Financial Implications of Increasing Medical School Class Size: Does Tuition Cover Cost?

Danny A Schieffler, Jr, PhD; Benjamin M Azevedo; Richard A Culbertson, PhD; Marc J Kahn, MD, MBA

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Abstract

Introduction: In 2006, the Association of American Medical Colleges (AAMC) issued a recommendation that medical schools increase the supply of physicians by 30% to meet the patient needs of the new millennium.

Objective: To provide financial analysis of the cost of increasing class size.

Methods: To determine the financial consequences of increasing medical student enrollment and in the absence of nationally published cost data for medical schools, adjusted secondary revenue data was analyzed using AAMC and Liaison Committee on Medical Education (LCME) financial data from 2009. Linear regression analysis was used to determine average fixed costs and variable cost per student in USD.

Results: In USD, $62,877 represents the best point estimate of the annual variable cost of educating a medical student.

Conclusion: Comparing this cost to current tuitions and fees of LCME-accredited medical schools suggests that revenues other than tuition are needed to cover increases in class size. Tuition and fees revenue from increasing enrollment will not increase overall revenue to medical schools.

Introduction

The 1910 Flexner report established basic requirements for admission to medical schools, set the length of general medical education, and recommended university affiliation as a means of providing better academic oversight among other sweeping reforms.[1] Flexner further set priority to the theoretical triadic framework of education, research, and clinical care that would become the objective of the majority of medical schools today. Little attention was paid at the time to the monetary burdens of this framework. Understanding the finances associated with modern academic medicine has become mired in layers of administrative funding sources and ancillary revenue streams that vary across schools. One difficulty in appreciating the economic structure of academic medicine lies in distinguishing the measurement of the cost of education apart from the other functions of an academic medical center.[2] Explicitly, what does it cost to educate one medical student for one year and would an increase in the number of medical students necessarily increase revenue to the school for its overall mission? If it does not, by how much must those payments be adjusted such that more students creates more revenue to the school given the general costs associated with education related expansion?

Studies addressing this issue have only skimmed the surface of the number of variables that such questions encompass. The Association of American Medical Colleges (AAMC) issued a recommendation that graduates of "LCME [Liaison Committee on Medical Education]-accredited medical schools should be increased by 30%" through both increases in existing class sizes and through the development of new medical schools.[3] This equates to raising the number of graduates in allopathic medical schools to 21,434 on the basis of 2002 matriculate numbers. This increase is needed in large part because of the growing age of the general population and the relative flat matriculation rates of US medical students.[4] Although these recommendations include suggestions for studies on the impact of market forces, little attention has been paid to the financial ramifications of student increases on the fiscal health of the parent school.

In follow-up, the AAMC presented the results of a 2006 survey addressing expansion planning in medical schools. Of the reporting schools, 58.6% had planned to increase enrollment at the time with a majority reporting a strategic increase of 5 or more students in the 2011-2012 academic year.[5] This is in accordance with the additional recommendation that schools slowly add to class enrollment and not overwhelm the educational balance. Some schools were reporting much larger increases. However, only 63 of the 121 schools responding to the survey acknowledged conducting "financial analysis" on this topic. Some schools, however, reported increasing faculty numbers and reconfiguring and constructing new teaching space in anticipation of class expansion without mentioning fiscal expectations or analysis.[5] Although cost was considered a "major" expansion barrier for some schools, few indicated that expansion would not take place at some future date hence the need for further research into cost allocation.[5]

Paradoxically, in the 2009 Enrollment Survey, 12 schools had developed plans to reduce enrollment as a result of the slump in the US economy.[6] This decline in enrollment pushed the projection of a 30% increase in medical school

Danny A Schieffler, Jr, PhD, is Manager of Doctoral Studies in the Office of Research & Doctoral Studies in the Steinhardt School of Culture, Education, & Human Development at New York University, NY. E-mail: das24@nyu.edu. **Benjamin M Azevedo** is a Third-Year Medical Student and is pursuing a Masters of Public Heatlh in the Department of Global Health Systems and Development at the School of Public Health and Tropical Medicine at Tulane University in New Orleans, LA. E-mail: bazevedo@tulane.edu. **Richard A Culbertson, PhD,** is a Professor of Public Health in the Department of Global Health Systems and Development in the School of Public Health and Tropical Medicine at Tulane University in New Orleans, LA. E-mail: rculber@tulane.edu. **Marc J Kahn, MD, MBA,** is a Professor of Medicine in the School of Medicine at Tulane University in New Orleans, LA. E-mail: mkahn@tulane.edu.

