



# **Influence of Pre-Medicine Course GPA and National Medical Admission Test Percentile Rank on First Year Medicine GPA Among College of Medicine Students: A Retrospective Review**

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## **ABSTRACT**

The criteria used by medical schools in the Philippines and the Adventist University of the Philippines College of Medicine (AUPCOM) in admissions selection of future doctors are generally the same. These include academic ability, based on the cognitive Pre-Medical Course Grade Point Average (Pre-Med GPA) and the National Medical Admission Test percentile rank (NMAT score). Other non-cognitive essential criteria are gleaned through personal interview or written essays, such as insight into medicine, extracurricular activities and interests, personality, motivation, high work standards, and communication skills. Objective evidence justifying the use of such criteria is an area that AUPCOM intended to investigate as basis for evaluating applicants to the medical school. This retrospective study utilized 153 students from the first four consecutive cohorts (from Batch 2019-2022) of medical students who were accepted in AUPCOM. The data taken from the COM records were strictly handled with utmost confidentiality. Statistical analysis consisting of mean, standard deviation, percentage, correlation, and regression was employed. The NMAT percentile rank of the medicine students had an average of 72.01, with a Pre-Med GPA of 90.69 (B) and first year Medicine GPA of 84.6 (C+). The bivariate correlation revealed significant positive relationship of NMAT score and Pre-Med grade to the first year Medicine GPA. Regression analysis revealed that Pre-Medicine course GPA and National Medical Admission Test Percentile Rank were both predictors of the first year medicine GPA among College of Medicine students. This result can be an eye-opener to medical schools on the percentage weight given to NMAT percentile rank as one of the major criteria in the selection process of future doctors. Future research needs to include other predictors of performance in Medicine since Pre-Med GPA contributes only 13.2% of the variance in medicine students' first year Medicine GPA.

**Keywords:** GPA, Pre-Medicine Course GPA, First Year Medicine GPA, NMAT Percentile Rank, NMAT Score, Retrospective Study

## **INTRODUCTION**

The Adventist University of the Philippines - College of Medicine opened its medical program in academic year 2015 - 2016. As a Seventh - day Adventist health science institution the AUPCOM adheres to the principles of integration of faith and learning that “aims to restore man into the image of his Maker”. Its mission is to provide excellent Christian education and training through scholarly instruction, character building, and spiritual formation. Its vision is to achieve national recognition in medical education and social service ultimately becoming a training center for world class Christian medical professionals in the Asia - Pacific region (Manual of Academic and Non-Academic Policies, 2019).

Selection of students into medical school is a high profile, contentious, and high stakes exercise. Selection typically serves two distinct purposes: to reduce the large number of otherwise qualified and capable applicants to match the number of places available, and to accept medical students deemed most likely to succeed in what is considered an arduous program of study, to subsequently become effective members of the profession. In the Philippines, the National Medical Admissions Test (NMAT) has to be taken and passed successfully with the CHED-designated 40th percentile rank as the passing score, prior to application into any medical school. There are equivalent written admissions examinations in other countries. The AUP College of Medicine has appointed an Admissions Committee whose function is to provide a fair and just selection process for deserving students using the combination of Pre-Med GPA, NMAT percentile rank, and interview.

The AUPCOM, being on its fifth year of operation, can now evaluate the first four consecutive cohorts of Medicine batches which have data on First Year Medical School GPA, which can be compared with Pre-Med GPA and NMAT percentile rank.

The AUPCOM Criteria for evaluating applicants to the medical school consist of: Pre-Med GPA = 40%, NMAT percentile rank = 30%, and Interview (Verbal/Written) = 30% to make a total of 100% (Manual of Academic and Non-Academic Policies, 2019). This study analyzed whether the cognitive admission criteria of Pre-Med GPA and NMAT percentile rank serve as significant predictors of the students' GPA in their first year of medical school, and further determined the extent of contribution of these variables in predicting the first year Medicine performance of the students.

