

Predicting Academic Progression for Student Registered Nurse Anesthetists

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In order to foster academic progression and improve retention in nurse anesthesia programs, admission selection criteria require attention. With the escalating cost of graduate education coupled with the current economic crisis, efforts by educational leaders to minimize attrition remain pivotal. Selecting potential candidates who are most likely to succeed, aligned with data-driven evidence, offers the greatest potential for academic success for student registered nurse anesthetists.

The purpose of this quantitative correlational study was to determine if a relationship existed between admission criteria (grade point average [GPA], science grade point average [SGPA], Graduate Record Examination

scores, and critical care experience) and academic progression (current academic status and GPA). Key findings revealed that statistically significant relationships exist between the admission selection criteria and academic progression. Findings also indicated that a combination of the independent variables, specifically the GPA and SGPA, predict academic progression. Further research that includes examination of cognitive and noncognitive admission criteria may offer greater evidence predicting academic performance by student registered nurse anesthetists.

Keywords: Academic progression, admission selection criteria, attrition, nurse anesthesia education.

Students applying to nurse anesthesia programs throughout the United States compete for a limited number of openings. Although program selection criteria vary, grade point average (GPA), science grade point average (SGPA), Graduate Record Examination (GRE) scores, and critical care nursing experience comprise the traditional criteria for admission consideration. In addition, programs may require letters of recommendation and interviews with prospective applicants.

Because of the limited number of openings in nurse anesthesia programs, not all applicants possessing the academic criteria and critical care nursing credentials required for consideration for admission remain viable candidates. Determining the candidates most likely to succeed based on the current admission criteria remains a formidable challenge for nurse anesthesia program administrators and faculty. Candidate selection using current admission criteria may not provide substantive data necessary for predicting student progression through nurse anesthesia programs.¹

Failure to meet academic guidelines required for continued progression for program completion places students in academic jeopardy. In some cases, dismissal follows persistent poor academic performance. Academic jeopardy extends the student stay in nurse anesthesia education, resulting in economic strain.² Dismissal from a nurse anesthesia program creates financial loss to the students, nurse anesthesia programs, and the university.³⁻⁵ Although academic failure represents one variable linked to attrition in nurse anesthesia programs, retain-

ing students remains pivotal for student and program success.⁶

In 2004 the American Association of Colleges of Nursing (AACN) recommended the Doctor of Nursing Practice (DNP) as the terminal degree for advanced practice nurses, including nurse anesthetists.⁷ Subsequently, the AANA adopted the proposal prompting the initiation of the practice doctorate.⁸ Increased educational rigor associated with doctoral education reinforced the need for examination of current variables required for entry to nurse anesthesia programs that foster successful academic progression.

A 20-year review of the literature offered no studies offering empirical evidence useful to nurse anesthesia program leaders or faculty regarding preadmission variables and the relationship to academic progression for student registered nurse anesthetists (SRNAs). Rather, nurse anesthesia literature examining preadmission variables remains confined to descriptive or outcome studies related to the national certifying examination or graduation from a nurse anesthesia programs.⁹⁻¹⁴

The purpose of this quantitative correlational study was to determine if a relationship existed between admission criteria (GPA, SGPA, GRE scores, and critical care experience) and academic progression (current academic status and GPA). Because a paucity of research related to variables predicting academic progression in nurse anesthesia programs exists, the current research study sought to document evidence regarding preadmission variables linked to academic progression. Expanding the existing body of knowledge regarding admissions criteria

offers the opportunity for guidance related to admissions procedures. Ultimately, minimizing attrition in nurse anesthesia programs assists in addressing concern regarding shortages of nurse anesthetists as well as nurse anesthesia faculty.^{3,15-18}

The research question for the study was as follows: What is the relationship between GPA, SGPA, GRE scores, and critical care nursing experience and academic progression for students admitted to nurse anesthesia programs?

Materials and Methods

Following approval by the institutional review board (IRB), a letter requesting participation was sent to 108 nurse anesthesia program directors. De-identified data including the preadmission GPA, SGPA, GRE scores, number of years of critical care nursing experience, and the current GPA and academic status were requested for students currently enrolled in nurse anesthesia programs. Demographic data, including student gender and age, were requested. All data were pooled, ensuring confidentiality and anonymity.

