by Daniel Kennedy (2019), he was able to determine that utilizing an active teaching strategy can improve students' level of knowledge to a greater extent universities' traditional lecture strategy. Specifically, with implementation of active learning strategies such as team-based problem solving, and trivia competitions students' overall grades improved by 6% (Kennedy, 2019).

Two of the articles included in the literature review looked at effectiveness of simulation training for transesophageal echocardiogram and cricothyrotomy (Johnston et al., 2022 and Shields & Gentry, 2020). The study conducted by Shields & Gentry (2020), showed that students retained more information when provided a variety of teaching methods. This was demonstrated

by subjects who underwent both a lecture and hands-on activities receiving the highest post-test scores (Shields & Gentry, 2020). Given these findings, use of both an educational lecture and hands-activities would likely benefit students most.

Perceived Level of Knowledge

In addition to methods of teaching, it is also important to consider students' comfort level with the information taught and potential impacts on their overall confidence in the clinical setting. Three of the articles chosen look at students' perceived level of knowledge and the potential impact it has on their perceived ability to succeed in clinical scenarios (Norazlina et al., 2019, Bruun et al., 2022, and Khan & Hood, 2018). In the study conducted by Norazlina et al. (2019), they were able to determine a distinct link between level of knowledge and confidence level. In their study 70% of subject stated that adequacy of pharmacology teachings aided in their ability to adjust to the clinical setting and manage patients appropriately (Norazlina et al., 2019).

This directly related to this project as the overarching purpose is to increase students' preparedness and confidence level prior to entering the clinical setting (Norazlina et al., 2019). Furthermore, they found that 71.8% of students involved in their study felt it would be efficacious to be taught pharmacology during their clinical rotations in addition to pre-clinical courses (Norazlina et al., 2019). While this project is not advocating to teach students pharmacology throughout clinical semesters, it shows there is the potential gaps in the current curriculum that could benefit from a review course that highlights applicable topics.

Overall, the articles included in the literature review provided the groundwork for the underlying need to provide students with information regarding pharmacology and methods of providing the information. The information gathered showed that students would benefit from being provided an educational lecture on the medications utilized and involvement of group

activities ensured that they remained engaged, and information is retained. This not only offered the opportunity to allow students to have an increased knowledge of medications utilized but improve their confidence level and performance in the clinical setting.

Conceptual Model

The conceptual framework that was used to guide the project is Kotter and Cohen's model of change. This model consists of eight steps and has been proven effective in implementing change throughout organizations (Melnyk & Fineout-Overholt, 2019). The eight steps include urgency, team selection, vision, communication of the vision, empowerment, interim success, ongoing persistence, and nourishment (Melnyk and Fineout-Overholt, 2019).

The first step of urgency involves an initial motivation to implement change (Melnyk & Fineout-Overholt, 2019). For example, in this project the initial motivating factor was the insufficient knowledge of the most common pharmacologic agents used in the operating room. Step two involves developing a team of individuals who are motivated and informed on the topic (Melnyk & Fineout-Overholt, 2019). This helped ensure that the information provided to the target audience was accurate and provided in a convincing manner (Melnyk & Fineout-Overholt, 2019).

Following the development of a team, the third step was constructing a vision that helped outline the goal of the project and the strategy to attain it (Melnyk & Fineout-Overholt, 2019). In this project, the overall vision was to improve knowledge of common medications utilized and fulfilling that with a pre-test, presentation, and post-test. Next is the communication of the vision to the target audience (Melnyk & Fineout-Overholt, 2019). This is further explained as when people are provided the information, process it, and begin to quantify the importance associated with the material provided (Melnyk & Fineout-Overholt, 2019). The presentation

provided in this project directly relates to this, providing information in a direct manner that is succinct and easily understood by the general population.

The last four steps of Kotter and Cohen's change model each entail reinforcement of the message provided and actions to ensure that the change is sustained (Melnyk & Fineout-Overholt, 2019). These steps are further explained to be critical with the implementation of change in an organization but not with small scale educational projects (Melnyk & Fineout-Overholt, 2019). Despite each of these steps not being directly used, the post-test provided did offer reinforcement of the information discussed.

