Simulation for Nurse Anesthesia Program Selection: Redesigned

John Roebuck, CRNA, MSN

April 24, 2017

Presented to the Faculty at the University of Michigan-Flint
In partial fulfillment of the requirements for the
Doctor of Anesthesia Practice Program

Primary Advisor/First Reader:

Name Jane Motz, CRNA, DrAP

Signature _____ Date 5/2/2017

Second Reader:

Name Lawrence Stump, CRNA, MEd

Signature _____ Date 5/1/2017

Table of Contents

Abstract

Purpose: This project is meant to answer the research question: What applicant character traits do Nurse Anesthesia Program Directors and Faculty identify as favorable predictors for successful completion of a nurse anesthesia program, and what evaluation methods are best to evaluate these traits in prospective students?

Methods: A prospective cross-sectional survey tool was developed and sent to all current nurse anesthesia program directors, assistant directors, and faculty within the United States. Participants were identified via the Council on Accreditation of nurse anesthesia programs (COA) website, a hard copy of the survey was provided to attendees of the Assembly of School Faculty meeting 2016.

Results: The essential evaluation methods included: 1) interviews (88.4%), 2) letters of recommendation (62.1%), 3) shadowing a Certified Registered Nurse Anesthetist (CRNA) (60.8%), and 4) high fidelity simulation (58.1%). The personal characteristics included; 1) ability to learn from mistakes (99.5%), 2) commitment (99.5%), 3) integrity (99.5%), 4) judgment (99.5%), 5) hardiness (99.5%), 6) clinical awareness (97.9%), and 7) leadership (94.2%) as high predictors of program success.

Conclusion: The assessment and evaluation methods survey tool demonstrated many findings congruent with previous research. High fidelity simulation as an evaluation method was ranked as being an essential or important predictor of successful program completion by 58.1% of respondents. It was the preferred evaluation method for two personal characteristics, clinical awareness (59.4%) and judgment (50%). Therefore, simulation was identified as a viable method to evaluate two personal characteristics. Information gained from this project was used to create a simulation scenario which may assist program directors and faculty in the prospective anesthesia student evaluation process.

Data Sources: The survey was recorded in Qualtrics® and analyzed by SPSS Statistics 24® software. Criteria were searched via PubMed and CINAHL.

Keywords: Program director, Certified Registered Nurse Anesthetist, CRNA**,** Simulation**,**

Admission criteria**,** Anesthesia Education**,** Kolb's experiential learning theory**,** Assessment**,**

Attrition

Introduction

The nurse anesthesia education programs (NAEPs) student selection process is critical to a program's success and ultimate accreditation. High attrition can decrease the quantity and quality of future applicants, decrease administrative support from affiliated universities, and potentially lead to loss of accreditation status from the Council on Accreditation of nurse anesthesia programs (COA).[1] NAEPs are historically known for being time intensive and expensive endeavors for students and universities alike.

The COA for nurse anesthesia programs mandates that attrition is less than 20% for any given three-year period.[1] Academic programs with higher attrition rates are at risk for being placed on probation that can potentially lead to the closure of the entire program.[1] Student demands and accreditation requirements create the necessity for NAEPs to make the best selections during the admissions process. The selections need to accurately determine which candidates will successfully complete the program.

Becoming a Certified Registered Nurse Anesthetist (CRNA) may be challenging and rewarding endeavor both professionally and financially, which has contributed to a historically competitive admission process. The number of applications for nurse anesthesia programs is much greater than the number of positions available.[4] An illustration of this is Oakland University's program in Rochester, Michigan. Which offers up to 25 student positions from approximately 200 applicants each year. The tuition and total cost of completing the Oakland University Nurse Anesthesia Program are $63,000.[5] Beyond the credit hour expense of the program, the loss of income owing to an inability to work during the intense program can significantly impact the total cost of education for CRNA students.

Oakland University's (OU) nurse anesthesia program selection process begins with review and ranking of students completed applications. During this process, all student transcripts are analyzed for required degrees, science courses, and overall GPA.[1, 6] Letters of recommendation are integral to the application evaluation process. Applicants with the highest ranking composite scores and required critical care experience are invited to participate in the interview process.

Oakland University faculty previously utilized a written applicant test until 2008, at which time the test was replaced with high fidelity simulation experiences that utilize the Laerdal SimMan®.[6] Admissions committee members decided to incorporate high-fidelity simulation scenarios into the interview process based information in the research. A pilot study conducted by Penprase et al.[6] demonstrated a positive linear relationship between simulation and interview scores.

Applicants participating in the simulation created for the program at OU, are rated on their ability to correctly identify the manikin's simulated condition and implement an appropriate and timely treatment plan. Leadership characteristics and overall communication with other team members are evaluated. The responses during the simulation portion of the interview account for 20% of the total applicant's admission score.[6] The admissions committee at Oakland University initiated the simulation experience as they believed it provided valuable insight into an applicant's knowledge base, critical thinking, and communications skills.

The ability of the simulation experience to evaluate the desired intangible character traits of applicants remains unclear. One prominent reason for this is the validity of the simulation experience has not yet been tested to assess specific traits. There is a paucity of literature and lack of past and recent research specific to this academic area. The purpose of this project is to

identify desired character traits of Student Registered Nurse Anesthetist (SRNA) applicants, and the methods to best evaluate these characteristics based on survey responses from program directors, assistant directors, and faculty. Results from this project assisted in providing recommendations that were utilized to design an evidence-based, high fidelity simulation scenario to accurately assess desired skills and character traits that are considered predictors of applicant success in NAEPs.

Research Question

What applicant character traits do nurse anesthesia program directors and faculty identify as favorable predictors for successful completion of a nurse anesthesia program and what evaluation methods are best to evaluate these traits in prospective students?

Review of the Literature

Attrition is a multidimensional concern identified in graduate nursing education. It not only affects students and NAEPs, it has far-reaching implications for the nurse anesthesia profession as well as the public. Access to healthcare is a critical need for individuals of all ages and knowledgeable, well-prepared, advanced practice nurses are needed to provide that care. Attrition is known to vary from year to year in nurse anesthesia programs although the rates and reasons for attrition have not been consistently elucidated. Ultimately, the COA Standard IV, E3 has required programs to monitor students leaving programs and mandates that attrition rates be publicly advertised for each program.[1]

A research study surveyed 101 program directors to determine the rates and contributing factors leading to attrition in a cohort of nurse anesthesia students who were preparing to graduate.[7] Two program directors declined to participate, and 29 did not respond resulting in a 67% response rate. The results revealed that the rate of attrition varied from 0% to 41%. The

average attrition rate per program was 7.7% plus or minus 9.1%.[7] Any program reporting an attrition rate over 20% over a five-year period is obligated to report to the COA, reasons for the high attrition and produce a detailed plan to improve results.[1] The survey explored the program's potential reasons for high attrition rates.

Dosch et al.[7] reported that the most common reason for attrition was resignation (35.5%), followed by dismissal for academics (30.4%) and dismissal for clinical performance (15.5%). The factors that lead to resignation were reported to include; personal and health reasons, poor academic performance, being unaware of the time commitment, job role, or responsibilities of a CRNA, poor clinical performance, or impairment (0.27%).[7] Academic dismissals were attributed to poor academic preparation, poor study habits or time management, poor undergraduate preparation, personal or health reasons, poor clinical performance, and lack of motivation. Clinically related attrition was most often reported to be from poor clinical performance and/or poor theory transference. In addition, some respondents reported that there was some lack of interest in the nurse anesthesia profession and diminished motivation after students began their clinical rotations. This study demonstrates that meeting the traditional selection criteria does not accurately predict academic and clinical success for 45% of the students that were dismissed from NAEPs.[7]

Hulse et al.[8] conducted a study to identify cognitive and noncognitive factors that predict student success in the United States Army Graduate Program in Anesthesia Nursing (USAGPAN). There were 42 participants who completed this 3-year longitudinal, nonexperimental, prospective, descriptive internet study. Cognitive and non-cognitive tools that had reliability and validity testing were used to identify predictors of success in the USAGPAN. The cognitive indicators included the Watson-Glaser Critical Thinking Appraisal (WGCTA), a

validated cognitive test, and the Graduate Record Examination (GRE) verbal and quantitative score. The non-cognitive indicators included the Rotter Locus of Control Scale (Appendix A), the trait portion of the State-Trait Anxiety Inventory (STAI), and demographics such as age and gender. The non-cognitive tools were completed by students already attending the USAGPAN and not utilized as admission criteria.

Hulse et al.[8] revealed that the WGCTA and the GRE verbal and quantitative scores were not statistically significant cognitive predictors of success for the USAGPAN. This finding was different from other historical findings, that demonstrated the undergraduate Grade Point Average in science (SGPA) accounted for 24% of the variance for the overall score of the National Certification Exam (NCE).[9] Results supported a statistical significance in non-cognitive factors demonstrated by the Rotter Locus of Control Scale, and the trait portion of the State-Trait Anxiety Inventory as predictors of success in the USAGPAN.[8] Hence, students noted to have a greater locus of control and lower anxiety were more likely to succeed. It should be noted that the limited convenience sample for this study could impact the generalizability of these findings.