Prior to data collection and following IRB approval, 12 nurse anesthesia program directors were randomly selected to review and provide written comments regarding the data collection sheet (Excel, Microsoft, Redmond, Washington) and information requested for the research study. All 12 program directors responded, and the feedback was used to refine the Excel spreadsheet, thereby improving clarity and accuracy for data collection while enhancing internal validity and reliability.

Results

The quantitative correlational study examined if relationships existed between each of the independent variables (admission GPA, SGPA, GRE scores, and critical care experience) and the dependent variable academic progression (current GPA and academic status). Analysis of the data was performed using the Statistical Package for Social Sciences (SPSS) software (version 16.0, SPSS Inc, Chicago, Illinois). Correlation statistics were used to test the hypotheses set at the level of significance < .05.

- *Descriptive Statistics.* Descriptive statistics, frequen-

cies, percents, means and standard deviations (SDs) were conducted to investigate the research hypotheses. Of 108 nurse anesthesia program directors, 21 (19.4%) submitted the requested de-identified student record data totaling 914 records. Of 914 records, 406 (44.5%) represented male students and 508 (55.5%) represented female students (Table 1).

Frequencies and percents were conducted on the current student academic status. Results found that most of the students (n = 823; 90.05%) were not on any form of probation, academic warning, or dismissal, whereas only a few (n = 91; 9.95%) were (see Table 1). The mean response for student age was 31.56 years (SD = 2.52 years).

Means and standard deviations were calculated for admission GPA, SGPA, total GRE score, number of years of critical care experience, and current GPA. The results are displayed in Table 2.

- *Findings.* Preadmission selection criteria, including the GPA, SGPA, GRE scores, and the years of critical care nursing experience, as well as the student's current GPA and academic status represented the variables under study. The study determined whether a relationship existed between nurse anesthesia programs' admission criteria and academic progression through nurse anesthesia programs as evidenced by the student's current academic status and GPA. Each of the variables were individually examined and compared to determine if a relationship to academic progression exists. Further,

Gender	No.	Percent
Male	406	44.5
Female	508	55.5
Total	914	100.0
Poor academic status		
Yes	91	10.0
No	823	90.1
Total	914	100.0

Table 1. Frequencies and Percents for Gender and Frequencies and Percents on Academic Status (warning, probation, or dismissal)

Variable	No.	Minimum	Maximum	Mean	SD
GPA	914	2.21	4.00	3.46	0.33
SGPA	518	1.80	4.00	3.35	0.42
Total GRE score	653	580.0	1,510.00	1,014.17	154.30
CCE (no. of years)	914	0.50	20.00	3.93	3.10
Current GPA	914	0.86	4.00	3.70	0.32

Table 2. Means and Standard Deviations on GPA, SGPA, Total GRE, CCE Number of Years, and Current GPA
GPA indicates grade point average; SGPA, science grade point average; GRE, Graduate Record Examination; CCE, critical care experience.

variables were examined to determine if one variable predicts a meaningful relationship as compared with the other variables.

• *Hypothesis 1.* A null hypothesis and alternative hypothesis were proposed.

H1₀: There is no relationship between GPA and academic progression for SRNAs.

H1_A: There is a relationship between GPA and academic progression for SRNAs.

In order to assess hypothesis 1, a Pearson product moment correlation was conducted to examine if a relationship exists between admission GPA and the current GPA. The results reveal that there was a significant relationship between the admission GPA and current GPA— $r(914) = 0.31, P < .01$ —suggesting that as the admission GPA increases, current GPA will also increase. The null hypothesis was rejected, and the alternative hypothesis was accepted. The results are summarized in Table 3.

• *Hypothesis 2.*

H2₀: There is no relationship between SGPA and academic progression for SRNAs.

H2_A: There is a relationship between SGPA and academic progression for SRNAs.

In order to assess hypothesis 2, a Pearson product moment correlation was conducted to examine if a relationship exists between the admission SGPA and the current GPA. The results reveal that there was a significant relationship between admission SGPA and the current GPA— $r(516) = 0.28, P < .001$ —suggesting that as the admission SGPA increases, current GPA will also increase. The null hypothesis was rejected, and the alternative hypothesis was accepted. The results are summarized in Table 3.

• *Hypothesis 3.*

H3₀: There is no relationship between GRE scores and academic progression for SRNAs.

H3_A: There is a relationship between GRE scores and academic progression for SRNAs.