Goals, Objectives, and Expected Outcomes

The overarching goal for this project was to provide first year SRNAs at Marian University with adequate understanding of the most common pharmacologic agents utilized in the operating room by nurse anesthetists. Most information regarding the common pharmacologic agents administered in the operating room are taught one semester prior to entering clinical and the goal of this project was aimed at providing this information again prior to entering clinical. Specifically, objectives of this educational intervention include; subjects improving their average scores by 10% between pre and post-tests after being provided the educational lecture and students demonstrating an increased confidence level with an improvement in mean by at least one point. Overall, the expected outcomes is that this enhanced knowledge ultimately helps optimize students' confidence and performance, starting their first semester of clinical. This outcome can be specifically measured by a 10% improvement in knowledge-based questions and improvement of mean confidence level by at least one point after being provided an hour lecture on May 10th, 2023 via PowerPoint on the most common pharmacologic agents utilized in the operating room.

SWOT Analysis

With implementation of this project there were a variety of factors and individuals that were involved with each phase. The project chair: Dr. Monteiro, primarily oversaw the project at each phase and provided constructive feedback through dissemination. Dr. Ranali also played a crucial role, being responsible for instructing the pharmacology courses at Marian University. He was utilized as a resource for the project to ensure information provided builds off his courses. Furthermore, Dr. Stelflug was consulted with development of the project to ensure it aligned with program objectives and a time and location was able to be determined for implementation.

Stakeholders within the university also included SRNAs who were depended on for feedback regarding their level of pharmacologic knowledge when entering the clinical setting. Strengths of the project included that it directly applies to what first year students will be doing during their clinical rotations, information was be provided by a second year SRNA who is familiar with their circumstances, information was provided in a succinct fashion via PowerPoint, and information provided pertains to didactic and board exam preparation. Barriers for the project would include students' stress level regarding their upcoming clinical rotations and possible inability of some students to attend the in-person presentation.

Providing an educational lecture regarding most common pharmacologic agents opened the opportunity for students to build their confidence entering their first semester of clinical, decrease stress, and improve familiarity with most common medications used. Threats to the project included the potential inability to obtain a space on campus to provide the presentation, participants failing to complete pre and/or post-test, and a potential change in schedule for clinical rotations. The full SWOT analysis chart can be found on Appendix C.

Project Design & Methods

The educational lecture was provided via power point and in person during orientation week for 2023 summer semester on May 10th, 2023. Included in the lecture, was information covering topics stated in the needs assessment surveys provided to all three cohorts of the nurse anesthesia program. Information provided included concentration, mechanism of action, duration of action, side-effects, and special considerations for the most common medications used. The most common medications can be broken down into categories based on clinical use and indications for administration.

Prior to starting the educational lecture, subjects were provided a pre-test that was composed of five questions; three knowledge based, one measuring confidence level, and one asking for the last four of their student ID number. Following the pre-test, the educational lecture was provided over an hour duration. The main categories that were focused on included induction agents, volatile anesthetics, neuromuscular blockers, neuromuscular blocker reversal agents, antiemetics, vasopressors, and vasodilators.

Medications discussed included the most common medications utilized in the operating room and highlighted information on each that pertained to their use in the clinical setting. Hands-on activities and trivia over topics discussed were incorporated into the lecture. This allowed students to not just understand characteristics of medications but what syringes are appropriate to use and remain engaged with questions. Providing information with a variety of teaching methods helped students retain information and helped them remain interested. Throughout the duration of the lecture, students were asked if they have any questions or information is not being communicated clearly.

Following the presentation, a post-test was also provided to subjects. The post-test was also composed of five questions, with three of them being knowledge based, one measuring confidence level, and one asking again for the last four digits of their student ID number. Both pre and post-test entries were recorded anonymously online via Qualtrics and was accessed via a QR code that could be scanned from students' smartphones. All data obtained was quantitative, allowing for direct comparison of results from the pre and post-test.

Project Site and Population

The population targeted for this project was first year nurse anesthesia students at Marian University. This cohort was specifically targeted as they were approaching their first semester of clinical rotations where they apply information taught in the classroom to cases in the operating room. The amount of information applied in the clinical setting can be overwhelming and this project is aimed at easing this transition.

The educational lecture took place on campus at the Marian University Evans Center in room 134 at 1:00pm on May 10th, 2023. This room was utilized due to its convenient location on campus and ability to seat all members of the first-year cohort. Holding the presentation on campus and in person allowed for direct interaction with students and ensured effective delivery of information.