The impetus of the study was the observation among the first four batches of medical students at AUPCOM of relative inconsistency as to their first year academic performance, as evidenced by their first year Medicine GPA versus their Pre-Medical course GPA, as well as their NMAT

percentile rank. It was observed that a number of freshmen medical students who had relatively high Pre-Med GPA, even graduating with Baccalaureate Latin honors, turned out with low academic performance, as gleaned from low GPA at the end of first year Medicine; while on the other end of the scale, those who had relatively lower Pre-Med GPA and NMAT percentile rank, turned out with even relatively higher academic performance, as reflected in a higher first year Medicine GPA.

The questions therefore that we aimed to address in this study are:

1. How do college of medicine students perform in their Pre-Medicine Course and in National Medical Admission Test?
2. Is there correlation of Pre-Med GPA and NMAT percentile rank on the first year academic performance of the medical students of the AUP College of Medicine, based on their First Year Medicine GPA?

## **LITERATURE REVIEW**

The correlation of the NMAT score (or its equivalent in other countries) with the academic performance of the students in Medical school (Med GPA) on one hand, versus the correlation between the Pre-Med GPA and the Med GPA on the other hand, have long been the concern of medical schools in assessing the validity of their admissions criteria. This important area of inquiry is so essential in determining which admissions selection criteria would serve as significant predictors of academic performance in medical school.

Foreign universities have embarked on studies to determine the significant predictors of academic performance in medical school, to aid in their admissions selection process .

In a systematic review done by Ferguson, James, and Madeley in the United Kingdom (2002), they were able to show that consistent with reviews , academic or cognitive ability was a moderate predictor of success in undergraduate medical training. All other factors such as interviews, personality tests, learning styles may have low predictive power in relation to achievement in medical education.

In Australia, at the University of Queensland, Wilkinson, Zhang, Byrne, Luke, Ozolins, Parker, and Peterson (2008) had concluded in their study on medical school selection criteria that the Pre-Med GPA was most strongly associated with medical school performance , followed by interview score and least with GAMSAT (Graduate Australian Medical School Admissions Test). The results of his study have resulted to the modification of their medical admissions selection process.

On the other hand, in China the study done by Zhou, Zhao, Wan, Peng, Yang, and Ou (2014) found that their NCEE (National College Entrance Examination) score was an important predictor of the first year Med GPA, hence concluding that NCEE remains to be the “gold standard” as a valid evaluating tool for selecting medical students, although it is not the sole predictor of academic performance.

In Saudi Arabia, the results of Abdulrahman’s study (2008) support the need for a prerequisite minimum GPA in the premedical year before proceeding to higher levels. The GPA of the pre-medical year was a useful predictor of students who need close monitoring and academic support once admitted into medical colleges.

In Indonesia, the study made by Manuputty, Yusuf, Patellongi, As’ad, and Budu (2015) had concluded that national admission test scores were significantly correlated with preclinical and clinical GPAs and with Indonesian Medical Doctor Competency Examination (UKDI) scores, but the correlations were seen only in certain medical schools. Preclinical year GPA was significantly correlated with UKDI score and the result was consistent on all medical schools.

In a study of fourteen American medical schools, Julian (2005) found that medical school grades were best predicted by a combination of medical college admission test (MCAT) scores and undergraduate GPA, and he strongly concluded that the “MCAT performs well as an indicator of academic preparation for medical school, independent of the school-specific handicaps of undergraduate GPA.”

Concurring with the above study is the research of Miagliarreti, Bozzaro, Siliquini, Stura, Costa, and Cavallo (2017) in the School of Medicine of Turin, Italy which concludes that university admission test scores are able to predict subsequent academic success in the first year of medicine course, and that the test is therefore useful for both students and medical schools.

Local studies in the Philippines on these cognitive selection criteria of NMAT and Pre-Med GPA have shown varying results. At the West Visayas State University College of Medicine, in Iloilo, Philippines, Posecion (2018) had shown that the academic performance was significantly influenced by the NMAT percentile rank in favor of those with very high scores ( $\geq 95$ ); the pre-medical degree in favor of those with highest GPA (1.0-1.5); and the sex in favor of females. According to his study, the pre-medical baccalaureate degree, the Pre-Med GPA, and the sex are predictors of academic performance; with Pre-Med GPA, being the most significant predictor.