In order to assess hypothesis 3, a Pearson product moment correlation was conducted to examine if a relationship exists between current GPA and total GRE. The

results reveal that there was a significant relationship between total GRE and current GPA— $r(653) = 0.15, P < .001$ —suggesting that as total GRE increases, current GPA will also increase. The null hypothesis was rejected, and the alternative hypothesis was accepted. The results are summarized in Table 3.

• *Hypothesis 4.*

H4₀: There is no relationship between critical care nursing experience and academic progression for SRNAs.

H4_A: There is a relationship between critical care nursing experience and academic progression for SRNAs.

In order to assess hypothesis 4, a Pearson product moment correlation was conducted to examine if a relationship exists between current GPA and the number of years of critical care nursing experience. The results reveal that there was a significant inverse relationship between the number of years of critical care experience and current GPA, $r(914) = -0.14, P < .001$, suggesting that as the number of years of critical care experience increases, current GPA will decrease. The null hypothesis was rejected, and the alternative hypothesis was accepted. The results are summarized in Table 3. Table 4 presents a summary of hypotheses 1 through 4.

A multiple linear regression was conducted with GPA, SGPA, total GRE score, and number of years of critical care nursing experience predicting current GPA. Multiple linear regression was used to examine how much of a variance in the current GPA could be

Variable	Current GPA (N)
GPA	0.313 (914) ^a
SGPA	0.279 (517) ^a
Total GRE score	0.153 (653) ^a
CCE (no. of years)	-0.135 (914) ^a

Table 3. Pearson *r* Correlation Between Current GPA and Admission GPA, SGPA, Total GRE Score, and Critical Care Experience

GPA indicates grade point average; SGPA, science grade point average; GRE, Graduate Record Examination; CCE, critical care experience.

^a $P < .001$.

Independent variable	B	SE	β	<i>t</i>	<i>P</i>
Constant	2.38	0.19	12.24	<.001	
GPA	.026	0.06	0.25	4.33	<.001
SGPA	0.12	0.05	0.14	2.50	.013
Total GRE score	0	0	0.04	.87	.384
CCE (no. of years)	-0.01	0.01	-0.08	-1.66	.098

Table 4. Multiple Regression With GPA, SGPA, Total GRE Score, and CCE Predicting Current GPA

B indicates coefficient of predictor variables; GPA, grade point average; SGPA, science grade point average; GRE, Graduate Record Examination; CCE, critical care experience.

$F(4, 403) = 17.12, P < .001, R^2 = 0.145$.

explained by the combination of predictor variables: admission GPA, SGPA, total GRE score, and the number of years of critical care nursing experience. The results of the regression were significant: $F(4, 403) = 17.12, P < .001, R^2 = .145$; the independent variables accounted for 14.5% of the variance of the dependent variable. As GPA increases by 1 unit, current GPA increases by 0.264 units. As SGPA increases by 1 unit, current GPA increases by 0.118 units. The results are summarized in Table 4.

A logistic regression was conducted with GPA, SGPA, total GRE score, and number of years of critical care nursing experience predicting academic status (probation, warning, dismissal). The regression was significant, $\chi^2(4) = 26.70, P < .001, R^2 = .128$, and the independent variables accounted for 12.8% of the dependent variable's variance. The results suggest that for every 1-unit increase in GPA, participants were 4.2 times more likely not to have been on probation, and for every 1-unit increase in SGPA, participants were 3.0 times more likely not to have been on probation (Table 5).

Discussion

- *Grade Point Average (GPA)*. The results indicate that a statistically significant relationship exists between the admission GPA and the current GPA for SRNAs. Of the 4 independent variables examined, the GPA possesses the highest absolute r value (.313), indicating the strongest correlation with the admission GPA compared with the SGPA, total GRE score, and the years of critical care experience. The relationship suggests that as the admission GPA increases, the current GPA will also increase.

The result is consistent with findings of previous research.^{9,10,19-27} This result supports the seminal descriptive study identifying GPA as a vital admission criterion for SRNAs.¹⁰ However, the result contrasts with the findings of Cohen-Schotanus et al²⁶ and Kuncel and colleagues,²⁷ who found standardized testing to be more predictive of student success than the GPA. Cohen-Schotanus et al²⁶ found no relationship between the pre-

admission GPA and attrition. However, the researchers found high GPA scores correlated with preferred placement for residencies, greater scientific study by students, and less time to graduation. Kuncel et al²⁷ determined usefulness when combining the GPA and Graduate Management Admission Test (GMAT) for admission to business programs, but found that the GPA possessed less predictive value of student academic performance compared with the GMAT.