Dr. Brad Stelflug was consulted leading up to delivery of the education presentation, working with staff at the Evans Center to arrange the reservation of the room and organizing the overall week of orientation. As part of this effort, a project site agreement letter was obtained prior to the educational lecture that is included in Appendix E. In addition, Dr. Lee Ranalli was also consulted in the days leading up to the presentation providing constructive feedback on the

information included and ensuring that information provided was congruent with information he provided as part of the Pharmacology I course.

Resources utilized for delivery of the educational presentation included the digital projector provided in Evans Center room 134, Qualtrics survey software for both the pre and post-test, and staff of the Nurse Anesthesia program as mentioned previously. Barriers for the project included the one-hour time limit provided for the room and the large amount of information provided to students throughout the day. These barriers were overcome by condensing the presentation into 41 slides, providing the slide show to students via email to also review at a later time, and only included information that pertained to clinical practice.

Measurements & Data Collection

Prior to educating students, surveys were sent to students of all cohorts in the Marian University nurse anesthesia program. Questions were focused on highlighting areas of pharmacology that students felt least confident about. Sending surveys to all cohorts helped identify differences between cohorts and see how changes in the curriculum have improved or worsened students' confidence. The needs assessment consisted of seven questions total, with three questions asking which pharmacology topics would most benefit first-year students, one question measuring students' confidence level when they first entered clinical rotations, two covering demographic information, and one directly asking if they felt a pharmacology lecture would benefit students. The needs assessment survey utilized can be found in Appendix F.

Once data from the initial survey was collected, analyzed, and used to develop the presentation, students were be provided a pre-test immediately before the presentation. In addition to knowledge-based questions, students were asked to quantify their confidence level regarding pharmacology. Specifically, the pre-test was composed of five questions, three

knowledge-based questions, one measuring confidence level, and one asking for the last four of

their Marian University student ID number to help match entries. The pre-test utilized can be

found in Appendix G.

Once all pre-test entries were completed, students were provided the educational lecture.

Following the lecture, they were provided a post-test that contains similar questions to assess

effectiveness of the teaching. Specifically, the post-test was composed of seven questions total.

Of the seven questions, five were knowledge-based, one asked students to quantify confidence

level, and one asking for subjects to provide the last four digits of their Marian University

student identification number. The same five knowledge-based questions were used to allow for

effectiveness of teaching to be quantified. The post-test can be found in Appendix H. Data

received from both the pre and post-test will then be recorded and analyzed.

Ethical Considerations

Prior to implementation of the project approval was obtained from the Marian Internal

Review Board (IRB). The IRB approval letter can be found in Appendix I. Any potential bias

based on sex, race, or cultural differences was addressed by providing the educational lecture to

all first-year students together. This allowed for all students to be provided the same information

and prevent potential influence on data entries. Subjects were also not asked their sex or race to

help further diminish the likelihood of compromising anonymity.

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Data Analysis and Results

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The effectiveness of the education was assessed by observing to see if students

consistently reported an increase in confidence level after the presentation and if there was an

increase in correct answers recorded. With completion of the educational intervention, all data

from the pre and post-tests was entered into Qualtrics and analyzed. All 33 subjects involved in

the study completed a pre-test and 31 completed a post-test. Of the 33 pre-test entries, six

subjects failed to enter in the last four digits of their student ID number, and five additional

subjects submitted their pre-test as incomplete. The entries that didn't have a corresponding post-

test were able to be identified and discarded by matching the last four digits of subjects' student

identification numbers. After eliminating tests that were incomplete and didn't have a

corresponding pre or post-test, the total number of subjects was brought to 21.

Paired sample t-testing was utilized to assess the significance of the change in number of

correct answers and confidence levels recorded. The hypothesis tested was that there would be

an improvement in test scores from the pre to post-test versus the null hypothesis that there

would be no difference. Table 1 includes data from Pre and Post-Test scores and Table 2

compares the confidence level of subject before and after the educational intervention. All

analyses were carried out by testing for a significance determined by a *p*-value <0.05.

Table 1

Pre-Test & Post-Test Results (n=21)

Paired Samples T-Test

			statistic	df	p
Pre-Test Scores	Post-Test Scores	Student's t	-4.17	20.0	<.001

Note. H_a $\mu_{\text{Measure 1 - Measure 2}} < 0$

Descriptives

	N	Mean	Median	SD	SE
Pre-Test Scores	21	3.90	4	1.091	0.238
Post-Test Scores	21	4.81	5	0.512	0.112

Of the five knowledge-based questions included in the pre and post-test surveys the mean

number of correct answers improved from 3.9 to 4.8 with the median improving from 4 to 5.

