


Pre-Admission Standardized Tests and the Relationship with Anesthesiologist Assistant Student Performance: A Retrospective Analysis

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Background: The Anesthesiologist Assistant (AA) profession is gaining popularity, and as such, the number of applicants and the number of AA programs are also increasing. There is no published data on what makes a good AA student – multiple studies exist in this regard for anesthesiology residents and medical students. The Medical College Admissions Test (MCAT) and the Graduate Record Examination (GRE) have shown to have some correlation with student success in other health professions. There is no data to suggest that they can indicate potential success or academic problems during AA school. As such, this study evaluated the impact of these standardized test scores and student success in both the preclinical and clinical curricula at the Emory AA program.

Methods: A retrospective analysis of MCAT scores and GRE scores was performed. 2-tailed Pearson coefficients were calculated to see if there was a relationship between higher MCAT and GRE scores and performance in our program.

Results: 2-tailed Pearson coefficients showed a moderately strong correlation between MCAT scores and our AA program's science curriculum. There was a weak correlation as well between GRE scores here. The correlation dropped slightly for the MCAT and performance during our clinical curriculum, and a similar drop was noted for the GRE.

Discussion: Our study shows that the MCAT appears to more strongly correlated with better performance in both the science curriculum of our program and also with our clinical program. The study likely implies that the MCAT appears to be a better gauge as to how a student will do in an AA program in comparison to the GRE. Further studies are needed to understand how to appropriately admit students who will successfully complete the rigorous AA program curriculum both at Emory and beyond.

Keywords: admission metrics, certified anesthesiologist assistant, anesthesia care team, student success, standardized test scores

Introduction

The Anesthesiologist Assistant (AA) career is a rapidly expanding health professions career that has seen tremendous popularity in the United States over the last several years. AAs are advanced practice providers who work in the anesthesia care team model, providing highly skilled anesthetic care to patients in a variety of settings.¹ AA schools are affiliated with national schools of medicine and offer a masters-level degree to their students, and they are seeing significant growth in terms of applications and interest.^{1,2} As such, more programs are also being developed. All of these programs have demanding basic science and clinical training curricula that work to prepare students to enter the anesthesia care team. The curriculum for AAs in the USA spans 24–28 months, and the program is divided into didactic coursework and clinical training. The didactic phase includes subjects such as pharmacology, physiology, anatomy, and patient monitoring, equipping students with a solid foundation in medical knowledge and anesthesia principles. Simultaneously, students participate in simulation labs to develop hands-on skills. The clinical phase immerses students in diverse settings, including hospitals and surgical centers, where they gain experience under the supervision of physician anesthesiologists and certified AAs.² This phase covers a wide range of anesthesia techniques and patient

populations, ensuring that graduates are well-prepared to provide safe and effective anesthesia care across various clinical scenarios. The curriculum is rigorous and aims to produce competent, highly skilled professionals capable of delivering high-quality patient care.^{1,2}

Very little published data exists for AA program directors to use in their admissions processes. While the physician (allopathic and osteopathic) programs,^{3–5} physician assistant programs,^{5–8} nursing programs,⁵ and podiatric programs⁹ have years of data that have shown which admissions criteria may predict student performance in their respective careers, AA programs lack both quantitative and qualitative data in the world of admissions. The only data that currently exists is that pre-admission grade point averages (GPA) shows a solid relationship with performance during the AA program.¹⁰

Standardized test scores have routinely been used in a variety of health professions fields to stratify applicants. Many studies exist evaluating the relationship between these objective admissions criteria and academic success. Kreiter et al showed a consistent moderate positive correlation of the Medical College Admissions Test (MCAT) with performance in medical school in their meta-analysis of twenty-nine studies.¹¹ The Association of American Medical Colleges furnishes large studies, updating them over many years, showing that while the MCAT and pre-matriculation grade point averages added something different to the admissions process, a combination of both together was a strong predictor of student success in medical school.^{4,10–12} A variety of other studies have also shown similar results. In the allied health professions, Yoho et al have shown that the MCAT did have some correlation with performance in the pre-clinical curriculum of a podiatric medical school.⁹ Studies in the physician assistant literature also show similar positive correlations with standardized test scores (specifically the Graduate Record Examination [GRE]) and performance on their national certifying examinations and GPAs during their programs.^{6–8}

To our knowledge, there currently is no published research looking at the correlation between MCAT and GRE scores and performance at an AA program. This study is a retrospective analysis of the association of these standardized test scores, and performance in the basic anesthesia science curriculum and the clinical curriculum of the Emory AA program, as measured by GPAs. Students are required to have either a GRE score or an MCAT score to apply to our program.