Newton and Moore,¹⁹ using retrospective correlational methodology, determined that the admission GPA represented the most significant variable for selection to graduate nursing programs. Although the researchers found the GPA predictive of admission GRE scores, whether to require both the GPA and GRE for graduate programs in nursing remains in question.¹⁹ Further study by the researchers determined that a strong relationship exists between the GPA and personal characteristics resulting in greater academic success.²⁰

Fish and Wilson²¹ as well as Sulaiman and Mohezar²² determined the usefulness of the GPA for selecting students to graduate programs in business programs. The researchers determined noncognitive variables, including student motivation and business experience, offered greater predictive value for academic success than GPA alone. Similarly, Kreiter and Kreiter²⁴ used a meta-analysis technique evidencing support for the continued use of GPA and Medical College Admission Test (MCAT) scores for student selection to medical schools. Utzman and colleagues²³ examined the use of preadmission variables predictive of academic success for physical therapy students. The researchers determined that GPA and GRE scores remain significant variables for student selection. Like Utzman et al, Young²⁵ found the GPA and GRE to be valid predictors of academic performance.

Although a paucity of nurse anesthesia literature exists specifically addressing the relationship of the admission GPA to academic progression, the relationship between the predictive nature of the admission GPA to

	B	SE	Wald	P	Exp(B)
GPA	1.44	0.56	6.66	.010	4.23
SGPA	1.08	0.49	4.97	.026	2.95
Total GRE score	0	0	0.42	.518	1.00
CCE (no. of years)	-0.03	0.05	0.35	.552	0.97
Constant	-5.24	1.80	8.50	.004	0.01

Table 5. Logistic Regressions With GPA, SGPA, Total GRE Score, and CCE Number of Years Predicting Academic Status (probation, warning, or dismissal)

B indicates coefficient of predictor variables; SE, standard error; Wald, tests significance for each predictor variable; Exp(B), changes in odds ratio associated with 1 unit change in predictor variable; GPA, grade point average; SGPA, science grade point average; GRE, Graduate Record Examination; CCE, critical care experience.

^a $\chi^2(4) = 26.70, P < .001, R^2 = 0.128$.

performance on the National Certification Examination for Nurse Anesthetists offers results consistent with the current findings.^{9,13} Zaglaniczny⁹ identified the GPA and the SGPA as significant variables predicting success on the national certifying examination following graduation from nurse anesthesia programs. However, Boytim¹³ determined that although the GPA was significant as a determinant for success on the board examination, the variance remained small owing to sample size (N = 128).

- *Science GPA.* A statistically significant positive relationship was found between the admission SGPA and current GPA for SRNAs. The result indicates that as the admission SGPA increases, the current GPA increases. The result is consistent with the findings of Haritos and colleagues¹⁰ and Reese.¹ Haritos et al¹⁰ identified the SGPA as a vital criterion for admission, in a descriptive study of preadmission variables.¹⁰ Reese suggested that cognitive variables may be an overemphasized criterion for admission.¹

To this author's knowledge, no prior studies exist demonstrating a correlation between the SGPA and academic progression for SRNAs. Therefore, the current study offers new information regarding the correlation between the SGPA and academic progression for SRNAs.

- *Graduate Record Examination.* A statistically significant positive relationship was found between the total GRE score and current GPA. The result indicates that a statistically significant relationship exists between the admission GRE score and the current GPA. This result suggests that as the total GRE increases, the current GPA will also increase.

The result is consistent with the findings of other authors.^{23,25,28,29} Utzman et al²³ and Young²⁵ found GPA and GRE score to be significant admission variables predictive of academic success. Grove and Wu²⁹ determined the usefulness of the GRE score as a predictor of academic success for students enrolled in doctoral economics programs. The researchers determined that GRE quantitative ability correlated significantly with completion of the PhD and with productive research. Holt et al²⁸ found GRE verbal scores not predictive of student research performance in graduate engineering programs, but they determined the GRE-verbal scores are predictive of GPA for graduates in the Air Force Institute of Technology.