There is a dearth of studies demonstrating empirical evidence of predictive selection criteria.[7, 9, 10] However, the findings from these studies are not congruent. The evaluation process for selection is known to vary between universities. Undergraduate GPA, GRE scores and other methods of evaluation, such as interviews, are often utilized by programs to evaluate and qualify applicants. These methods, however, are not standards set forth by COA. This offers an opportunity to examine the methods of evaluation and character traits that program faculty identify as predictors of success, and identify a need for future improvements.

Academic Predictors

Burns[11] explored and found a relationship existed between admission criteria, including the undergraduate GPA, science course GPA, GRE scores, critical care experience, and academic progression existed. The author collected information from a data sheet sent to 108 nurse anesthesia program directors. The researcher received 914 records from 21 programs for a response rate of 19.4%.[11] The results statistically supported significant relationships for the independent variable on academic progression, but not all in a positive direction. The results demonstrated that for every one unit the GPA increased, the participants were 4.2 percent more likely to have been on probation, and for every 1 unit the SGPA increased, participants were 3.0 times more likely not to have been on probation.[11]

The GRE score had a statistically significant positive relationship with the participants' current GPA in the nurse anesthesia program. There was a statistically significant inverse relationship between the number of years of critical care experience and the applicants' current GPA in the nurse anesthesia program. Burns[11] demonstrated the validity of the utilization of the undergraduate GPA, SGPA, and GRE scores during the selection process of candidates for admission into nurse anesthesia programs. However, the authors did not explore program outcome measures such as attrition and National Certifying Exam (NCE) scores. This is a noted limitation of the study by the authors.

Willcockson, et al.[12] examined the predictors of success for students admitted to a graduate program in biomedical informatics. They analyzed 235 student records from the University of Texas, School of Health Information Sciences at Houston (SHIS) and Oregon Health and Science University Department of Medical Informatics and Clinical Epidemiology (DMICE). The results for the SHIS students demonstrated that, each one point drop in

Undergraduate Grade Point Average (UGPA) multiplied the predicted odds of failure by 10.5%. [12] However, at DMICE, the other institution, the authors found that the smaller number of outcomes classified as a failure and did not provide statistical significance to predict future failure. The GRE-Verbal score was the only predictor that contributed significantly to predicting mastery as indicated by a letter grade of "A" at both institutions. The results of this study, although not specifically studying nurse anesthesia programs, further demonstrates that there can be variability in trying to determine predictors of failure or success in graduate programs.

Interview Process

Interviews are an essential component for selecting an optimum applicant for a university, organization, or employer. The popularity of the interview remains high. Job seekers, for example, identify landing an interview as a measure of success and accept it as part of the selection process, therefore giving it face validity or legitimacy.[13] An interview is simply a specialized form of a conversation conducted for the specific purpose of predicting whether a candidate will meet performance expectations.[14] There are two basic types of interview techniques, structured and unstructured.

The unstructured interview has an open format in which the interviewer can ask a wide range of questions.[15] The questions may or may not pertain to the specifics of the position or the organization. Unstructured interviews are more concerned with the overall performance of candidates. It is conducted in an unrestrained pattern. Interviewers practice in a free interview format with only a few planned key questions and thus each unstructured interview has the potential to generate data with different structures and patterns.[15] Interviewers do not set any official correct answers, the process of interviews are more like a friendly conversation, and interviewers get the information that they want by observing how applicants respond. Although

the unstructured interview possesses a higher degree of freedom, the unrestrained pattern may cause the interviews to stray from the intended purpose. In addition, each applicant could be asked totally different questions. The unstructured interview format can make it difficult to effectively rate and compare one applicant to another.[16]

There are many variables that contribute to the unstructured interview's lower reliability and validity compared to structured interviews. Seven known factors are; 1) There is low reliability among interviewers regarding what to ask of applicants and how applicants are evaluated, 2) Applicant appearance including attractiveness and attire bias, 3) Non-verbal cues such as eye contact and smiling bias ,

4) Interviewers give more weight to negative information than positive. Research demonstrates it takes more than twice as much positive as negative information to change the interviewer's initial impression, 5) Primacy effects, where information gathered prior to the interview or during the early portion can dominate the interviewer's judgments. Research demonstrates that interviewers come to final decisions about applicants four minutes into a thirty-minute interview, 6) Similarity effects, where applicants who are similar to the interviewer with respect to race, gender, or other characteristics receive higher ratings, and 7) Interviewers typically only recall half of what they glean during the interview process.[13]

Contrary to the weight of evidence against the unstructured interview's validity, it is still frequently utilized. Dana, Dawes, and Peterson[16] describe a notable example of the failure of an unstructured interview technique. This took place at the University of Texas Medical School in Houston. In 1979 by an act of legislation, the school was required to accept fifty more applicants that were originally rejected, due to results of the unstructured interview processes. Interestingly, after graduation, no statistical difference was found between attrition, academic,

clinical performance, or honors earned between the fifty students the school was forced to accept compared to the students they initially selected.[16]

The structured interview consists of a set of standardized questions, pertaining to the position and the institution.[14,17] These same questions are asked of every applicant and evaluated on a developed scale. As a fixed format, the structured interviews process is adept at finding candidates that are suitable for a specific position, which is the goal of the structured interview.[13] There is evidence that the structured process has greater reliability and validity compared to the unstructured process for interviews in business. A meta-analysis by Conway, Jako, and Goodman[18] reported that 111 studies demonstrated that highly structured interviews had an average reliability of 0.59, while unstructured interviews reliability is only 0.37. There is support for structured interviews having higher validity as well. An earlier meta-analysis by McDaniel, Whetzel, Schmidt, & Maurer[19] found that the mean validity of structured interviews was 0.31, while the validity of unstructured interviews was 0.23.

Additional studies on structured interviews have demonstrated higher validity. Pilbeam and Corbridge[20] found a validity of 0.6 which correlated with the validity of ability tests, including numerical and verbal reasoning. The degree to which the strength of the structured interview can be demonstrated is affected by how the structured interview is carried out. One variance of the interview process involves including a panel of interviewers as opposed to a single person.[20]

A panel interview is conducted by a team of interviewers and can be performed simultaneously. All interviewers' ratings are ultimately combined into a final panel score.[21] A panel interview can technically be informal or unstructured, but it is typically utilized in conjunction with a structured format. Prior to 1980, all studies on panel interviews were

conducted exclusively in the public sector used by police and in military settings.[21] Panel interviews are considered a more proper and reliable way to estimate the ability of a candidate as they are better able to predict job-related criteria than interviews conducted by individual evaluators.[22] Interviews conducted by groups can avoid personal biases, thus standardized measure can be used to rate candidates alignment with the organization's current needs. However, caution should be taken when selecting interviewers as the panel needs to be properly trained how to conduct a structured interview and how to utilize scoring anchors.[21] Compared with individual interviews, panel interviews are more efficient as they can save time and additional resources.[21]

Applicant Characteristics

In 2000, a survey of program directors, associate directors, and senior clinical instructors to determine student characteristics that they thought were the most important for success in a military nurse anesthesia program.[23] The survey the researchers developed included 35 characteristics grouped into four categories. They included; 1) academic knowledge, 2) nursing knowledge, 3) clinical skills, and 4) personal characteristics. Program faculty was asked to rate the characteristics on an importance scale: 3-Essential, required for clinical success; 2-Important, contributes to clinical success; 1-Low importance, minimal effect on clinical success; 0-Unimportant, does not contribute to clinical success.

Content validity of the survey was established by a panel of six CRNA experts that were asked to rate the relevance of items using a content validity index (CVI). If five of the six CRNA experts rated the item “very relevant” or “relevant” the CVI of the item was at least 0.80 and considered relevant for use in the survey.[23] The 6-expert panel determined 28 of the 35 items to be relevant, however, the researchers decided to include all 35 items. The reliability of the

survey was determined using Cronbach's alpha which is 0.9074 overall and the subgroup alphas range from 0.6839 to 0.9253. [23]

The response rate of the survey was 100% from the 29 clinical faculty assigned to military training sites. Six characteristics were rated as essential to the clinical success of applicants. The essential characteristics were integrity, ability to learn from mistakes, judgment, clinical awareness, hardiness, and commitment. [23] Twenty-two items were rated important to clinical success. The highest-ranking items included pharmacology and physiology grades, critical care experience of 1-2 years, and undergraduate science GPA. The GRE was the lowest scoring item in the importance category. [23]

Medical residents are selected for anesthesiology residencies in a similar process. As stated by Matveevskii, A.S., Gravenstein, N.[24], the process includes academic credentials, preparedness, ability, aptitude, letters of reference, communication skills, personal qualities and a passing score on Step 1 of the United States Medical Licensing Exam (USMLE). In medical anesthesiology residencies, the academic test scores can be predictors of academic success, however, they are not as predictive of clinical performance.[25] Characteristics such as Trait-anxiety, vigilance, and the ability to process information rapidly are associated with clinical competence.[24,25,26] Characteristics such as vigilance, can be assessed by measuring reaction times to simulated intraoperative physiologic data that is of significance in anesthesia competency[24]. These characteristics should cross over into nurse anesthesia education, as CRNA's and anesthesiologist's practice in the same environment within the same practice standards.