Furthermore, the results provided a *p*-value < 0.001 allowing the null hypothesis to be rejected with confidence. This offers evidence that suggests the educational intervention was effective in enhancing the knowledge level of all 33 students who participated in the lecture.

Table 2

Confidence Level Before and After Education

Paired Samples T-Test

			statistic	df	p
Pre-Test Confidence Level	Post-Test Confidence Level	Student's t	-12.1	20.0	<.001

Note. $H_a \mu_{\text{Measure 1 - Measure 2}} < 0$

Descriptives

	N	Mean	Median	SD	SE
Pre-Test Confidence Level	21	5.10	5	1.41	0.308
Post-Test Confidence Level	21	7.05	7	1.66	0.362

Regarding subjects' confidence level, the hypothesis tested entailed that there would be an improvement in confidence level from pre to post-test. Overall, students reported an increase in confidence level after the completion of the lecture with the mean confidence level increasing from 5.1 to 7.05. With analysis of the results the improvement in confidence level was associated with a p-value <0.001 allowing the null hypothesis to be rejected with confidence. The increase in confidence level was correlated with an increase in knowledge level of the medications discussed. This increase in knowledge level was demonstrated by an improvement in the percentage of correct answers of knowledge-based questions from 84.8% to 96.7%.

Discussion

With completion of the educational intervention, effectiveness was able to be quantified and determined effective with improvements in students' confidence level and test scores. There was also found to be a correlation between increased knowledge level and higher level of

confidence among subjects. This reinforces the notion that providing students with adequate education can set them up for success and provide them with confidence when entering the clinical setting.

The strengths of the project include a sample size of 21 subjects, required few resources to implement, knowledge-based questions allowed for effectiveness of teaching to be directly measured, and confidence level was able to be quantified immediately before and after the intervention. Limitations of the project included the hour timeslot provided. Given the vast number of medications SRNAs administer during their clinical rotations, condensing this information into an hour is challenging. Maintaining a focus on the most common medications utilized helped address this issue but could've been expanded upon with more time. Moving forward this project could expand upon this project and measure student's confidence level after this first clinical rotation. Furthermore, collaboration with the pharmacology course instructors could be also expanded upon, tying in course materials with the lecture.

Conclusion

The curriculum for Marian University's Nurse Anesthesia program aims to provide students with the knowledge and skills to provide safe and effective care to patients in the clinical setting. The gap in time between the Pharmacology II course and the start of clinical rotations risks compromising this knowledge and students' confidence level. This was reinforced by the needs assessment that demonstrated students' mean confidence level at 5.39 on a scale of 1-10.

After implementation of the educational intervention, the improvement in mean confidence level from 5.1 to 7.05 and average test scores from 78% to 96% echo the need for a pharmacology lecture immediately prior to students entering their clinical rotations. This can aid