One correlative study done by Rigor, Co, and Sin (2018) at the medical school of the University of Santo Tomas in Manila concluded that there is significant and higher correlation between the undergraduate grades (Pre-Med GPA) and the first year medical school grades (Med GPA) as compared to the NMAT and the academic performance in medical school.

A similar result was obtained in the study of Valbuena, Castillo, Villalon, and Dimaano (2011) at the University of the Philippines College of Medicine (UPCM) in Manila, which showed that the Pre-Med general weighted average grade (GWAG) had higher correlations to Med GWAG than NMAT scores. In terms of PLE scores, the Med GWAG showed the highest correlation, followed by Pre-Med GWAG, then NMAT scores least of all.

Also at the UPCM, in a large study of 23 cohorts from 1990-2012, done by Catabijan, Ignacio, and Canal (2017) results showed that all criteria for admissions (Pre-Med GPA, NMAT, and Interview Score) were correlated with the academic performance parameters (Med-GPA and Class Rank) and Board Rating, but the strongest correlation was observed in the Pre-Med GPA with Med-GPA and Class Rank.

The significant predictive value of the NMAT score is supported by two studies: first, a study by Balcita, Langcaun, Medalla, Paz, and Tabigue (2017) of the University of the Visayas – Gullas College of Medicine, in Cebu, Philippines showing a significant correlation between the NMAT scores and academic performances of the first year students; and second, a study presented by Facton, Geraldoy, Karaan, Que, Tan, and Buzon (2019) at the UST medical school showing that NMAT scores have a significant moderate negative correlation with the rate of taking remedial examinations among the 2009-2010 entrants to the school, and that almost 50% of the likelihood of taking remedials is attributable to low NMAT scores.

## **METHODS**

This retrospective study utilized all students from the first four batches who were accepted into the College of Medicine. Of the 153 medicine students, 11.1% were from Batch 2019, 26% from Batch 2020, 33% from Batch 2021, and 30.1% from Batch 2022. Table 1 present the distribution in terms of AUPCOM batch, sex, and course.

Table 1. Frequency Distribution of Batch 2019 to Batch 2022, Sex and PreMed Course

Batch		Frequency	Percent
Valid	Batch 2019	17	11.1
	Batch 2020	40	26.1
	Batch 2021	50	32.7
	Batch 2022	46	30.1
	Total	153	100.0

  

Sex		Frequency	Percent
Valid	Female	101	66.0
	Male	52	100.0
	Total	153	

  

Course		Frequency	Percent
Valid	BMLS	76	49.7
	BS Biology	24	15.7
	BS Nursing	17	11.1
	Other courses	36	235
	Total	153	100.0

The majority of these Medicine students were females (66%) and had pre-Medical courses such as Medical Laboratory Science (49.7%), BS Biology (15.55), and BS Nursing (11.1%). The data taken from the COM records were strictly handled with utmost confidentiality. Statistical analysis consisting of mean, standard deviation, percentage, correlation, and regression was employed.

## RESULTS

The NMAT percentile rank of the medicine students had an average of 72.01, with a Pre-Med GPA of 90.69 (B) and first year Medicine GPA of 84.6 (C+), with their corresponding standard deviations. As shown in Table 2, the first year Medicine GPA was at 2.87 with % average equivalent of 84.06.

Table 2. Respondents' PreMed Profile in terms of NMAT, Entering Grade Average Equivalent, First Year Medicine Grade

	Mean	Std. Deviation
NMAT	72.01	14.00
Entering Grade % Average Equivalent	90.69	5.35
First year Med GPA	2.87	.31
First year Med GPA (% Average Equivalent)	84.06	3.55
Valid N (listwise)		

**Correlates of First Year Medicine GPA**

**Table 3. Correlations Analysis of NMAT, Entering Grade % Average Equivalent, and First Year GPA**

		NMAT	Entering Grade % Average Equivalent	First year Med GPA
NMAT	Pearson Correlation	1	.120	.241**
	Sig. (2-tailed)		.141	.003
	N	153	153	153
Pre-Medicine Course GPA	Pearson Correlation	.120	1	.379**
	Sig. (2-tailed)	.141		.000
	N	153	153	153

\*\* . Correlation is significant at the 0.01 level (2-tailed).