graduates to 2018. Despite this, 83% of 125 medical schools have increased their enrollment. The largest increases have been, and are anticipated to occur, in publicly funded medical schools as opposed to privately funded schools. Funding of public medical schools is often more fluid than that of private schools, which must rely on somewhat limited resources in the absence of state funding.[7,8] Yet, only 28% of all schools in that survey believed that the economic recession would affect their ability to increase class sizes in the future albeit in the absence of any national cost analysis. Given these results, it would appear that few schools have noticed or have been unable to absorb the financial impact of increased enrollment. One assumption might be that funds outside of tuition and fees are used to support the educational mission or that the larger enrollment numbers are being absorbed using existing staffing and facilities. Or, another possibility is that the increased tuition gained is indeed enough to cover those new costs. However, without some analysis of those numbers, it is difficult to determine.

Additionally, much has been written about the impact of medical student debt on future career choice and community involvement.[9-11] Medical schools should evaluate the impact of increasing tuition as both a financial and social burden. Schools considering tuition increases to offset enrollment costs face the challenge of justifying those increases in light of a number of factors that recommend against it such as access to financial aid, competing funding requests from allied health sciences, and general student ability to repay.[12-14] Yet, the impact that tuition revenue can have on institutions has not been widely examined because of the difficulty of isolating direct revenue streams to education as a function of that tuition versus other funding sources across the entire spectrum of US medical schools.[15-17]

However, isolating the financial impact on institutions from tuition revenues can be done, but few studies have attempted to address that influence beyond any individual schools. This is further impeded as schools are not required to report cost inputs in relation to education to any national organization thus making comparisons between institutions difficult. One study examined the cost of education and other expenses in contrast to the consumer price index and its medical component of two teaching hospitals. The authors concluded that the impact of medical education does indeed affect the overall financial balance of academic health centers. That is, they determined that loss of medical education revenues (both undergraduate and graduate medical education) would have a negative effect on the financial viability of these hospital-based institutions. However, we drew no conclusions on the impact of tuition revenue as a function of class size specifically to schools.[18]

Other work isolated the actual cost of educating medical students with greater specificity.[19] Virginia Commonwealth University used a compound method of average scheduled instruction workload, salary rates of faculty, and faculty-to-student ratios to determine that $69,992 was necessary to educate 1 medical student per year.[19] On a larger scale, studies conducted at the University of Wisconsin took a much broader approach to calculating cost by simplifying the methods of assigning budget dollars to the various aspects of medical education.[20] They concluded that 60% of budgeted education revenues to departments went to medical education within their system with the remaining funds used for research, for faculty support, and for development.

Most recently, a global independent commission examined financing of medical education on an international scale.[21] Using a combination of micro and macro approaches, the North American estimated expenditure per graduate is $497,000 based on 2008 data with an average, global cost per medical graduate of $122,000.[21] Western Europe at $400,000 is the only territory measured in this work that approaches the North American estimate. This has direct implications for this current work given its relation to other physician-producing countries and the further acknowledgment that more research is needed to determine financial considerations of medical education in the US.

Of those schools not covering costs, 91% were public and 9% private.

Methods

Given the absence of nationally published cost data by institution directly related to education, raw data for our study came from the 2009 LCME Part-1-A Annual Financial Questionnaire (AFQ), taken from the AAMC's Medical School Profile System (MSPS) Database. This database provides 7 categories of revenues for each of the 131 LCME accredited medical schools except for the newly established Virginia Tech Carillion. On the basis of the assumption that these funds were most reasonably allocated to the cost of educating medical students, we chose 3 revenue streams for our analysis.[8] Total Tuition and Fees Revenues, Total Government and Parent Support, and Total Revenues from Gifts and Endowment Funds were the 3 categories used from this database as reported at the time of the study. Tuition and fees are obviously attributable to the cost of educating a medical student. Government and parental support revenues are particularly important for state-funded public institutions that receive this revenue on an annual basis and are likely to use these funds in educating their students.[2] As such, the average public school revenue in this category was almost 8 times the average amount received by private schools. Finally, Total Revenues from Gifts and Endowment Funds were included in our computations because many institutions pay for scholarships for students or professorship chair positions both of which contribute to costs in student education.[7]

The other 4 categories (Total Federal Research Grants and Contracts, Other Grants and Contracts, Total Expenditures and Transfers from Hospital Funds, and Other Revenues) were not included in our analysis as these revenues are not clearly identified with medical student education. The University of Central Florida, Commonwealth Medical College, and Uniformed Services University of the Health Sciences were not included in our analysis because these schools indicated no charges for tuition, bringing the total number of schools in our analysis to 127.