Methods

The Emory University Institutional Review Board has marked this study as exempt from review since it is considered non-human research with anonymized results, as defined by United States Department of Health and Human Services. The Emory AA curriculum begins with 4 semesters of demanding anesthesia-related science coursework. MCAT scores and GRE scores were accessed for the last five graduating cohorts. In each of these five cohorts, more students submitted GRE scores than MCAT scores, which is the typical trend for the Emory AA program. MCAT scores were converted to percentiles based on data accessed from the Association of American Medical Colleges MCAT website.¹³ Only the percentile associated with the quantitative section of the GRE were utilized for the purposes of this study. These percentiles were then linked to the respective GPAs earned by the student at multiple points throughout our curriculum. GPA was used as a surrogate for student performance, as it is an objective data point available for all students to mark student progress through our program. Of note, while clinical rotations do begin by the second semester, the grades associated with these rotations were removed for what will be referred to as the AA program science GPA (composed of all science related coursework in the first 4 semester of the program). GPAs at the end of the program mesh clinical performance into the final GPA.

Statistical Package for Social Sciences (SPSS) version 28 was utilized to analyze data. 2-tailed Pearson product correlation coefficients were tabulated to assess relationships between the following associations: between MCAT total percentile and AA program science GPA; between MCAT total percentile and AA program graduation GPA; GRE quantitative percentile and AA program science GPA; between GRE quantitative percentile and AA program graduation GPA. $P \leq 0.05$ was noted to be statistically significant.

Results

For the cohorts that were analyzed for this study, 81 students submitted MCAT scores and 96 submitted GRE scores. The mean MCAT score percentile was 58. The mean GRE quantitative percentile was 67. [Table 1](#) shows these data. Mean

Table 1 Number of Test Takers and Mean Percentiles

	N=	Mean Percentile
MCAT	81	58
GRE	96	67

Abbreviation: Medical College Admissions Test (MCAT); Graduate Record Examination (GRE).

Table 2 2-Tailed Pearson Product Correlations Medical College Admissions Test and Graduate Record Examination and Grade Point Averages

MCAT correlation with Science GPA	$r=0.425$
GRE correlation with Science GPA	$r=0.198$
MCAT correlation with Cumulative GPA	$r=0.351$
GRE correlation with Cumulative GPA	$r=0.146$

Abbreviation: Medical College Admissions Test (MCAT); Graduate Record Examination (GRE); Grade Point Average (GPA).

science GPAs across the cohort was calculated out to be 3.24. Mean GPA at graduation from our program was 3.46. MCAT percentile score showed a moderate, statically significant positive correlation with science GPA ($r=0.425$, $P=0.01$) as well as a moderate, statistically significant positive correlation with end of program GPA ($r=0.351$, $P=0.03$). GRE quantitative percentile scores were also positively correlated with first semester GPA, though was considered a weak correlation ($r=0.198$, $P=0.03$). GRE quantitative percentile score was also weakly correlated with end of program GPA, also statistically significant ($r=0.146$, $P=0.04$). [Table 2](#) shows all four of these data sets.

Discussion & Conclusions

Our data suggests that the MCAT may have a stronger predictive value in relation to GPAs and student success in the AA curriculum when compared to the GRE. Given that AA programs nationally do not have standardized admissions criteria and requirements, the implications of these data are important to suggest future directions.