There is a gap in the selection criteria for graduate nurse anesthesia students identified in the literature. This provides opportunities for improvement and the possibility to create new

ways to identify candidates and to hone in on other specific traits of candidates that are currently missed by standard selection criteria. This noted gap was the impetus that led Oakland University faculty to implement the use of simulation in the selection process. To enhance the simulation's role in the selection process, it may be helpful to assess applicant characteristics that are not demonstrated by the traditional selection criteria. In an attempt to investigate characteristics that program directors are seeking in applicants and the methods used to evaluate applicants, a survey similar to the one Clayton et al.[23] was developed, to query current program directors, assistant directors, and faculty of all nurse anesthesia programs in the United States.

Theoretical Framework

The theoretical framework that provides support for simulation as a viable option for selection criteria comes from Kolb's experiential model. Kolb[27] defines learning as, the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming the experience.[27] The four phases of learning from this model are; 1) Concrete experience, 2) Observation and reflection, 3) Forming abstract concepts and, 4) Testing new situations.[27] The use of high fidelity simulation in CRNA education allows for Kolb's experiential learning process to take place in an environment in which each applicant can be evaluated during a simulated experience. High fidelity simulation provides concrete experience in rarely occurring emergency situations, such as an advanced cardiac life support (ACLS) scenario, in which applicants demonstrate skills and synthesis of abstract knowledge that are applicable to nurse anesthesia. ACLS certification is a requirement for applying to nurse anesthesia programs and is common knowledge that all intensive care unit (ICU) nurses are expected to know and should provide a fair assessment.

Willhaus, Burleson, Palaganas, & Jeffries[28] share that simulation methods have been used primarily for teaching in nursing education, but are transforming into use for high-stakes evaluation. High-stakes simulations are those that evaluate participants for significant consequences, impact, or grades.[29] Simulation used for high-stakes evaluation differs from simulation used for teaching in several significant ways. Simulation used for teaching provides a safe environment that allows the participants to practice and make mistakes. Using simulation for high-stakes evaluation eliminates some components of that safe environment.[28] This is due to the inherent nature of high-stakes consequences, in which students may in fact fail.

Willhaus, et al.[28] states that another essential difference between the two types of simulations is the need for standardization. Standardization helps to discourage academic dishonesty, such as the sharing of information about the simulation. One option to accomplish standardization is by creating parallel scenarios for each of the selected topic areas. The unique teaching styles and individual facilitator's action can further affect standardization. This variation can lead to cueing or other measures, which can result in disparate understanding and performance of the participants being evaluated.[28]

The final way in which teaching and high-stakes simulation differ is in the evaluation assessment of student achievement while the student is learning. High stakes simulation is a form of summative evaluation. Summative evaluations provide a description of achievement at the end of coursework.[30] The results of a summative evaluation could be used to determine whether a participant would either pass or fail a course, graduate or even gain licensure and certification.[30] Thus, summative evaluation method and high-stakes simulation used for the selection process into a nursing graduate program are congruent.

Methodology

Design

A prospective cross-sectional design was used to identify student applicant traits deemed desirable by nurse anesthesia program directors and faculty in the United States. The trait assessment and evaluation survey used for this research (Appendix B) was developed based on a survey created by Clayton et al.[23] Permission for the use of the "Trait Assessment Tool", was granted by the authors.[23] Alterations to the survey were implemented, in order to gain approval from the investigational review board (IRB) from The University of Michigan-Flint…….. The results from the survey for this project were combined with knowledge obtained from current literature to design an evidence-based high-fidelity simulation scenario to evaluate nurse anesthesia applicants for Oakland University.

Subjects

The target population included nurse anesthesia program directors, assistant program directors, and program faculty of accredited CRNA programs in The United States. Participants that were not program directors, assistant directors, faculty, or under the age of 18 were excluded. There are 113 nurse anesthesia programs in the United States each with a director and assistant program director and additional academic faculty. Approval from the University of Michigan Institutional Review Board (IRB) was obtained prior to the commencement of and study activities.

Setting

This internet-based survey was made available electronically via a link sent by the Qualtrics® software to program directors, assistant directors, faculty and program emails. The

email addresses were obtained from the Council on Accreditation of Nurse Anesthesia Educational Programs and from individual program websites in February 2016. In addition, a hard copy of the survey with instructions was made available to attendees of the Assembly of School Faculty meeting February 25-27, 2016. Both survey instructions included that participants should only complete one version of the survey.

Instruments and Data Collection

The trait assessment and evaluation methods tool was developed to identify student nurse anesthetist's traits that were determined to be predictors of success by program directors, assistant directors and faculty of nurse anesthesia programs in the United States of America. In addition, the survey explored the evaluation methods CRNA programs used currently during the admissions process and what traits the evaluation methods were best to identify. The form was loaded into internet based software, Qualtrics®. An invitation to participate in the survey was sent electronically to all program directors, assistant directors, and CRNA faculty via the Qualtrics® software. Participants who chose to participate clicked on a link that allowed them to take the survey. Responses were recorded electronically via Qualtrics®. Participants were given four weeks to complete the trait assessment survey with follow-up reminder emails sent after one week.

The survey was also made available at the Assembly of School Faculty conference in February 2016 in paper format with instructions for program directors, assistant program directors, and faculty only to complete one form of the survey tool. Information gleaned from the survey was manually entered into the Qualtrics® software. Survey responses were used in the development of a simulation promotion of learning activity that assesses specific identified desirable traits in prospective nurse anesthesia students.

Measures

The assessment survey included questions to identify what personal characteristics that participants considered positive predictors for student nurse anesthesia applicants to complete their program. Limited demographic data was also captured including position, age, and years in their position. Instant descriptive statistics were captured via Qualtirics® as each member chose to complete the online trait assessment activity. Surveys received in hard copy format at a faculty conference were also entered into Qualtrics®.

Analysis

The trait assessment and evaluation methods survey was a one-time survey that was analyzed using SPSS Statistics 24® software. Descriptive statistics, utilizing collected data obtained through SPSS Statistics 24® can be used to review and improve current admissions criteria and inform the development of an evidence-based simulation and assessment for admissions into a CRNA program.

Responses

The survey was e-mailed through Qualtrics® software to 346 unique program related email addresses that were listed on individual program and COA websites. There were 205 online surveys started from the emails for a response rate of 59%. There were 125 completed surveys for a completion rate of 61%. Twenty-one responders met the first three exclusion criteria and were not allowed to complete the survey. Only one respondent stated that they were under the age of 18, 12 had stated that they had taken the survey before, and 8 responded that they were not a director, assistant director, or faculty of a COA accredited nurse anesthesia program. There were 180 hard copy surveys distributed during the Assembly of School Faculty meeting in February of 2016. There were 87 responses for a response rate of 48.3%. Three met

the exclusion criteria for not being program directors or faculty and two said they had taken the survey previously. Eighty-four hard copy surveys complete for a 96.5% completion rate of responders. The remainder of the emailed and the written surveys were combined.

Demographics

Position	**n**	**%**
Program Director	62	29.7
Assistant Director	55	26.3
Clinical Coordinator	14	6.7
Program Faculty	78	37.3

Experience	**n**	**%**
< 1 Year	19	9.1
1-2 Years	19	9.1
3-4 Years	48	23
> 5 Years	123	58.8

Age Group	**n**	**%**
20-30 Years Old	2	0.9
31-40 Years Old	31	14.9
41-50 Years Old	63	30.3
51-60 Years Old	74	35.6
> 60 Years Old	38	18.3

Evaluation Methods and Factors Utilized

The survey included 20 (table 1) methods and factors that programs may use to evaluate applicants for admissions. The top six methods of evaluation and factors identified were reported to be used by greater than 60% of respondents. These included interviews (74.8 %), years of critical care experience (73.7 %), letters of recommendation/professional references (72.2 %), nursing program GPA (65.0%), undergraduate GPA (65.0%), and undergraduate science GPA (60%). The bottom eight reported evaluation methods and factors were identified by less than 25% of responses. These included additional Volunteer work (19.9%), additional Master's degree (12.8%), taking a quiz (10.9%), standardized personality test/profile (7.1%), Other (7.1%), high fidelity simulation (4.9%), ACLS instructor certification (2.3%), and trauma course(s) (2.3%).