in equipping student's with a strong knowledge base of pharmacologic agents utilized and ultimately enhance their performance in the clinical setting. Overall, integration of a pharmacology lecture the week prior to the start of clinical rotations for SRNAs at Marian University would be beneficial for both students and the program, aiding in fulfilling its overall mission.
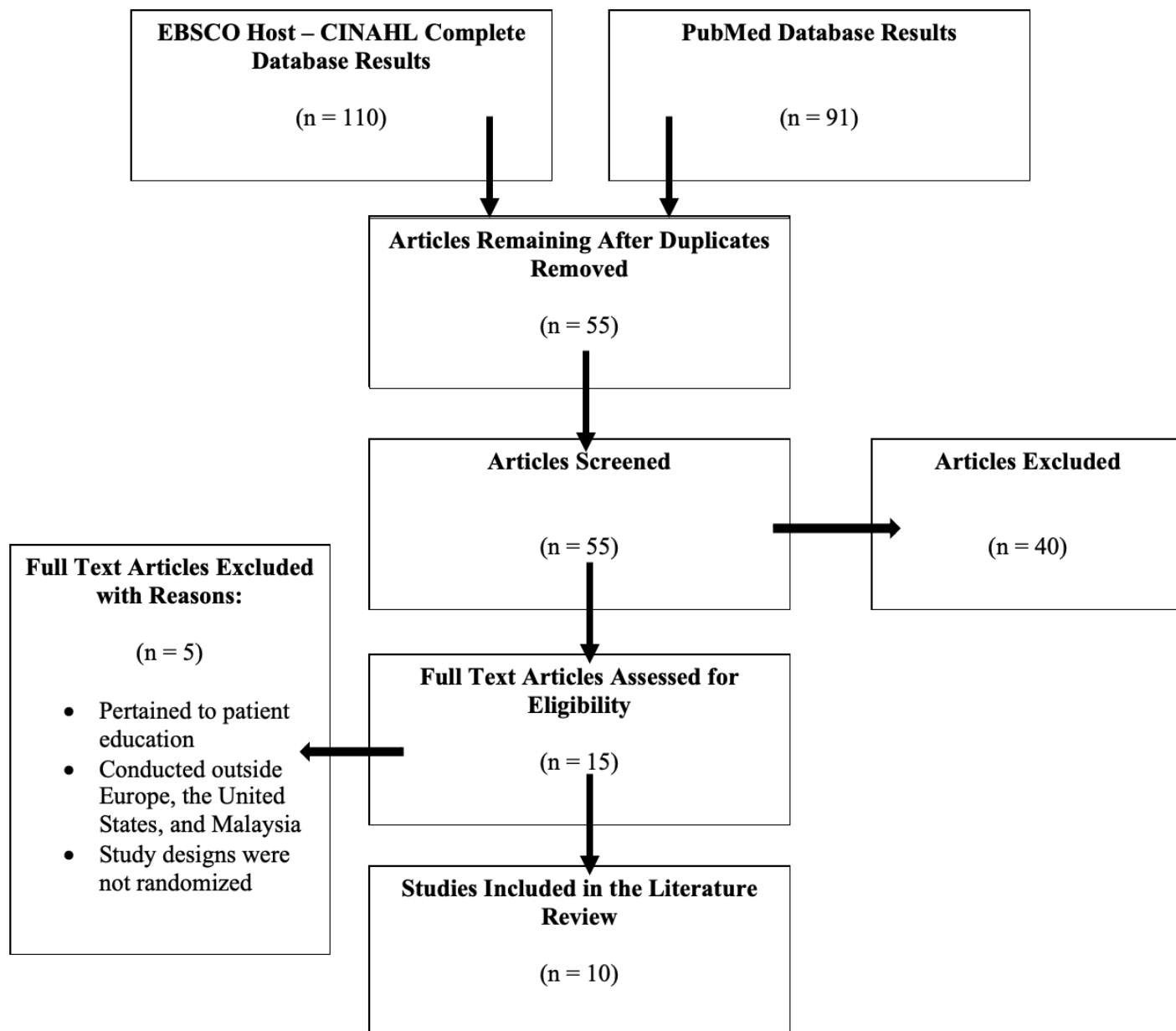
GANTT Chart

The GANTT chart can be found in Appendix D. The GANTT chart outlines the timeline for the project, detailing the development of the topic, planning, submission of project proposal, conduction of literature review, data collection and analysis, delivery of presentation, and dissemination.

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Appendix A

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│  EBSCO Host – CINAHL Complete │        │   PubMed Database Results    │
│       Database Results        │        │                              │
│                               │        │                              │
│          (n = 110)            │        │          (n = 91)            │
└──────────────────────────────┘        └──────────────────────────────┘
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EBSCO Host – CINAHL Complete Database Results

(n = 110)

PubMed Database Results

(n = 91)

Articles Remaining After Duplicates Removed

(n = 55)

Articles Screened

(n = 55)

Articles Excluded

(n = 40)

Full Text Articles Excluded with Reasons:

(n = 5)

- Pertained to patient education
- Conducted outside Europe, the United States, and Malaysia
- Study designs were not randomized

Full Text Articles Assessed for Eligibility

(n = 15)

Studies Included in the Literature Review

(n = 10)