The bivariate correlation revealed significant positive relationship of NMAT score and first year Medicine GPA ( $r = .241$ ) and between Pre-Medicine course GPA and First Year Medicine GPA ( $r = .379$ ) among College of Medicine Students. These results showed that students with high Pre-Medicine GPA and with higher NMAT percentile rank have higher First year Med GPA.

**Table 4. Regression Analysis on the Predictors of First Year Medicine GPA**

Coefficients <sup>a</sup>							
	Model	Unstandardized Coefficients		Standardize d Coefficients Beta	t	Sig	R Squared Change
		B	Std. Error				
1	(Constant)	62.150	4.637		13.404	.000	
	Entering Grade % Average Equivalent	.242	.051	.364	4.734	.000	
2	(Constant)	59.828	4.653		12.857	.000	
	Pre-med Course GPA	.229	.050	.345	4.548	.000	.132
	NMAT	.048	.019	.188	2.475	.014	.035
R = .409 F = 14.66 Sig. = .000							Total R Squared = .167

a. Dependent Variable: First year Med GPA (% Average Equivalent)

Regression analysis revealed that Pre-Med GPA and NMAT percentile rank were both predictors of the first year Med GPA among College of Medicine students. The total variance

accounted for by the two predictors to the First year Med GPA is 0.167 or 16.7%. Of the 16.7%, 13.2% is contributed by Pre-Med GPA and only 3.5% is contributed by the NMAT score.

## **DISCUSSION**

This study shows that the two cognitive admissions criteria used in the selection process, the NMAT score and the Pre-Med GPA, are both predictors of the subsequent first year academic performance, although the Pre-Med GPA contributes more than the NMAT score in predicting the medical students' first year Medicine GPA. This finding jives with the studies of Rigor et al. (2018), Valbuena, et al. (2011), Posecion (2018), and Catabihan et al. (2017), wherein the undergraduate GPA compared to the NMAT score had a higher correlation with the Med GPA.

This result can be an eye-opener to medical schools on the percentage weight given to these factors as the major criteria in the selection process of future doctors. Future research needs to include other predictors of performance in Medicine since Pre-Med GPA contributes only 13.2% of the variance in Medicine students' first year Medicine GPA.

In the study of Posecion (2018) at the WVSU, results showed that in addition to Pre-Med GPA and NMAT score, sex is also a predictor of academic performance in medical school. Likewise, in the study of Zhou, et al. (2014) it is concluded that although the National College Entrance Exam (NCEE) is considered the "gold standard" for admission to medical school in China, it is not the sole determinant, because, interestingly, the female students had a higher GPA than male students, and students whose parents have a higher income tended to have lower GPA.

### **Conclusion and Recommendation**

The researchers cannot discount the fact that other non-cognitive factors, mentioned in other studies, such as the overall attitude toward medical schooling, personality type, motivation, study habits, learning styles, work ethic and standards, communication skills, family and personal concerns, sex, ethnicity, interests and extracurricular activities, as well as adjustment issues, might have played a significant role in the academic performance in first year medical school, as shown by the studies of Ferguson, et al. (2002), Posecion (2018), and Zhou, et al. (2014).

Having obtained from this study the low predictability of NMAT rank in the eventual first year medical school academic performance (Med GPA), these authors therefore recommend a revision of the AUPCOM admissions criteria, much similar to the recommendation of the

Australian study done by Wilkinson, et al. (2008), wherein modification of the medical admissions selection process was implemented, based on the research finding of strong correlation of Pre-Med GPA to medical school performance, followed by interview, and least correlation with the government admission test.

To comply with the strict designation by the Philippine Commission on Higher Education Technical Committee on Medical Education (CHED-TCME) of 40 percentile rank as the requisite NMAT score for acceptance to every medical school (CHED Memorandum Order No. 18, Series of 2016) in the country, the AUPCOM will continue to use the NMAT score as a basic screening tool, but the weight percentage as a criterion will be lowered. The recommendation of this study therefore is a modification of the the breakdown of the AUPCOM Admissions Selection Criteria as follows: Pre-Med GPA = 50% (an increase from previous of 40%), having been found to be a significant predictor; NMAT Score = 20% (a decrease from previous of 30%), having been found to have lower predictive value; and Interview = 30% (to be unchanged), to make up a total of 100%.