Table 1. Sensitivity analysis varying percentages of education revenues to calculate cost of education[1]			
	Analysis 1	**Analysis 2**	**Analysis 3**
Percentage of revenue allocated	40% of revenue	50% of revenue	60% of revenue
Fixed cost	$13,379,828	$16,724,785	$20,069,742
Variable cost per student (95% confidence interval)	$41,918 ($25,485-$58,351)	$52,397 ($31,856-$72,939)	$62,877 ($38,227-$87,527)
Number of schools covering cost with tuition and fees	28[a]	0	0

[a] All 28 are private schools.

[1] Ridley GT, Skochelak SE, Farrell PM. Mission aligned management and allocation: a successfully implemented model of mission-based budgeting. Acad Med 2002 Feb;77(2):124-9.

After adding the 3 revenue categories together for each school, we proportioned 60% of that total as being our best estimate of the total school cost for medical education based on published criteria of allocation of revenue.[20] Using linear regression (Microsoft EXCEL, version 2007; Redmond, WA) total education costs were regressed with student enrollment numbers using the 2010-2011 matriculation numbers for each of the 127 schools according to the LCME Part II Annual Medical School Questionnaire in the MSPS database. Linear regression was chosen so that it could be determined how the created continuous variable measured against a single predictor. That is, the y-intercept of the resultant line represents the total fixed cost of education whereas the slope represents the annual variable cost of educating a medical student. Sensitivity analysis was performed in Table 1 by varying the revenue/cost percentage at 40% and 50%. Tuition values for each school were obtained from the AAMC Tuition and Student Fees Survey as published by the AAMC.[22] Sensitivity at higher percentages would be meaningless. To simplify the calculations, we speculated that only state residents attended a given public school and therefore used in-state tuition and in-state fees. Similarly, we used out-of-state tuition and out-of-state fees for all private schools except for Mercer University in Georgia that admits only Georgia residents despite being a private institution.[23]

Results

On the basis of our regression analysis, the best point estimate of the variable cost of educating a medical student in the US is $62,877 (95% confidence interval (CI): $38,227-$87,527; $p < 0.00001$). The best point estimate of fixed cost is $20,069,742 for each school ($p = 0.01$). That is, to educate medical students, a school would have to allocate an average fixed cost of approximately $20 million plus $62,877 for every student in any of the 4 years of medical school. From another perspective, assuming an average school size of 578 and an average tuition of $30,886 (as derived from the AAMC

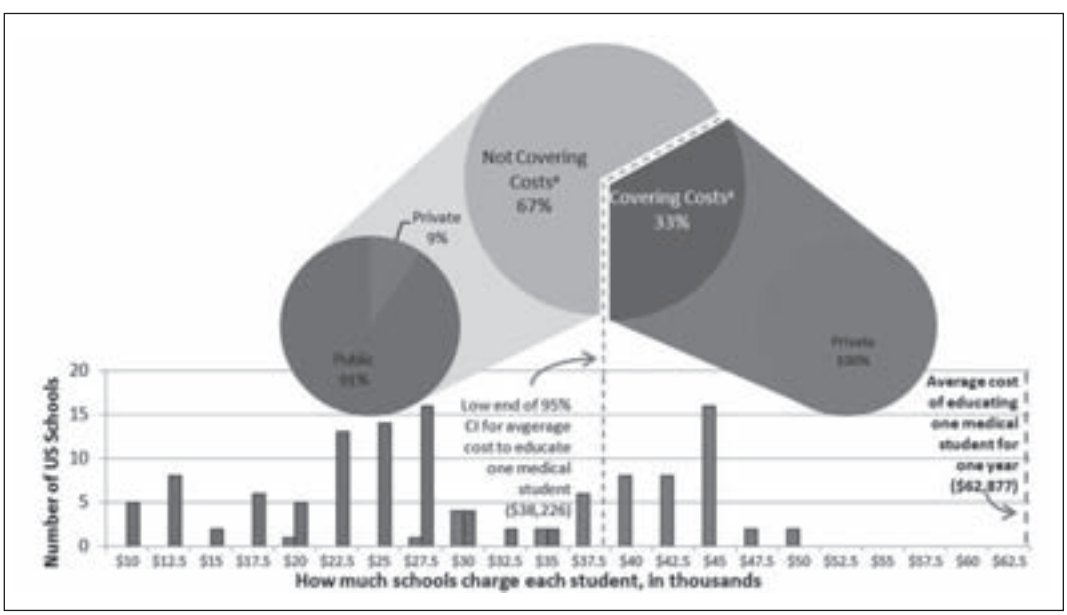

Figure 1. The percentage of US schools are covering the costs of medical education at $38,226 (lower 95% confidence interval [CI]).[1]

[1] Center for Workforce Studies. Results of the 2009 Medical School Enrollment Survey—report to the Council of Deans. Washington, DC: Association of American Medical Colleges; 2010 Apr.

database), the average medical school would have to identify $5,549,588 to increase their class size by 30%. Table 1 shows our sensitivity analysis varying the assumed percentage of total revenue attributable to the cost of educating a medical student at both 40% and 50%.