The literature on the association between the MCAT scores and academic performance in medical school reveals a consistent positive correlation.^{9,11} Higher MCAT scores are generally predictive of better academic outcomes. Studies have shown that students with higher MCAT scores tend to perform better on course exams and have higher grades in their early medical education.¹² Additionally, these scores correlate strongly with performance on standardized exams such as the United States Medical Licensing Examination (USMLE) Step 1 and Step 2, which are critical milestones in a medical student's career.^{11,12} This predictive validity is largely attributed to the MCAT's comprehensive assessment of critical thinking, problem-solving abilities, and foundational knowledge in biological and physical sciences, which are essential for understanding and mastering medical school curricula. Our data also suggests a stronger correlation.

However, the reliance on MCAT scores as a primary admissions criterion has also been scrutinized. Some research points to the importance of non-cognitive factors, such as resilience, empathy, communication skills, and teamwork, which are not measured by the MCAT but are crucial for clinical performance and overall success in medical practice.^{3-5,14} These attributes often predict how well students will perform in the clinical years and in their professional careers. Consequently, some medical schools have started to incorporate holistic admissions processes that consider a broader range of factors, including extracurricular activities, personal statements, and interviews, to identify candidates who not only have strong academic capabilities but also possess the interpersonal skills necessary for effective patient care and collaboration within healthcare teams.³ This approach aims to balance the strengths of

MCAT scores with a more comprehensive evaluation of each applicant's potential to succeed in the multifaceted environment of medical practice.

Research on the Graduate Record Examination (GRE) and its predictive validity for performance in health professions programs, such as pharmacy, veterinary, and public health programs, indicates mixed results. Some studies suggest that higher GRE scores are associated with better academic outcomes, such as higher GPAs and success on licensing exams.⁵⁻⁷ The GRE's emphasis on verbal reasoning, quantitative reasoning, and analytical writing skills can correlate with the rigorous demands of graduate-level coursework. However, other research highlights the limitations of the GRE in predicting academic success and in predicting clinical or practical performance, emphasizing that non-cognitive factors like interpersonal skills, resilience, and hands-on experience play a significant role in a student's success in health professions.¹⁵⁻¹⁷

There continues to be a dearth of information related to admissions for AA programs. As the popularity of this profession increases and the number of AA programs increase, program directors and admission committees need data to help drive the selection process. Our statistics suggest that while the MCAT is certainly associated with better performance in our Emory AA program, the relationship begins to weaken slightly when the clinical curriculum is considered. Moreover, the GRE does have a positive correlation with performance in our program. Yet it is certainly much weaker in comparison to the MCAT. This relationship further weakens when the clinical grades are considered. These conclusions are similar to what was found in other health professions programs. As such, the MCAT may be a better gauge of performance during the pre-clinical coursework of AA programs.

The reasoning behind the MCAT being more solidly associated with better GPAs in our science curriculum likely has to do with the volume and importance of the sciences needed to perform well on the MCAT. Mastery of this focused material likely means that students are able to appropriately assimilate the challenging science coursework in an AA program. The GRE is slightly more generalized and may not allow programs to evaluate a student's ability to perform in focused science coursework. Of course, these are generalized conclusions with very little published data.

There are limitations to our study. This was a single center study, and curricula for AA programs do vary nationally. Also, as noted above, there are no standardized admissions requirements between programs. As such, trying to facilitate a multi-institution project looking at more data sources remains difficult. The confounder of clinical rotations also needs to be further clarified, since some positive correlations do exist between both the MCAT and the GRE. Further research on these implications is a future direction.

In conclusion, while MCAT and GRE scores provide valuable insights into the academic readiness of applicants to AA programs, it is crucial to recognize their limitations. The predictive validity of these standardized tests for academic performance is well-documented in other fields; however, the complex nature of anesthesia practice demands a broader set of skills and attributes that are not captured by these exams alone. Based on our data, program directors may want to consider utilizing the MCAT over the GRE for admissions purposes. It is important to note, however, programs need to select candidates who not only possess the intellectual capabilities but also the professional and personal qualities necessary to excel as AAs. Future research should continue to explore the multifaceted predictors of success in AA programs to refine admissions processes further and enhance the training of competent, compassionate healthcare professionals.

Disclosure

The authors report no conflicts of interest in this work.