Future studies are encouraged to evaluate other non-cognitive predictors of medical academic performance.

## REFERENCES

- Adventist University of the Philippines College of Medicine. (2019 Edition). *Manual of academic and non-academic policies*. Cavite, Philippines: Adventist University of the Philippines.
- Al-Mazrou, A. M. (2008). Does academic performance in the premedical year predict the performance of the medical student in subsequent years? *Journal of Family and Community Medicine*, 15(2).
- Balcita, J. R. P., Langcauon, D. J. C., Medalla, M. J. D., Paz, C. M. D., and Tabigue, V. A. P. (2015). *The Relationship of National Medical Admission Test (NMAT) scores and academic performance of first year students at the University of the Visayas – Gullas College of Medicine of school year 2013-2014*. University of the Visayas-Gullas College of Medicine Publication.
- Catabijan, C. G., Ignacio, S. D., and Canal, J. P. A. (2017). Predictors of academic performance of medical students of University of the Philippines College of Medicine: Class 1990 to Class 2013 Lateral Entrants. *PJHRD*. Retrieved from <http://phrd.edu.ph/index.php/main/article/view/196>
- CHED Memorandum Order No. 18, Series of 2016. *Policies, Standards and Guidelines for the Doctor of Medicine (M.D.) Program*.

- Facton, R. T., Geraldoy, I. R. G., Karaan, C. J. M., Que, S. K. C., Tan, E. J. L., and Buzon, R. M. (2019). SlideServe. *The relationship between NMAT scores and the rate of taking remedial examinations during the first year in medical school of 2009-2010 entrants to University of Santo Tomas Faculty of Medicine and Surgery*. Retrieved from <http://slideplayer.com/slide/91495561>
- Ferguson, E., James, D., and Madeley, L. (2002). Factors associated with success in medical school: systematic review of the literature. *British Journal of Medicine*
- Julian, E. R. (2005 October). Validity of the medical college admission test for predicting medical school performance. *Journal of the American Association of Medical Colleges*, 80(10).
- Manuputty, J., Yusuf, I., Patellongi, I., As'ad, S., and Budu. (2015). Correlations between medical students national admission test score, preclinical and clinical year mean cumulative GPA and UKDI score. *American Journal of Educational Research*, 3(6).
- Migliaretti, G., Bozzaro, S., Siliquini, R., Stura, I., Costa, G., and Franco, C. (2017). Is admission test for a course in medicine a good predictor of academic performance? A case control experience at the School of Medicine of Turin. *BMJ*, 7(11). Retrieved from <http://dx.doi.org/10.1136/bmjopen-2017-017417>
- Posecion, Manuel J. (2018 January). *Pre-enrolment background variables: Their influence on medical performance*. HERDIN Record #: R06-WVSU-18011016373410.
- Rigor, E. M., Co, B. G., and Sin, R. L. (2018 May). *Assessing the validity of the NMAT: A correlative study on medical school performance at the University of Santo Tomas*. HEERDIN Record #: PCHRDPC923166
- Valbuena, M. N., Castillo, T. R., Villalon, P. T., and Dimaano, T. L. (2011). Correlation of National Medical Admission test scores, general weighted average grade in pre-medical courses, general weighted average in Medicine and the Physician Licensure Examination scores among medical graduates of the University of the Philippines College of Medicine. *Acta Medica Philippina*, 45(3).
- Wilkinson, D., Zhang, J., Byrne, G.J., Luke, H., Ozolins, I. Z., Parker, M. H., and Peterson, R. F. (2008 March). Medical school selection criteria and the prediction of academic performance. *MJA*, 188(6).
- Zhou, Y-X., Zhao, Z-T., Li, L., Wan, C-S., Peng, C-H., Yang, J., and Ou, C-Q. (2014 April). Predictors of first-year GPA of medical students: a longitudinal study of 1285 matriculates in China. *BMC Medical Education*. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4004455/>