Table 1. *Percentages Who Reported Methods Used to Evaluate Applicants, n = 266*

Predictor	**n**	**%**
Interview	199	74.8
Years of critical care experience	196	73.7
Letters of recommendation/Professional references	192	72.2
Nursing program GPA	173	65.0
Undergraduate GPA	173	65.0
Undergraduate science GPA	165	62.0
Type of critical care experience	155	58.3
Shadowing a CRNA	152	57.1
GRE scores	150	56.4
Writing sample, such as an essay	136	51.1

Personal references	135	50.8
ACLS certification	134	50.4
Graduate-level science course GPA	121	45.5
Advanced Nursing Certification(s)	108	40.6
Involvement in professional organizations	92	34.6
PALS certification	89	33.5
Additional required courses	76	28.6
Volunteer work	53	19.9
Additional Master's degree	34	12.8
Quiz	29	10.9

Ranking of Categories

The survey divided the evaluation methods and factors into 6 categories: 1) evaluation methods, 2) academic knowledge, 3) nursing knowledge, 4) clinical skills, 5) patient care experience, and 6) personal characteristics. The participants ranked each method as a potential predictor of successful program completion. A four-point Likert scale verbally expressed as Essential, required for clinical success, Important, contributes to clinical success, Low importance, minimal effect on clinical success, Unimportant, does not contribute to clinical success was utilized to rank the chosen methods. Numerical assignments of 1-4 were given to the Likert scale for data analysis purposes, they were not visible to the participants and the results are reported in Tables 2 – 7.

The evaluation predictors (Table 2) illustrates the most frequent methods chosen by participants. These essential predictors included: 1) interviews (88.4%), 2) letters of

recommendation (62.1%), 3) shadowing CRNA (60.8%), and 4) high fidelity simulation (58.1%). The evaluation methods chosen infrequently by participants included: 1) quiz (35.0%) and 2) personal references (33.7%). Though participants ranked simulation utilization as a high predictor of program completion, interestingly less than 10% of respondents currently utilized this method during the selection process.

Table 2. *Percentages Who Rated Predictors of Successful Program Completion*

Predictor	**1**	**2**	**3**	**4**
Interview, n = 207	45.4%	43.0%	8.7%	2.9%
Letters of recommendation/ Professional references, n = 206	13.1%	49.0%	31.1%	6.85%
Shadowing a CRNA, n = 204	20.6%	40.2%	24.5%5	14.7%
High fidelity simulation, n = 203	14.8%	43.3%	28.1%	13.8%
Standardized personality test/profile, n = 201	9.5%	40.3%	30.8%	19.4%
Writing sample, such as an essay, n = 206	9.2%	40.8%	40.3%	9.7%
Quiz, n = 204	9.5%	25.5%	35.5%	29.5%
Personal references, n=205	6.4%	27.3%	42.9%	23.4%

Note. 1 = Essential, required for clinical success, 2 = Important, contributes to clinical success, 3 = Low importance, minimal effect on clinical success, 4 = Unimportant, does not contribute to clinical success

Academic knowledge factors (Table 3) such as undergraduate science GPA (91.7%), graduate (86.8%) and undergraduate GPA (81.5%) were chosen by most participants as essential or important predictors of program completion success. Subjects reported GPA in additional required courses (53.6%), GRE (49.5%), additional master's degree (21.9%), and trauma course(s) (14.8%) to be less essential in predicting program completion success. In this

category, Graduate-level science courses were ranked by participants as high predictors of successful program completion, however, less than 60% reported utilizing them for evaluation of applicants for admission.

Table 3. *Percentages Who Rated Academic Knowledge as Predictors of Successful Program Completion*

Predictor	**1**	**2**	**3**	**4**
Undergraduate science GPA, n = 205	48.3%	43.4%	6.8%	1.5%
Graduate-level science course GPA, n = 204	34.3%	52.5%	9.8%	3.4%
Undergraduate GPA, n = 205	33.7%	47.8%	15.6%	2.9%
Nursing program GPA, n = 204	31.9%	48.5%	16.2%	3.4%
Additional required course, n = 205	6.3%	47.3%	31.7%	14.7%
GRE scores, n = 204	12.7%	36.8%	31.9%	18.6%
Additional Master's degree, n = 206	1.0%	20.9%	51.55	26.6%
Trauma course(s), n = 203	1.0%	13.8%	53.7%	51.5%

Note. 1 = Essential, required for clinical success, 2 = Important, contributes to clinical success, 3 = Low importance, minimal effect on clinical success, 4 = Unimportant, does not contribute to clinical success

Nursing knowledge factors (Table 4) were rated by the majority of respondents as an essential or important predictor of program completion. These essential factors included: advanced nursing certification(s) (65.7%), ACLS certification (56.0%), and PALS certification (47.6%). Trauma course(s) (22.4%) and ACLS instructor certification (13.1%) were the least chosen predictors of future success in completing a nurse anesthesia program. Respondents

reported advanced nursing certification(s) to be the highest ranking as a predictor of success in this category. Similar to other criteria, less than 50% of respondents currently incorporate this score during the program selection calculation.

Table 4. *Percentages Who Rated Nursing Knowledge as Predictors of Successful Program Completion*

Predictor	**1**	**2**	**3**	**4**
Advanced nursing certification(s), n = 207	12.1%	53.6%	22.7%	11.6%
ACLS certification, n = 207	20.3%	35.7%	27.1%	16.9%
PALS certification, n = 206	13.6%	34.0%	33.0%	19.4%
Trauma course(s), n = 206	1.0%	21.4%	53.9%	23.7%
ACLS instructor certification, n = 206	1.0%	12.1%	44.2%	42.7%

Note. 1 = Essential, required for clinical success, 2 = Important, contributes to clinical success, 3 = Low importance, minimal effect on clinical success, 4 = Unimportant, does not contribute to clinical success

Essential or important clinical skills that are reported as being accurate predictors (Table 5) of program success are: clinical awareness (96.4%), maintenance of vasoactive infusions (93.4%), maintenance of arterial lines (78.8%), intravenous access skill (77.8%), initial airway care in cardiac arrest (73.8%), and maintenance of pulmonary artery (64.7%). Clinical skills chosen less likely to be accurate predictors of program success included: maintenance of intra-aortic balloon (47.0%), certification to draw ABGs (31.3%) and ECMO training (21.2%).

Table 5. Percentages Who *Rated Clinical Skills as Predictors of Successful Program Completion*

Predictor	**1**	**2**	**3**	**4**
Clinical awareness (Situational awareness), n = 198	82.8%	13.6%	2.6%	1.0%
Maintenance of vasoactive infusions, n = 198	56.1%	37.3%	5.1%	1.5%
Maintenance of arterial lines, n = 198	35.4%	43.4%	16.1%	5.1%
Intravenous access skills, n = 198	37.9%	39.9%	18.7%	3.5%
Initial airway care in cardiac arrest, n = 198	35.9%	37.9%	20.6%	5.6%
Maintenance of pulmonary artery catheters, n = 198	15.2%	49.5%	29.8%	5.5%
Sought added intubation experience, n = 198	19.7%	36.4%	31.3%	12.6%
Maintenance of intra-aortic balloon pumps, n = 198	5.1%	41.9%	41.4%	11.6%
Certification to draw ABGs, n = 198	11.1%	20.2%	41.9%	26.8%
ECMO training, n = 198	1.5%	19.7%	49.0%	29.8%

Note. 1 = Essential, required for clinical success, 2 = Important, contributes to clinical success, 3 = Low importance, minimal effect on clinical success, 4 = Unimportant, does not contribute to clinical success

Critical care experience (Table 6) illustrates respondent's selection of essential or important predictors of success as having previous experience with: care of patients with severe cardiac disease (95.0%), care of patients with severe pulmonary disease (94.5%), care of patients with multiple organ failure (91.4%), critical care experience of 3-4 years (88.9%), critical care experience of 1-2 years (83.3%). Open heart surgery (76.3%), critical care experience of greater

than 5 years (66.2%), and care of pediatric patients (58.1%) were chosen less frequently by participants. Ranking critical care experience of greater than 5 years less essential to successful program completion is congruent with Burns,[11] previous findings. This further supports an inverse relationship between the number of years of critical care experience and the current GPA of students in a nurse anesthesia program.

Table 6. *Percentages Who Rated Patient Care Experience as Predictors of Successful Program Completion*

Predictor	**1**	**2**	**3**	**4**
Care of patients with severe cardiac disease, n = 198	39.9%	55.1%	4.0%	1.0%
Care of patients with severe pulmonary disease, n = 198	39.4%	55.1%	4.5%	1.0%
Care of patients with multiple organ failure, n = 198	44.4%	47.0%	7.6%	1.0%
Critical care experience, 3-4 years, n = 198	36.9%	52.0%	8.6%	2.5%
Critical care experience, 1-2 years, n = 198	42.9%	40.4%	15.2%	1.5%
Care of patients after open heart procedures, n = 198	16.2%	60.1%	21.7	2.0%
Critical care experience, > 5 years, n = 198	19.2%	47.0%	28.3%	5.5%
Care of pediatric patients, n = 198	16.7	41.4%	37.4%	4.5%

Note. 1 = Essential, required for clinical success, 2 = Important, contributes to clinical success, 3 = Low importance, minimal effect on clinical success, 4 = Unimportant, does not contribute to clinical success

Respondents chose personal characteristics (Table 7) such as ability to learn from mistakes (99.5%), commitment (99.5%), integrity (99.5%), judgment (99.5%), hardiness

(99.5%), clinical awareness (97.9%), and leadership (94.2%) as high predictors of program success. Age less than 40 years (44.0%) or age 40 years or older (20.5%) were chosen not to be an accurate predictor of program success. These findings support previous work published by Clayton et al.[23] Participants rated clinical awareness as an essential or important clinical skill, as well as an essential personal characteristic.