The result contrasts with the research of some authors, however.^{14,30,31} Although Hulse et al¹⁴ found a poor correlation between the GRE scores and academic success, study results remained limited owing to examination of student scores in 1 program only. Norcross and colleagues³⁰ found GRE scores ranked lowest in the hierarchy for admission consideration to psychology programs, yet acknowledged that GRE scores remain heavily weighted for prospective applicants to graduate programs in psychology. Feely et al³¹ determined that GPA is predictive of student progression rather than the GRE for

students applying to graduate programs in communications. However, the researchers determined GRE verbal scores positively predicted graduation rates.³¹

- *Years of Critical Care Nursing Experience.* A statistically significant inverse relationship was found between the years of critical care nursing experience and the current GPA. The result suggests that as the number of years of critical care experience increases, the current GPA will decrease. No studies exist supporting or contrasting with the result of the current study for SRNAs. General studies support the nature of skills and critical thinking required by nurse anesthetists but lack empirical evidence to support a relationship between the number of years of critical care nursing experience and the current GPA indicating academic progression.³²⁻³⁴ Although Elnitsky et al¹¹ identified clinical experience required for selection to nursing anesthesia programs as a variable requiring additional research, no additional studies support or negate the study result.

Multiple linear regression was used to examine how much of the variance in the criterion variable "current GPA" could be explained by the combination of the predictor variables, including admission GPA, SGPA, GRE scores, and the number of years of critical care experience. Multiple linear regression revealed that 14.5% of the variance of the current GPA may be predicted by the combination of the independent variables, including the admission GPA, SGPA, GRE scores, and the number of years of critical care nursing experience. Multiple linear regression results were significant. When the GPA increases by 1 unit, the current GPA increases by 0.264 units. As the SGPA increases by 1 unit, the current GPA increases by 0.118 units.

Logistic regression was conducted with the GPA, SGPA, total GRE score, and number of years of critical care experience predicting academic status. Because academic status represented a dichotomous variable, logistic regression was used to explain how much variance in the academic status could be explained by the combination of predictor variables, including admission GPA, SGPA, GRE scores, and the number of years of critical care experience.

The logistic regression conducted with the GPA, SGPA, total GRE score, and number of years of critical care experience predicting academic status was significant, accounting for 12.8% of the dependent variable (academic status) variance. The logistic regression results were significant. The results suggest that for every 1-unit increase in admission GPA, students will be 4.2 times less likely to experience academic probation, warning, or dismissal. For every 1-unit increase in SGPA, SRNAs will be 3.0 times less likely to experience academic probation, warning, or dismissal.

Most of the students (n = 823; 90.05%) were not on any form of probation, academic warning, or dismissal

for academic reasons. The logistic regression result supports that the majority of students are less likely to experience academic probation, warning, or dismissal when considering the GPA and SGPA. Although most students were not on any form of probation, academic warning, or dismissal for academic reasons, the logistic regression signifies the predictive nature of the preadmission variables significantly influencing student progression. Whereas 12.8% of the variance in student status may be explained by the independent variables, the alternative variables influencing academic status remain in question.

- *Implications.* The current study established the need for educational leaders to examine admission criteria as the initial action supporting positive academic progression for all students. Identifying the best criteria for selection to nurse anesthetist programs based on evidence rather than using traditional variables demonstrates movement toward best practice in education beginning with the admission process. Findings from the current research revealed that a significant relationship exists between the admission GPA, SGPA, GRE scores, and the years of critical care experience with the student's current GPA and academic status. In addition, the predictive value of combining the admission criteria allows educational leaders to tailor admission criteria that may foster student progression and success. Defining the best admission criteria for judging potential applicants to nurse anesthesia programs remains critical in an effort to foster academic success and minimize attrition.

Correlation statistics offered the ability to discern the strength and relationship between the independent variables (admission GPA, SGPA, GRE scores, and years of critical care nursing) with the dependent variable (academic progression and student status). The correlational coefficient for each relationship offered the ability to discern the strength of the relationship. The higher the absolute value of the coefficient, the stronger the relationship.³⁵ For the present study, the GPA possessed the highest absolute value, followed by the SGPA, GRE scores, and number of years of critical care experience. The study provides nurse anesthesia educational leaders with substantive data to support or modify existing admission criteria. Furthermore, the study gives nurse anesthesia educational leaders the data to support or refine the weight associated with specific variables when considering applicants for admission to nurse anesthesia programs.