Appendix B

Citation	Research Design & Level of Evidence	Population / Sample size n=x	Major Variables	Instruments / Data collection	Results
Bruun et al., 2022	Case Study & Level III	n = 40	Students experience in the operating room and level of moral courage.	Students participated in educational lectures on ethical issues and then were asked to describe a scenario they personally experienced.	SRNA narratives identified 18 situations involving lack of moral courage, 20 situations including moral courage, and two situations including both.
Elisha et al., 2020	Case Series & Level IV	n = 133	Domains regarding SRNA's clinical performance and administrators expressed level of significance.	Each subject rated relevance of each domain in the survey utilizing the 5-point Likert scale.	Average content validity index of 83% for the three rounds of surveys.
Flynn et al., 2022	Cohort Study & Level II	n = 22	Anesthesia education and non-technical skills.	Each subject was provided a survey and utilized the NANTS rating scale.	Students underestimated their clinical performance compared to assessments completed by preceptors.
Johnston et al., 2022	Case Study & Level IV	n = 58	Education on cricothyrotomy and ability to perform proper steps.	Subjects were rated using a modified Likert scale during their performance of a simulated cricothyrotomy.	Increase in median scores after education from 14 to 22.5.
Kennedy, 2019	Cohort Study & Level II	n = 75	Course format and students' level of knowledge.	Exam scores were recorded before and after changes to the curriculum and compared.	The average grade increased from 81.3% to 83.8% after change was made to the curriculum.
Khan, 2018	Cohort Study & Level II	n = 46	Nurses' education and opinion on	Nurses were provided a survey and asked about the relevance of pharmacology	Majority of subjects stated that they felt face-to-face lectures early in the program would be most beneficial.

			timing of curriculum	education received using a 5-point Likert scale.	
Mauldin, 2021	Case Study & Level II	n = unknown	Pharmacology education and confidence in the clinical setting	Nurses were provided an educational lecture on pharmacology and confidence level was recorded after the presentation and compared to answers recorded prior to the lecture.	Students reported, an increased confidence and understanding of pharmacology.
Murnane et al., 2019	Cohort Study & Level II	n = 157	Education and students' level of confidence	Data was collected via a questionnaire that covered information covered in the lecture.	There were no significant differences between the pre and post-intervention assessment.
Norazlina et al., 2019	Cross-sectional Cohort Study & Level III	n = 459	Pharmacology education and students' perceived level of effectiveness.	Students were provided a survey and recorded responses utilizing the 5 point Likert scale.	70% agreed that lessons were adequate and 8.9% felt it was inadequate.
Shields & Gentry, 2020	Cohort Study & Level III	n = 71	Simulation training and performance in performing a TEE.	Students were provided a pre and post-test regarding information provided in simulation training.	The mean of post-test scores were significantly higher, increasing from 42.3 to 69.4.

Appendix C

Strengths	Weaknesses
• Clinically Relevant • Direct & Comprehensive • Information Provided by Peer • Pertinent to Board and Course Exams	• Limited to Pharmacology • One SRNA Presenting Information • Limited Time to Provide Information
Opportunities	Threats
• Decrease Students' Stress Level • Improve Familiarity with Medications	• Inability to Obtain Space for Presentation • Lack of Interest from Students

Appendix D

	Task Name	Duration	Start	2023 Sep Oct Nov Dec Jan Feb Mar Apr May Jun Jul
1	Developing a Topic	25d	08/29/22	
2	Project Planning	26d	10/01/22	
3	Project Proposal Submissic	1d	12/05/22	
4	Literature Review	71d	08/29/22	
5	Data Collection & Analysis	34d	12/06/22	
6	Presentation Development	77d	01/21/23	
7	Dissemination	1d	05/08/23	

Appendix E

MARIAN UNIVERSITY
Indianapolis
Leighton School of Nursing
Nurse Anesthesia Program

3 February, 2023

To whom it may concern,

Zane Johnson has my permission to conduct his DNP project at Marian University.

Thank you,

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Appendix F

Improving Pharmacologic Preparedness of 1st Year SRNAs Prior to Clinical Rotations: Needs Assessment

This survey consists of 7 questions. All entries will remain anonymous and information gathered from these surveys will be used to help develop a presentation aimed at improving pharmacologic preparedness of first-year SRNAs.

By clicking "Proceed" you agree to participate in this survey and DNP project.

1   What is the last four digits of your Marian University Student ID #?

_____

2   Which Marian University SRNA cohort are you a part of?

Class of 2023 (1)

Class of 2024 (2)

Class of 2025 (3)

3 Do you feel first year SRNAs would benefit from a pharmacology lecture prior to entering clinical, discussing most common medications used in the operating room?

3   Yes (1)

4   No (2)

4 If you answered "yes" to the previous question, what pharmacology topics should be covered? (select all that apply)

☐ Drug Concentrations (1)

☐ Special Considerations (2)

☐ Syringe Sizes for Each Medication (3)

☐ Onset, Peak, & Duration (4)

☐ Dose Calculations (5)

☐ N/A: I don't feel a lecture would benefit first-year SRNAs (6)

5 On a scale of 1-10, rate your confidence level regarding medications used in the operating room prior to your first clinical rotation. (1=no confidence, 10=most confident).