References

1. About CAAs. American Academy of Anesthesiologist Assistants. available from: <https://www.anesthetist.org/about-caas/>. Accessed May 29, 2024.
2. AA Education and Certification. Association of Anesthesiologist Assistant Education Programs. available from: <http://www.aaaep.org/>. Accessed May 29, 2024.
3. Stratton TD, Elam CL. A holistic review of the medical school admission process: examining correlates of academic underperformance. *Med Educ Online*. 2014;19:22919. PMID: 24695362; PMCID: PMC3974177. doi:10.3402/meo.v19.22919
4. Kratzke I, Kapadia MR, Egawa F, Beaty JS. Medical Student Selection. *Surg Clin North Am*. 2021;101(4):635-652. PMID: 34242606. doi:10.1016/j.suc.2021.05.010

5. Salvatori P. Reliability and validity of admissions tools used to select students for the health professions. *Adv Health Sci Educ Theory Pract.* 2001;6(2):159–175. PMID: 11435766. doi:10.1023/a:1011489618208
6. Brown G, Imel B, Nelson A, Hale LS, Jansen N. Correlations between PANCE performance, physician assistant program grade point average, and selection criteria. *J Physician Assist Educ.* 2013;24(1):42–44. PMID: 23858825. doi:10.1097/01367895-201324010-00006
7. Honda TP, Patel-Junankar PA-C, MPAS D, Baginski PA-C, Robert MD, Scott RP. Admissions Variables: predictors of Physician Assistant Student Success. *J Phn Assis Educ.* 2018;29(3):167–172. doi:10.1097/JPA.0000000000000212
8. Andreeff R. Predictors of student success on the physician assistant national certifying examination. *J Physician Assist Educ.* 2014;25(3):36–39. doi:10.1097/01367895-201425030-00008
9. Yoho RM, Antonopoulos K, Vardaxis V. Undergraduate GPAs, MCAT scores, and academic performance the first 2 years in podiatric medical school at Des Moines University. *J Am Podiatr Med Assoc.* 2012;102(6):446–450. PMID: 23204195. doi:10.7547/1020446
10. Monroe KS, Bundy W, Greene Y, Jarvis G, Stever J, Patel GP. Impact of Pre-Admission Grade Point Averages on Anesthesiologist Assistant Student Performance at Emory University School of Medicine. *Adv Med Educ Pract.* 2024;15:611–614. PMID: 38948485. doi:10.2147/AMEP.S465374
11. Kreiter CD, Kreiter Y. A validity generalization perspective on the ability of undergraduate GPA and the medical college admission test to predict important outcomes. *Teach Learn Med.* 2007;19(2):95–100. PMID: 17564535. doi:10.1080/10401330701332094
12. Hanson JT, Busche K, Elks ML, et al. The Validity of MCAT Scores in Predicting Students' Performance and Progress in Medical School: results From a Multisite Study. *Acad Med.* 97(9):1374–1384. doi:10.1097/ACM.00000000000004754
13. Percentile Ranks for the MCAT Exam. Association of American Medical Colleges. available from: <https://students-residents.aamc.org/mcat-research-and-data/percentile-ranks-mcat-exam>. Accessed May 29, 2024.
14. Agahi F, Speicher MR, Cisek G. Association Between Undergraduate Performance Predictors and Academic and Clinical Performance of Osteopathic Medical Students. *J Am Osteopath Assoc.* 2018;118(2):106–114. PMID: 29379965. doi:10.7556/jaoa.2018.025
15. Sealy L, Saunders C, Blume J, Chalkley R, Bianchi C. The GRE over the entire range of scores lacks predictive ability for PhD outcomes in the biomedical sciences. *PLoS One.* 2019;14(3):e0201634. PMID: 30897086; PMCID: PMC6428323. doi:10.1371/journal.pone.0201634
16. Bell SM, Blumstein J, Brose K, et al. Defining success in graduate school. *Mol Biol Cell.* 25(13):1942–1944. PMID: 24970485; PMCID: PMC4072567. doi:10.1091/mbc.E14-03-0793
17. Kurysheva A, Dilaver G, Fox CM, Kell H, Kern MR, van Rijen HVM. To Test or Not to Test? The Graduate Record Examinations: predictive Validity toward Graduate Study Success on Research Masters' Programs in a Large European University. *Educ Sci.* 2024;14:549. doi:10.3390/educsci14050549

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