Discussion

Given that no school has current tuition at $62,877 per year, increasing class size will not result in increased revenue for medical schools as the variable cost of educating a medical student is not covered by the additional tuition revenue or absorbed by existing structures. This amount is lower, in fact, than the amount determined by individual analysis at Virginia Commonwealth in 1997.[19] As $62,877 is based on national data, this could imply that the amount is indeed approaching the actual amount. Figure 1 shows that using the lower end of the 95% CI from our analysis, $38,226, only 33% of medical schools examined could cover variable costs with tuition and fees.[6] Of those schools whose tuition was more than the lower 95% CI for the cost of educating a student, not surprisingly, all were privately funded schools. Of those schools not covering costs, 91% were public and 9% private. Consequently, any planning on the part of a medical school to increase enrollment must identify revenue sources that go beyond tuition and fees to afford expansion. Because schools in the US are not facing bankruptcy, it would appear that other revenue streams or currently funded structures not reported are being used to cover both the fixed and variable costs of increasing class size.

A limitation of this study is the assumption that only three of the identified revenue categories are directed toward medical education: tuition and fees, government and parent institution support, and gifts. Of the other categories collected by the AAMC, allocated grant funds would not likely contribute to medical education directly, although indirect use of the laboratory and research equipment and teaching time by research may be contributions to student education that are not included in our analysis. Time spent by research faculty independent of work supported by grant funding is often difficult to calculate, yet may be a part of the costs associated with medical education.[19] Similarly, the revenue category of affiliated institutional support, primarily used to support graduate medical education, might also contribute to medical student education in a small way. Although not directly related to student instruction, the funds provided for graduate medical education allow for resident and faculty instruction that may not be available if those individuals were engaged in more direct revenue-generating activities and not education.[16,17]

Our assumption that 60% of total educational revenue is used for educating medical students is based on the allocation of revenue percentages reported by the University of Wisconsin Medical School in their Mission Aligned Management & Allocation model of 1999.[20] This percentage is the anticipated direct educational proportion of the total allocated budget given to each department. This figure has been chosen because it does not include other types of revenue streams such as practice plan contributions and general university funds.[20] This figure does, however, assume expansion allocations such as additional staffing or facility needs if necessary. Notwithstanding, sensitivity analysis at the 50% level showed that no school was able to cover the cost of medical education on the basis of the slope variable and that school's tuition charge (Table 1). Only at the 40% level were some schools able to cover the cost of the slope variable with their tuition dollars (Table 1). Our analysis assumes a linear relationship of cost to enrollment. The relationship may be curvilinear with larger student numbers at some institutions.[24] However, our data suggests reasonable linearity within the normal range of student numbers.

Conclusions

If no school is able to currently shield the variable costs of educating a medical student solely with tuition and fees revenues, increasing class size is not a revenue-generating endeavor. Given the precarious financial positions of many academic medical centers in the current economic environment, and considering length of time students spend in medical education compared with other professional degrees, increasing class size, given our data, is counterintuitive from a cost–revenue perspective.[10] This seems ironic given the public policy position advocated by the AAMC to increase school class size by 30%.[3] Additionally, this direction is certainly not discouraged by the stipulation in the 2010 Patient Protection & Affordable Care Act for a comprehensive work force review to examine the adequacy of physician supply and distribution.[25]

Yet, it is hard to imagine attainment of what is an overarching policy goal of producing more practitioners if achievement comes at the expense of medical schools' financial balance. Public universities are clearly experiencing financial pressure as a direct consequence of compromised public support resulting from declining tax revenues in the recent economic downturn.[26] If public policy goals of physician workforce expansion and replenishment are to be achieved, enhanced revenue sources are required for both public and private medical schools in this challenging fiscal environment. ❖

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

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The Mighty Instruments

Let us not forget that a university or a medical college may have large endowments, palatial buildings, modern laboratories, and still the breath of life may not be in it. The vitalizing principle is in the men—both teachers and students—who work within its walls. Without this element of life, this bond between teacher and taught, these things are but outward pomp and show. But let these greater opportunities receive the breath of life from the inspiration of great teachers and they then become the mighty instruments of higher education and scientific progress.

— William H Welch, 1850-1934, physician, pathologist, medical school administrator, cofounding professor at Johns Hopkins University