1   2   3   4   5   6   6   7   8   9   10

Confidence Level ()	

6 Rank classes of medications based on your familiarity prior to entering your first clinical rotation. (1=most familiar, 6=least familiar).

_____ Volatile Agents (1)
_____ Induction Agents (2)
_____ Vasopressors/Vasodialators (3)
_____ Neuromuscular Blockers/Reversal Agents (4)
_____ Antiemetics (5)
_____ Antibiotics (6)

7 In your own words, explain pharmacology topics that would benefit first-year SRNAs most if provided prior to clinical rotations.

_____

Appendix G

Improving Pharmacologic Preparedness Pre-Test

1 What are the last four digits of your Marian University student ID number?

_____

2 On a scale of 1-10, how would you rate your confidence regarding medications utilized in the operating room? (1=least confident, 10=most confident)

	0 1 2 3 4 5 6 7 8 9 10
Confidence Level ()	

3 What is the concentration of Succinylcholine?

○ 10mg/mL (1)

○ 100mcg/mL (2)

○ 20mg/mL (3)

○ 200mcg/mL (4)

4 You have a patient who is undergoing a laparoscopic cholecystectomy. After induction you note that the vital signs are: HR: 54, BP: 80/45, SPO2: 99%. You have determined that Ephedrine is most appropriate to treat the patient's hypotension. What dose would be most appropriate?

○ 50mcg (1)

○ 50mg (2)

○ 5mcg (3)

○ 5mg (4)

5 You are taking over a colleague's case and note that the patient has received numerous doses of ephedrine and neo-synephrine for hypotension. The patient's blood pressure is unresponsive (BP: 75/50) to these medications and is actively being bloused with IV fluid. You determine that vasopressin should be administered. What would be an appropriate dose?

○ 1 unit (1)

○ 100 units (2)

○ 1mg (3)

○ 100mcg (4)

6 You arrive to the operating room to prepare for your first case of the day, a robotic hysterectomy. You are drawing up 100mg of 2% Lidocaine for induction. How many mL's would this be?

○ 100mL (1)

○ 10mL (2)

○ 5m (3)

○ 2mL (4)

7 Which of the following is an absolute contraindication for Nitrous Oxide?

○ Pulmonary HTN (1)

○ 1st Trimester of Pregnancy (2)

○ Increased ICP (3)

○ Deficiency of Methionine Synthase (4)

Appendix H

Improving Pharmacologic Preparedness Post-Test

1 What are the last four digits of your Marian University student ID number?

_____

2 On a scale of 1-10, how would you rate your confidence regarding medications utilized in the operating room? (1=least confident, 10=most confident)

	0 1 2 3 4 5 6 7 8 9 10
Confidence Level ()	══════════▮══════════

3 Which of the following is an absolute contraindication for Nitrous Oxide?

○ Pulmonary HTN (1)

○ 1st Trimester of Pregnancy (2)

○ Increased ICP (3)

○ Deficiency of Methionine Synthase (4)

4 You have a patient who is undergoing a laparoscopic cholecystectomy. After induction you note that the vital signs are: HR: 54, BP: 80/45, SPO2: 99%. You have determined that Ephedrine is most appropriate to treat the patient's hypotension. What dose would be most appropriate?

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○ 50mg (2)

○ 5mcg (3)

○ 5mg (4)

5 You arrive to the operating room to prepare for your first case of the day, a robotic hysterectomy. You are drawing up 100mg of 2% Lidocaine for induction. How many mL's would this be?

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○ 10mL (2)

○ 5mL (3)

○ 2mL (4)

Q3 What is the concentration of Succinylcholine?

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○ 100mcg/mL (2)

○ 20mg/mL (3)

○ 200mcg/mL (4)

Q5 You are taking over a colleague's case and note that the patient has received numerous doses of ephedrine and neo-synephrine for hypotension. The patient's blood pressure is unresponsive (BP: 75/50) to these medications and is actively being bloused with IV fluid. You determine that vasopressin should be administered. What would be an appropriate dose?

○ 1 unit (1)

○ 100 units (2)

○ 1mg (3)

○ 100mcg (4)