A multiple regression for all 4 variables offered the ability to discern which of the variables offered predictive value for determining student progression. Logistic regression offered the ability to discern which of the variables offered predictive value for academic status. Although the admission GPA, SGPA, GRE scores, and the number of years of critical care experience were individually correlated to the current GPA and academic status,

the GPA and SGPA remained the most predictive of the current GPA and student academic status. Therefore, GPA and SGPA remain important as selection criteria. Not all programs reported the SGPA during data collection (n = 518). All programs (N = 914) reported the GPA. Considering the strength of the relationship between the SGPA and current academic status, the SGPA may offer additional evidence when considering selection of nurse anesthesia applicants.

The GRE scores and years of critical care nursing experience represented the independent variables with small correlation and possessing little predictive value with academic progression when multiple regression and logistic regression were employed. Not all programs reported the GRE scores (n = 653). The usefulness of standardized testing remains in question. However, given the results of the study, including the GRE in applicant selection offers little meaning. In addition, the costs and benefits associated with the GRE preparation, study, and testing offer further consideration by educational leaders when discerning the best admission criteria on which to base applicant selection. Consideration of cost associated with standardized testing that offers a weak relationship to academic progression, specifically during the existing economic crisis, requires examination by educational leaders. Nurse anesthesia leaders remain in a pivotal position to employ cost-effective admission strategies.

The years of critical care nursing experience represented a negative correlation with academic progression. Although critical care nursing experience remains a variable required for admission to nurse anesthesia programs, the evidence suggests consideration in weighting the variable accordingly. The data suggest that as the number of years of critical care nursing experience increase, the current GPA may decrease. The interpretive value of the evidence may suggest the need to consider how alternative variables influence the correlation. Furthermore, alternative variables influencing the data may foster academic progression for student applicants possessing viable GPAs and SGPA's who also possess longevity as critical care nurses.

Student motivation, attitude, psychological profile, and other noncognitive variables may influence academic progression for students who have long experience as critical care nurses.^{14,36,37} In addition, the amount of time away from academia may influence academic progression rather than the number of years of critical care nursing experience. The weight attached to the number of years of critical care experience as a criterion for selection to nurse anesthesia programs requires further examination. The finding that the longer the experience that a person has in critical care nursing seems to indicate a lower GPA may suggest the need for some type of academic support for students who have been away from a classroom as students for an extended time.

Research aimed at determining variables influencing academic progression for students with lengthy clinical experience may offer valuable information for educational leaders. In addition, research addressing job performance following graduation as a nurse anesthetist may influence the selection of students with lengthy clinical experience with lower GPAs. No research exists offering guidance to nurse anesthesia program leaders when considering how to interpret the length of clinical experience and the relationship to academic success or job performance following graduation.

The present study revealed that only 9.95% of the 914 students in the sample were on any form of probation, academic warning, or dismissal. Although the results suggest a small number of students experiencing academic jeopardy, nurse anesthesia leaders may lower the statistic further by improving the existing method for applicant selection. By lowering the statistic, attrition rates may decrease.

Although the study results revealed that only 9.95% of the sample was on any form of academic warning, probation, or dismissal, attrition remains a critical concern for nurse anesthesia program administrators and the Council on Accreditation of Nurse Anesthesia Programs. Attrition of SRNAs negatively affects students, nurse anesthesia programs, and consumers of healthcare.^{3,4,38} Financial strain associated with attrition negatively affects students, programs, and universities.⁴ Avoiding financial strain, particularly during the current economic crisis, creates further challenges for educational leaders. Efforts by educational leaders to change existing admission selection criteria that foster academic progression may alleviate financial strain due to attrition.

As nurse anesthesia programs transition from master's degree to doctoral preparation as the terminal degree for nurse anesthetists, formulating strategic planning, including examination of the existing admission criteria, remains pivotal. Understanding the relationship of admission criteria to academic progression necessitates the need to change or modify the current criteria to advance best practices in education for nurse anesthesia leaders. Promoting successful progression and timely program completion for student nurse anesthetists fosters meeting societal healthcare demands secondary to the existing nursing shortage.³ Promoting successful progression and graduation from nurse anesthesia programs also facilitates the ability to supply faculty in light of the existing nurse anesthesia faculty shortage.^{3,15,16,39} The current study arms educational leaders with data-driven evidence to employ admission criteria consistent with positive student progression. Changing existing admission practices may lead to lower attrition and improve the supply of nurse anesthetists and nurse anesthesia faculty. Fauber⁴⁰ emphasized the need for educational leaders to attend to the admission process as a key element essen-

tial for ensuring graduate student success. The current study provides meaningful data for leaders to examine and potentially change existing admission practices. The study has fostered the need for nursing leaders to conduct further research supporting best educational practices.