Table 7. *Percentages Who Rated Personal Characteristics as Predictors of Successful Program Completion*

Predictor	**1**	**2**	**3**	**4**
Ability to learn from mistakes, n = 190	92.1%	7.4%	0.5%	0.0%
Commitment, n = 190	94.2%	5.3%	0.5%	0.0%
Integrity, n = 190	95.3%	4.2%	0.5%	0.0%
Judgment, n = 190	93.7%	5.8%	0.5%	0.0%
Hardiness (stamina), n = 190	82.1%	17.4%	0.5%	0.0%
Clinical Awareness, n = 190	91.1%	6.8%	2.1%	0.0%
Leadership, n = 190	45.3%	48.9%	5.8%	0.0%
Age < 40 years, n = 189	8.5%	35.5%	37.0%	19.0%
Age 40 years or older, n = 190	1.6%	18.9%	47.9%	31.6%

Note. 1 = Essential, required for clinical success, 2 = Important, contributes to clinical success, 3 = Low importance, minimal effect on clinical success, 4 = Unimportant, does not contribute to clinical success

Evaluation Methods Best Used to Evaluate Personal Characteristics

The following evaluation methods (Table 8) were rated as useful to evaluate personal characteristics: 1) High-fidelity simulation – Highest – clinical awareness (59.4%), judgment (50.0%), ability to learn from mistakes (47.7%), Lowest – hardiness (13.9%), integrity (12.8%), commitment (7.9%), 2) Interview - Highest – commitment (53.4%), integrity (46.2%), judgment (39.1%), leadership (37.2%), Lowest – hardiness (27.4%), ability to learn from mistakes (25.6%), clinical awareness (25.2%), 3) Letters of recommendation / professional references - Highest – integrity (50.8%), leadership (44.7%), judgment (38.7%), commitment (36.8%), Lowest – ability to learn from mistakes (19.9%), hardiness (19.5%), 4) Personal references - Highest – integrity (42.9%), commitment (32.0%), Lowest – hardiness (14.3%), ability to learn from mistakes (12.0%), clinical awareness (10.9%), 4) Quiz - Highest – judgement (34.6%), clinical awareness (34.2%), Lowest – commitment (5.3%), hardiness (4.5), leadership (3.0%), 5) Shadowing a CRNA - Highest – commitment (51.9%), clinical awareness (25.6%), Lowest – leadership (9.0%), integrity (8.3%), ability to learn from mistakes (4.1%), 6) Standardized personality test/profile - Highest – judgment (36.8%), integrity (34.2%), leadership (28.9%), Lowest – ability to learn from mistakes (18.0%), clinical awareness (12.8%), 7) Writing sample - Highest – commitment (31.6%), judgment (24.4%), Lowest – clinical awareness (10.9%), ability to learn from mistakes (7.5%), hardiness (6.8%). High fidelity simulation was reported to be rarely used during the selection process, however the majority of respondents (59.4%) reported it as being a viable option to evaluate prominent personal characteristics that are identified predictors for successful program completion.

Table 8. *Percentage of Ratings of Which Evaluation Methods Used to Evaluate Personal Characteristics as Predictors of Successful Program Completion, n = 266*

Predictor	1	2	3	4	5	6	7
High fidelity simulation	47.7	59.4	7.9	13.9	12.8	50.0	28.9
Interview	25.6	25.2	53.4	27.4	46.2	39.1	37.2
Letters of recommendation /Professional references	19.9	26.7	36.8	19.5	50.8	38.7	44.7
Personal references	12.0	10.9	32.0	14.3	42.9	21.8	23.3
Quiz	10.5	34.2	5.3	4.5	6.4	34.6	3.0
Shadowing a CRNA	4.1	25.6	51.9	10.9	8.3	14.7	9.0
Standardized personality test/profile	18.0	12.8	24.4	24.1	34.2	36.8	28.9
Writing sample, such as an essay	7.5	10.9	31.6	6.8	20.3	24.4	21.1

Respondents selected all that applied to each evaluation method

Note. 1 = Ability to learn from mistakes, 2 = Clinical Awareness, 3 = Commitment, 4 = Hardiness (stamina), 5 = Integrity, 6 = Judgment, 7 = Leadership

High-fidelity Simulation Scenario

The results of the survey and investigation of the research led to the development of a high-fidelity simulation scenario used to evaluate prospective nurse anesthesia student s for Oakland University. Simulation was selected based on literature and survey responses that identified that simulation was highly ranked to evaluate clinical awareness and judgement. The

scenario includes an ACLS scenario which demonstrates the applicant's clinical awareness and judgement, which is objectively evaluated. (Appendix C)

Dissemination

The first choice for dissemination is the American Association of Nurse Anesthetist Journal (AANAJ). This journal is widely available to the target audience of nurse anesthesia program faculty and CRNAs. The Michigan Association of Nurse Anesthetist state meetings are a second choice for the same reason.

Discussion

This project served to answer the research question: What applicant character traits do nurse anesthesia program directors and faculty identify as favorable predictors for successful completion of a nurse anesthesia program and what evaluation methods are best to evaluate these traits in prospective students? Results from the assessment and evaluation methods survey created and distributed for this project, offered many findings congruent with previous work in this research area.[23] Both studies served to explore what characteristics, knowledge, clinical skills, and experience were considered predictors of successful completion of a nurse anesthesia education program. These projects differ in the generalizability of the findings. The survey for this project was available to all current nurse anesthesia programs, military and civilian. The research performed by Clayton et al.[23] included military programs exclusively.

The survey developed for this project included recommended changes and additions to the survey tool as proposed by Clayton et al.[23] Changes included surveying all program faculty from across the United States to enhance generalizability, elimination of the numerical values, and alphabetizing the survey choices. Similarities between this study and previously published

results included: high rankings of all GPAs, critical care experience of 1-5 years, types of critical care experiences, and personal characteristics.[23] The redesigned survey results revealed insights as to the varied evaluation methods currently being utilized to assess personal characteristics of potential nurse anesthesia student candidates.

Some of the highest rated predictors of successful completion of NAEPs identified in this project, were the various grade point averages prior to admission. Undergraduate science GPA (91.7%), graduate (86.8%) and undergraduate GPAs (81.5%) were chosen by most survey participants as essential or important predictors of program completion success. This was congruent with other findings.[11,12] However, they were reported to be utilized by 60-65% of the participants of the survey as part of the admissions process. This is at a lower rate of utilization than other evaluation methods such as interviews (74.8 %), years of critical care experience (73.7 %), and letters of recommendation/professional references (72.2 %). Therefore, utilization of evaluation methods and how they accurately predict successful program completion are not fully aligned considering evidence presented in the literature review.

Interviews were reported as the most frequent (74.8%) method of evaluation being used by programs as part of the admissions process. They were also rated as being essential or important (88.4%) by survey participants. However, the interview was only ranked by a majority (53.4%) of participants to evaluate one personal characteristic, commitment. Specific information about the best type of interviews to be used during the selection process was elucidated in the literature review. Unstructured interviews were determined to be less reliable compared to structured ones. Unstructured interviews have multiple forms of bias and demonstrated no effect as predictors of attrition, academic, clinical performance, or honors earned.[16] The wide utilization and dependence on interviews legitimize the need for programs to

evaluate how they are conducted and incorporate best practices. These best practices may provide some acceptable efficiencies by implementing structured panel interviews, as opposed to one on one interviews and reduced bias from having standardized scoring.

In contrast, high fidelity simulation was rarely reported (6.22%) as being by utilized during the admissions process. However, high fidelity simulation was ranked as being an essential or important predictor of successful program completion (58.1%), and the best evaluation method of two personal characteristics identified to determine successful completion of an NAEP. Personal characteristics identified by this project included clinical awareness (59.4%) and judgment (50%). Simulation was among the highest ranked evaluation method of personal characteristics, and the only one ranked to measure more than one characteristic, by 50% or more of study participants. Historically, the published literature supports the use of simulation for high stakes evaluation for admissions processes.[27,29,30]

Study Limitations

As a cross-sectional survey, this study is limited to the population that returned the survey at a single point in time. The population included those that attended the ASF conference in San Antonio, 2016 and those that had e-mails published on the COA website. Therefore, a portion of program faculty did not have the chance to participate. The response rate from the e-mail survey was 59% and 48% from the hard copy. Those that received the survey, but did not respond, may have differed from the respondents in some significant way. The survey only reflects the beliefs of program directors and faculty that completed the survey. It may not be generalizable to nurse anesthesia programs outside of the United States. The scenario developed was not able to be studied for validity for admissions due to timing and access.

Conclusion

Discovering the current low utilization of simulation during NAEP admissions, as identified by this research, provides an opportunity to improve the selection process. The goal is to predict which applicants can successfully complete a nurse anesthesia program by evaluating traits such as, clinical awareness and judgment. Which are considered to be desirable characteristics in anesthesia providers by nurse anesthesia program faculty.

In answering the question: What applicant character traits do nurse anesthesia program directors and faculty identify as favorable predictors for successful completion of a nurse anesthesia program and what evaluation methods are best to evaluate these traits in prospective students? It was determined that high-fidelity simulation scenarios used during the interview process can assist NAEPs to identify students with clinical awareness and judgment using an evidence based strategy. The answer to this question demonstrates the usefulness of simulation in the interview process.

Future research in this area may include validating the clinical scenario developed as a result of investigating this topic. Additional scenarios may also be developed and validated to continually improve the selection process.

Implications for this research include, that the results of this project may assist NAEPs in the selection of the best applicants. This can be accomplished by identifying the character traits and the methods to evaluate them. Programs may be able to improve their selection process by adding or eliminating methods that do not rank as important for the success of students. Improving the precision of the selection process may be able to lower attrition overall.

Appendix A

Terms

1. Watson-Glaser Critical Thinking Appraisal (WGCTA): The test was developed by Goodwin Watson and Edward Glaser. It measures the critical thinking skills.[31]
2. Rotter Locus of Control Scale: Locus of control is the extent in which people believe that can control the outcomes of events. Thus, a person with a high locus of control feels that events turn out to do to their actions and person with a low locus of control feel that outcomes are due to external forces other than their own.[32]
3. State-Trait Anxiety Inventory: The purpose of this scale is to measure the self-reported presence and severity of anxiety. There are two subscales, one which measures the current state of anxiety, and a second that measures an individual's propensity to be anxious.[33]

Appendix B

CRNA Survey

Introduction: My name is John Roebuck CRNA, MSN. I am a graduate student in the University of Michigan-Flint Doctor of Anesthesia Practice Program. I invite you to participate in a graduate program research project by taking a few minutes to complete the following survey.

Project Description and Objectives: I am surveying Program Directors and Faculty of Council on Accreditation (COA) accredited Nurse Anesthesia Programs to evaluate what characteristics they identify as most important for new applicants to be successful in completing a nurse anesthesia program. The goal is to help identify characteristics that are predictors of student success, which may assist in improving the selection process.

Procedures: This survey consists of multiple questions. It is anticipated that it will take approximately 15 minutes to complete.

Risks/Discomforts: No risks are anticipated for involvement in this study.

Benefits: There are no direct benefits for participants. It is hoped that through your participation, there can be improvements in the selection process for nurse anesthesia students.

Confidentiality: All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual responses). All questionnaires will be anonymous. No one other than the primary investigator and assistant researchers listed below will have access to the results. There will be no connection between data collected and any individual respondent.

Compensation: There is no direct compensation provided for this study. Participation is greatly appreciated.

Participation: Your participation will provide valuable information. You are not required to answer every question. Answering one or more survey questions implies consent to participate in this project.

Questions about the Research: The IRB Project Coordinator can be reached at the University of Michigan-Flint Office of Research at 810-762-3383 or by email at research@umflint.edu.

For specific questions pertaining to the survey/project, please contact:

Primary: John Roebuck at 248-842-0941 or jroebuck@umflint.edu

Faculty Advisor: Dr. Jane Motz at jamotz@umflint.edu.

Thank you for your anticipated participation,

John Roebuck CRNA, MSN

Q1. Are you 18 years old or older?

- ❍ Yes
- ❍ No

If No Is Selected, Then Skip to End of Survey

Q2. Have you completed this survey before?

- ❍ Yes
- ❍ No

If Yes Is Selected, Then Skip to End of Survey

Q3. Are you a Program Director, Assistant/Associate Director, Clinical Coordinator or other Program Faculty in a Council on Accreditation (COA) accredited Nurse Anesthesia Program?

- ❍ Yes
- ❍ No

If Yes Is Selected, Then Proceed to Q4. If No Is Selected, Then Skip to End of Survey

Q4. What is your position in a COA accredited Nurse Anesthesia Program?

- ❍ Program Director
- ❍ Assistant/Associate Director
- ❍ Clinical Coordinator
- ❍ Other Program Faculty

Q5. How long have you been a faculty member of a COA accredited Nurse Anesthesia Program (not including time solely as a clinical preceptor)?

- ❍ Less than a year
- ❍ 1-2 years
- ❍ 3-4 years
- ❍ Greater than 5 years

Q6. What is your age group?

- ❍ 20-30 years
- ❍ 31-40 years
- ❍ 41-50 years
- ❍ 51-60 years
- ❍ Greater than 60 years

Q7. What methods or criteria does your program use to evaluate applicants for admission into your Nurse Anesthesia Program? (Select all that apply)

- ❑ ACLS certification
- ❑ ACLS instructor certification
- ❑ Additional Master's degree
- ❑ Additional required courses
- ❑ Graduate-level science course GPA
- ❑ GRE scores
- ❑ Advanced Nursing Certification(s)
- ❑ High fidelity simulation
- ❑ Interview
- ❑ Involvement in professional organizations
- ❑ Letters of recommendation/Professional references
- ❑ Nursing program GPA
- ❑ PALS certification
- ❑ Personal references
- ❑ Quiz
- ❑ Shadowing a CRNA
- ❑ Standardized personality test/profile
- ❑ Trauma course(s)

- ❑ Type of critical care experience
- ❑ Undergraduate GPA
- ❑ Undergraduate science GPA
- ❑ Volunteer work
- ❑ Writing sample, such as an essay
- ❑ Years of critical care experience
- ❑ Other

Q8. Evaluation Methods: Rate the following criteria as predictors of successful program completion.

	Essential, required for clinical success	Important, contributes to clinical success	Low importance, minimal effect on clinical success	Unimportant, does not contribute to clinical success
High fidelity simulation	❍	❍	❍	❍
Interview	❍	❍	❍	❍
Letters of recommendation/Professional references	❍	❍	❍	❍
Personal references	❍	❍	❍	❍
Quiz	❍	❍	❍	❍
Shadowing a CRNA	❍	❍	❍	❍
Standardized personality test/profile	❍	❍	❍	❍
Writing sample, such as an essay	❍	❍	❍	❍

Q9. Academic Knowledge: Rate the following criteria as predictors of successful program completion.

	Essential, required for clinical success	Important, contributes to clinical success	Low importance, minimal effect on clinical success	Unimportant, does not contribute to clinical success
Additional Master's degree	❍	❍	❍	❍
Additional required course	❍	❍	❍	❍
Graduate-level science course GPA	❍	❍	❍	❍
GRE scores	❍	❍	❍	❍
Nursing program GPA	❍	❍	❍	❍
Trauma course(s)	❍	❍	❍	❍
Undergraduate GPA	❍	❍	❍	❍
Undergraduate science GPA	❍	❍	❍	❍

Q10. Nursing Knowledge: Rate the following criteria as predictors of successful program completion.

	Essential, required for clinical success	Important, contributes to clinical success	Low importance, minimal effect on clinical success	Unimportant, does not contribute to clinical success
ACLS certification	❍	❍	❍	❍
ACLS instructor certification	❍	❍	❍	❍
Advanced nursing certification(s)	❍	❍	❍	❍
PALS certification	❍	❍	❍	❍
Trauma course(s)	❍	❍	❍	❍

Q11. Clinical Skills: Rate the following criteria as predictors of successful program completion.

	Essential, required for clinical success	Important, contributes to clinical success	Low importance, minimal effect on clinical success	Unimportant, does not contribute to clinical success
Maintenance of arterial lines	❍	❍	❍	❍
Maintenance of intra-aortic balloon pumps	❍	❍	❍	❍
Maintenance of pulmonary artery catheters	❍	❍	❍	❍
Maintenance of vasoactive infusions	❍	❍	❍	❍
Certification to draw ABGs	❍	❍	❍	❍
Clinical awareness (Situational awareness)	❍	❍	❍	❍
ECMO training	❍	❍	❍	❍
Initial airway care in cardiac arrest	❍	❍	❍	❍
Intravenous access skills	❍	❍	❍	❍
Sought added intubation experience	❍	❍	❍	❍

Q12. Patient Care Experience: Rate the following criteria as predictors of successful program completion.

	Essential, required for clinical success	Important, contributes to clinical success	Low importance, minimal effect on clinical success	Unimportant, does not contribute to clinical success

Care of patients with multiple organ failure	❍	❍	❍	❍
Care if patients after open heart procedures	❍	❍	❍	❍
Care of patients with severe cardiac disease	❍	❍	❍	❍
Care of patients with severe pulmonary disease	❍	❍	❍	❍
Care of pediatric patients	❍	❍	❍	❍
Critical care experience, 1-2 years	❍	❍	❍	❍
Critical care experience, 3-4 years	❍	❍	❍	❍
Critical care experience, > 5 years	❍	❍	❍	❍

Definitions for Personal Characteristics

- Clinical awareness: applicant's awareness of a patients' clinical condition and the ability to respond appropriately to their needs.
- Clinical awareness: applicant's awareness of a patients' clinical conditions and the ability to respond appropriately to their needs
- Commitment: pledge the state of being obligated or emotionally impelled to succeed in the anesthesia program
- Hardiness (Stamina): applicant's physical, mental, and emotional toughness to persist in clinical training
- Integrity: applicant's honesty and sincerity in clinical and personal behavior
- Judgment: applicant's ability to form an opinion or evaluation by discerning or comparing clinical data
- Leadership: quality of leader; the applicant's capacity to lead

Q13. Personal Characteristics: Using the definitions above, rate the following criteria as predictors of successful program completion.