Limitations existed for this quantitative correlational study. Variance in nursing education for applicants to nurse anesthesia programs represents layers of knowledge and experience precluding accurate interpretation of the data. Undergraduate coursework taken in a variety of settings, including universities, community colleges, and degree completion programs, complicates the ability to interpret the GPA and SGPA. Coursework taken in a variety of settings precludes the ability to discern the type of academic rigor and GPA. Further study is recommended to discern the unique differences specifically in the SGPA taken at a variety of educational levels. Further research may offer greater understanding of this important admission variable. Distinguishing SGPA differences based on the type of academic setting may predict academic progression to a greater degree than evidenced in the current study.

The current GPA requested for the study represented the student academic status at varying points in the nurse anesthesia program. Some GPAs may represent data consistent with students nearing graduation, whereas other GPAs may represent initial academic performance representing only 1 or 2 grading periods. A future correlational study may preclude this limitation by identifying a specific end point to define the current GPA, such as program completion.

Variance in critical care nursing experience represents another limitation. Pure analysis of the number of years of critical care experience negates the type of experience and the hospital setting that may influence an applicant's potential for success. Therefore, a study aimed at discerning not only the amount of critical care nursing experience but also the type and setting may offer additional evidence on which to select applicants to nurse anesthesia programs.

• *Recommendations.* Based on the study findings, data analysis, and the review of the literature, the author makes the following recommendations.

1. Retain the GPA as the primary criterion for selection to nurse anesthesia programs. Refrain from selecting students who possess GPAs below the published program standard.
2. Calculate the SGPA and include the SGPA for selection to nurse anesthesia programs. Refrain from selecting students who possess SGPAs below the published program standard.
3. Consider eliminating the GRE scores as admission criteria for nurse anesthesia graduate programs.
4. Retain the number of years of experience as a critical care nurse as a meaningful criterion for admission to

the extent that the applicant possesses a GPA and SGPA consistent with predicting academic progression. Refrain from weighting the years of experience lower for applicants with more experience, realizing that noncognitive variables may influence the ability of a student with numerous years of experience to excel.

5. When assigning a weighted score for the selection criteria, consider the relationship of the selection criteria to academic progression.

6. Consider employing noncognitive selection criteria, including writing samples, personality inventories, and interviews when determining applicant selection.

7. While considering the employment of noncognitive selection criteria, examine the weight assigned to cognitive versus noncognitive criteria.

8. Consider designing programs for nurses reentering academia with lengthy clinical experience. Reentry strategies designed for students remote from the classroom for extended periods may ease the transition from clinical practice to academia. Testing reentry strategies may provide additional data to improve the likelihood of success for students returning to academia.

9. Conduct research to determine the type of critical care nursing that may influence academic progression.

10. Conduct research to determine the influence on academic progression for SRNAs based on the type of science courses taken at the associate degree level compared with the baccalaureate level.

11. Conduct research to determine the influence on academic progression for nurses who possess baccalaureate preparation in nursing compared with nurses applying to anesthesia programs who have bachelor's degree completion programs following the associate degree in nursing.

Conclusion

Results of the quantitative correlational study remain restricted to nurse anesthesia programs. Results may inform educational leaders in other advanced graduate programs in nursing as well as other educational disciplines. Although the current study represents new evidence for consideration when selecting students to nurse anesthesia programs, additional research remains essential for refining the current admission selection process. Future research regarding admission selection criteria may also assist nursing leaders as nurse anesthesia programs transition from the master's degree to the doctoral degree.

Today's admission criteria require refinement to foster academic progression for students entering nurse anesthesia programs.¹ With the escalating cost of graduate education coupled with the current economic crisis, efforts by educational leaders to minimize attrition remains pivotal.⁴ Selecting viable candidates consistent with current data-driven evidence offer the greatest potential

for academic success for SRNAs. Gaining viable nurse anesthesia candidates who successfully progress will help minimize the existing nursing shortage and anesthesia faculty shortage.^{3,15,16} Societal healthcare demands influenced by the nursing shortage as well as the nurse anesthesia faculty shortage remain critical.^{3,39} Refining admission criteria and selecting SRNAs based on current evidence benefit students, faculty, nurse anesthesia programs, and societal healthcare needs.

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