	Essential, required for clinical success	Important, contributes to clinical success	Low importance, minimal effect on clinical success	Unimportant, does not contribute to clinical success
Ability to learn from mistakes	❍	❍	❍	❍
Age < 40 years	❍	❍	❍	❍
Age 40 years or older	❍	❍	❍	❍
Clinical Awareness	❍	❍	❍	❍
Commitment	❍	❍	❍	❍
Hardiness (stamina)	❍	❍	❍	❍
Integrity	❍	❍	❍	❍
Judgment	❍	❍	❍	❍
Leadership	❍	❍	❍	❍

Definitions for Personal Characteristics

- Clinical awareness: applicant's awareness of a patients' clinical condition and the ability to respond appropriately to their needs
- Clinical awareness: applicant's awareness of a patients' clinical condition and the ability to respond appropriately to their needs
- Commitment: pledge the state of being obligated or emotionally impelled to succeed in the anesthesia program
- Hardiness (Stamina): applicant's physical, mental, and emotional toughness to persist in clinical training
- Integrity: applicant's honesty and sincerity in clinical and personal behavior
- Judgment: applicant's ability to form an opinion or evaluation by discerning or comparing clinical data
- Leadership: quality of leader; the applicant's capacity to lead

Q14. Using the definitions above, identify which evaluation method or methods can be used to evaluate an applicant's personal characteristics effectively. (*Select all that apply*)

	Ability to learn from mistakes	Clinical Awareness	Commitment	Hardiness (stamina)	Integrity	Judgment	Leadership
High fidelity simulation	❑	❑	❑	❑	❑	❑	❑
Interview	❑	❑	❑	❑	❑	❑	❑
Letters of recommendation/Professional references	❑	❑	❑	❑	❑	❑	❑
Personal references	❑	❑	❑	❑	❑	❑	❑
Quiz	❑	❑	❑	❑	❑	❑	❑
Shadowing a CRNA	❑	❑	❑	❑	❑	❑	❑

Standardized personality test/profile	❑	❑	❑	❑	❑	❑	❑
Writing sample, such as an essay	❑	❑	❑	❑	❑	❑	❑

End of Survey

Thank you for taking the time to complete the survey.

Appendix C

Simulation for Admissions

Scenario Objectives

The applicants will:

1. At the beginning of the simulation, describe nursing implications of the patient's history. (Cognitive Domain, Knowledge level)
2. summarize the nursing plan of care and perform an assessment. (Cognitive Domain, Comprehension level)
3. express their concerns about the results of the patient's assessment on the plan of care for the patient. (Affective Domain, Valuing level)
4. Implement measures necessary to address the patient's needs and ACLS when necessary:
    - Identify the patient's condition which includes hypoxemia, tachycardia and hypotension
    - Identify likely causes of the patient's condition, specifically hypovolemia from internal bleeding
    - Recognize and activate a code
    - Supply Oxygen for hypoxemia and bag mask ventilation for respiratory arrest
    - Implement a fluid bolus and request lab work and blood that may be needed
    - Evaluate the effectiveness of nursing actions
    - Identify that the patient is in PEA and utilize the correct ACLS pathway
    - Demonstrate respect during team communications
    - Direct and delegate tasks to team members as appropriate

Debriefing, the learners will:

1. Contribute to the analysis of the scenario
2. discuss the treatment and likely causes of PEA
3. Evaluate the actions taken during the scenario at the time of the debriefing.

Respiratory Therapist's Role

1. You are there for helping with the airway if you are requested
2. Offer little to no insight as to the patient's condition

3. Communicate with all team members

Resident On Call's Role

1. You are a newer resident with less than a year experience
2. Be there to offer some assistance and point out the obvious if the patient is not doing well
3. Do not follow ACLS protocol for PEA and order defibrillation if there is no pulse

Nursing assistant or Gopher's Role

1. Bring in equipment, labs, and other requests as directed by simulation coordinator
2. Do not offer much other assistance

Patient and Wife

Patient, Jack Miller, is a 62 y.o. male that is 176 cm tall and 84 kg. He is an engineer at an automotive company and is admitted to intermediate care after a laparoscopic prostatectomy. His wife is concerned because he told her he was not feeling well and has had increasing abdominal pain.

PMH: Patient is a 62-year-old male with a history of seasonal allergies, hypertension and smoking. The surgery went well overall, however there was a little more bleeding than usual with a blood loss of 600cc.

Past surgical history: Tonsillectomy at 4 years old and appendectomy in his 20's without any complications

Pre-OP vital signs:

HR 62

BP 145/86

RR 16

SaO^2 95%

Temp 36.8

Surgical course:

Surgery time 3hr 30min

Anesthesia: General Endotracheal tube, no complications

EBL 600cc

I.V. Fluids 2500cc

Urine output post op: 30cc for last 2.5 hours

Last pain medication 0.5 mg hydromorphone I.V. 30 minutes agoLines: 18 gauge peripheral I.V.'s x 2, radial arterial line

Simulation Scenario Template

Patient Name: Jack Miller	**DOB: Feb 2, 1955**
Patient Condition and Complexity:	**Patient is in his hospital bed moaning and complaining of not feeling well**

Patient Case History:

- **Hx: Status post laparoscopic prostatectomy**
- **Allergies: Penicillin**
- **VS: BP 95/55 T 36.2 HR 105 RR 22 SpO_2 94**
- **Labs: Not Immediately available**

Participant's assignments:

Nurse 1: Primary Nurse 1

Nurse 2: Primary Nurse 2

Nurse 3: Primary Nurse 3

Physician Orders: Vital signs every hour, including input and output, I.V. fluids 100cc per hour Lactated Ringers, and physical assessment every 4 hours per unit policy

Report to start scenario: Upon relieving RN for the shift, you enter the patient's room to provide your first assessment. The wife is very concerned about his pain and condition

Initial Computer Setup: Frame 0

Rhythm: Sinus Tachycardia	P: 105	BP: 95/55	SpO_2: 94%
T: 36.2	R: 22	Lungs: Clear	
Heart: S1 S2		Bowel sounds: absent	

Participants	Priorities	Interventions/Actions	Manikin Responses
	Address the patient and wife		Moaning complaining of pain, Wife affirming and alarmed
	Perform physical assessment		Abdomen firm with bloody dressing and bloody urine in Foley bag
	Check Vital Signs		
	Ask for additional information such as labs		

Computer Setup: Frame 1

Rhythm: Sinus Tachycardia	P: 115	BP: 88/48	SpO_2: 90
T:same	R: 26	Lungs: clear	
Heart: No Change S1 S2		Bowel sounds: Absent	

Participants	**Priorities**	**Interventions/Actions**	**Responses**
Nurses	Low SpO2	Supply oxygen via mask or nasal cannula	SpO2 increases to 95%
	Low blood pressure	Lie patient flat Give a fluid bolus of approximately 500cc	No effect on BP
	Low blood pressure	Give a fluid bolus of approximately 500cc	Increase BP to 100/50
	Pain	Requests or gives narcotic pain medication	SpO2 declines to 85%, BP 84/42
	Labs: Hgb 7.5 down from 11.5, all others normal, ABG acidosis with hypoxemia	Request blood or blood typing	
	Critical situation	Calls a Code or Rapid Response Team	Respiratory therapist and resident enter to offer assistance

Computer Setup: Frame 2

Rhythm: PEA	P: 135	BP: none	SpO_2: 70%
T:35.8	R: 0	Lungs: clear	
Heart: no sounds		Bowel sounds: none	

Participants	**Priorities**	**Interventions/Actions**	**Responses**
Nurses	Low SpO2, no respiration	Bag mask ventilation, instructs Respiratory therapist help , calls for intubation	SpO2 increases to 90%
	No blood pressure	Provide ACLS for PEA chest compression at least 100 per hour	No effect on BP when compressions are halted
		Give a fluid bolus of approximately 500cc and request blood	Increase BP to 60/30 thready pulse after 2 min
		Do not defibrillate as it is not indicated	No change if done
		Request more blood continued bolus	Increase BP to 100/50
	PEA from blood loss	Request surgeon intervention or transport to operating room	No effect on vitals: continue ACLS

Observational Skill-based Clinical Assessment Tool for Resuscitation (OSCAR)

0=Team severely compromised	1=Team compromised
2=Slight detriment to the Team	3=Team neither enhanced or hindered
4=Moderate enhancement to team	5=High level of enhancement to team
6=Highly effective in enhancing team work	

Communication

Beahaviors	Individual Score (0-6)	Total Score
Informs team of respiratory status/SpO2		
Informs team of any other relevant clinical signs (BP,HR,Rhythm, other)		
Communicates airway plan		
Requests patient history		
Communicates ACLS protocol		
Encourages team communication and opinions		
Provides clear information about patient arrest with the arrival of other team members		
Provides clear, audible requests to other team members when requesting equipment, labs, and other needs		
Instructs others on how to assist or other duties as appropriate		

Co-ordinaton

Behaviors	Individual Score (0-6)	Total Score
Information provided as changes occur		
Coordinate team to call code team or move patient to surgery		
Notifies others of anticipated further requirements for patient resuscitation		
Coordinates task such as sending labs, monitoring, placing lines, CPR		
Prepares code cart for use by team by getting it to bedside, turning on defibrillator etc		
Prepares drugs in readiness for next required use eg epinephrine		
Provides back up to others		

Leadership

Behaviors	Individual Score (0-6)	Total Score
Advises team on management, contingency plans and takes lead if needed		
Assertively takes lead in airway control and ventilation during arrest		
Supervises and assists others lacking familiarity with tasks or equipment		
Takes lead and clearly instructs others with requirements for arrest or defers leadership as appropriate		
Instructs others of additional requirements such as new results or attending to family		
Takes a lead with initiating ACLS		

Monitoring

Behaviors	Individual Score	Total Score
Maintains monitoring of patient condition, signs of respirations, & other clinical signs		
Checks for adequate ventilation, request ABG's and amends ventilation as necessary		
Confirms drug identity by checking labeling prior to drug administration		
Maintains awareness of activities of others on team		
Monitors progress of resuscitation protocol with checking of time and reassessment		
Checks team condition and monitors for fatigue in team members performing CPR and suggests change of roles		
Monitors patient dignity and considers well being of others including family		
Maintains awareness of the team needs such as equipment and support		

Decision Making

Behaviors	Individual Score (0-6)	Total Score
Prompt identification of the problem		
Rapidly and clearly outlines a plan and asks for equipment		
Anticipates potential problems and prepares accordingly eg cross-matched blood		
Rapidly decides an appropriated plan for resuscitation (PEA)		
Uses team as whole to develop options and asks for opinions		
Prompt and correct decision making during resuscitation		
Anticipates team needs and puts patient, bed, equipment in proper place to facilitate resuscitation		
Appropriate decision making regarding timing of initial cardiac arrest code call		

Reference List

1. Council on Accreditation of Nurse Anesthesia Educational Programs, Revised 2015. Standards for Accreditation of Nurse Anesthesia Educational Programs. Park Ridge, Ill: Council on Accreditation of Nurse Anesthesia Educational Programs; 2015.
2. Rossetter, R. (2012). Nurse Faculty Shortage. Retrieved from http://www.aacn.nche.edu/media-relations/fact-sheets/nursing-faculty-shortage.
3. Santiago, A. (2013). Nurse salaries for nursing careers. Retrieved from http://healthcareers.about.com/od/compensationinformation/tp/Nurse-Salaries.htm.
4. Keith, J. (2013). Anesthesia Career Professional. Retrieved from http://www.anscareerpro.com/.
5. Oakland University (2013). MSN: Nurse Anesthesia. Retrieved from https://www.oakland.edu/Default.aspx?id=27609&sid=515&CWFriendlyUrl=true
6. Penprase, B., Mileto, L., Bittinger, A., Hranchook, A.M., Atchley, J., Bergakker, S., Eimers, T., Franson, H. (2012). The use of high-fidelity simulation in the admissions process: one nurse anesthesia program's experience. AANA J. 80(1), 43-48.
7. Dosch, M., Jarvis, S., Scholosser, K. (2008). Attrition in Nurse Anesthesia Educational Programs as Reported by Program Directors: The Class of 2005. AANA J. 76(4), 277-281.
8. Hulse, J., Chenowith, T., Lebedovych, L., Dickinson, P., Cavanough, B., & Garrett, N. (2007). Predictors of student success in the US Army graduate program in anesthesia nursing. AANA J. 75(5), 339-346.
9. Zaglanicy, K. (1992). Factors which predict performance on the national certification examination for nurse anesthetists. AANA J. 60(6), 530-540.
10. Ortega, K.H., Burns, S.M., Hussey, L.C., Schmidt, J., Austin, P.N., (2013). Predicting Success in Nurse Anesthesia Programs: An Evidence-Based Review of Admission Criteria. AANA J. 81(3), 183-189.
11. Burns, S. (2011). Predicting academic progression for student registered nurse anesthetists. AANA J. 79(3), 193-201.
12. Willcockson, I., Johnson, C., Hersh, W., & Bernstam, E. (2009). Predictors of Student Success in Graduate Biomedical Informatics Training: Introductory Course and Program Success. J Am Med Inform Assoc. 16(6), 837-846. doi: 10.1197/jamia.M2895.
13. Judge, T. A., Higgins, C. A., & Cable, D. M. (2000). The Employment Interview: A Review of Recent Research and Recommendations for Future Research. Hum Resour Manage R. *10*(4), 383-406.
14. Ullah, M. (2010). A systematic approach of conducting employee selection interview. International Journal of Business and Management, *5*(6), 106-112.
15. Zhang, Y., & Wildemuth, B. M. (2009). Unstructured interviews. Applications of Social Research Methods to Questions in Information and Library Science. Westport, CT: Libraries Unlimited.
16. Dana, J., Dawes, R., & Peterson, N. (2013). Belief in the unstructured interview: The persistence of an illusion. Judgm Decis Mak. 512-520.
17. Latham, G. P., & Sue-Chan, C. A. (1999). A meta-analysis of the situational interview: An enumerative review of reasons for its validity. Can Psychol. *40*(1), 56-67.
18. Conway, J. M., Jako, R. A., & Goodman, D. (1995). A meta-analysis of interrater and internal consistency reliability of selection interviews. J Appl Psychol. *80*(5), 565-579.

19. McDaniel, M. A., Whetzel, D. L., Schmidt, F. L., & Mauer, S. D. (1994). The validity of employment interviews: A comprehensive review and meta-analysis. J Appl Psychol. *79*, 599-616.
20. Pilbeam, S., & Corbridge, M. (2006). People resourcing: contemporary HRM is practice. (3rd ed.). Essex, England: Prentice Hall.
21. Dixon, M., Wang, S., Calvin, J., Dineen, B., & Tomlinson, E. (2002). The panel interview: A review of empirical research and guidelines for practice. Public Pers Manage. 31(3), 397-428.
22. Dipboye, R. L., Gaugler, B. B., Hayes, T. L., & Parker, D. (2001). The Validity of Unstructured Panel Interviews: More than Meets the Eye? J Bus Psychol. 16(1), 35-49.
23. Clayton, B., Douglas, L., Connelly, L. (2000). Faculty perceptions of characteristics needed for clinical success at military nurse anesthesia programs. AANA J. 68(6), 515-523.
24. Matveevskii, A.S., Gravenstein, N., (2008). Role of simulators, educational programs and nontechnical skills in anesthesia resident selection, education, and competency assessment. J Crit Care. 23, 167-172.
25. Fletcher, G., Flin, R., McGeorge, P., Glavin, R., Maran, N., and Patey, R. (2003). Anaesthetists' Non-Technical Skills (ANTS): Evaluation of a behavioural marker system. Br J Anaesth. 90(5), 580-588.
26. Flin, R., Patey, R., Fletcher G., Glavin, R. and Moran, N., (2010). Anaesthetists' non-technical skills. Br J Anaesth. 105(1): 38-44.
27. Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. New Jersey: Prentice-Hall.
28. Willhaus, J., Burleson, G., Palanganas, J., & Jeffries, P. (2014). Authoring Simulations for High-Stakes Student Evaluation. Clinical Simulation in Nursing, 10(4), e117-e182.
29. International Nursing Association for Clinical Simulation in Learning, 2011. Standards of Best Practice: Simulation. Retrieved from http://www.inacsl.org/i4a/pages/index.cfm?pageid=3407.
30. Jeffries, P. R. (2013). *Simulation in nursing education: From conceptualization to evaluation (2nd ed.).* New York: National League for Nursing.
31. Pearson. https://www.talentlens.co.uk/select/watson-glaser-unsupervised-and-supervised-uk-edition. Accessed October 12. 2016.
32. Rotter, J. (1966). Generalized Expectancies for Internal Versus External Control of Reinforcement. Psychological Monographs: General and Applied, 80(1), 1-28. Retrieved from http://www.soc.iastate.edu/sapp/soc512Rotter.pdf. Accessed October 12, 2016.
33. Speilberger, C. State-Trait Anxiety Inventory for Adults™. Mind Garden. http://www.mindgarden.com/145-state-trait-anxiety-inventory-for-adults. Accessed October, 12, 2016.
34. Walker, S., Brett, S., McKay, A., Lamden, S., Vincent, C., Sevdalis, N., (2011). Observational Skill-based Clinical Assessment tool for Resuscitation (OSCAR): Development and validation. Resucitation, 82(7): e835-e844. Retrieved from http://www.resuscitationjournal.com/article/S0300-9572(11)00200-0/fulltext