

Letter from North America

MEDICAL EDUCATION IN THE UNITED STATES OF AMERICA

Throughout its history, medical education in the USA has been delivered through one of three systems: the apprenticeship system, in which students received instruction from a local practitioner; the proprietary school system; or the university system. The most common method for medical instruction in the 18th and early 19th centuries, the apprenticeship system, in time faded from prominence as the need for physicians increased. The university schools were eventually outnumbered by the proprietary schools, owned by a small faculty who operated the institutions for profit and measured their success in financial terms. At the proprietary schools, both entrance and graduation requirements were low, and classes consisted of didactic lectures in which students studied the same subjects and content over the course of two identical terms, requiring rote memorization and repetition of material. Laboratory and clinical work were minimal or non-existent, the schools were not affiliated with universities, and the faculty was not involved in research.¹⁻³

By the end of the 19th century, the university system was seen as the ideal system for medical education, yet proprietary schools remained, universal standards of education and accreditation were scarce, and there was much uncertainty about the exact form the future of American medical education would take. Into this setting stepped the Carnegie Foundation for the Advancement of Teaching, an independent policy and research centre, which sought to conduct a comprehensive study of all 155 medical schools operating then in the USA and Canada. To some surprise and consternation, Abraham Flexner—an educator and former headmaster of a private high school who had published *The American College*, a spirited critique of the American higher education system—was chosen to conduct the survey.¹⁻³

Flexner criss-crossed the USA, evaluating the medical schools by admission standards, size, faculty training and facilities. After visiting each of the 155 medical schools in the USA and Canada, Flexner prepared his report. The resulting document, published in 1910, described the lack of standards in medical schools, particularly the proprietary schools, and advocated for stringent entrance requirements. A medical school, Flexner wrote, ‘cannot provide laboratory and bedside instruction on the one hand, and admit crude, untrained boys on the other’. Flexner argued that problem-solving and analytical thinking should form the basis of a physician’s armamentarium. To ensure that students acquired a firm grasp of both the relevant medical knowledge and the scientific method of thinking, Flexner believed that students should learn by doing—that is, they should spend most of their time in the laboratory and hospital, rather than in the lecture hall. He wrote: ‘Modern medicine, like all scientific teaching, is characterized by activity. The student no longer merely watches, listens, memorizes; he does.’²

Flexner saw research as vital—not only for the new knowledge it would generate, but also for the added benefits it would bring to the craft of teaching. He believed that ‘men of active, progressive temper’ engaged in research made for the most effective and inspiring teachers.² It was clear to Flexner that to ensure that the highest level of medical education was consistently delivered, resulting in the most capable and appropriately trained young

physicians, each medical school should be situated within a thriving university, with a robust staff of full-time professors dedicated to both research and clinical activities.

As only a small number of medical schools operating then met this standard, Flexner recommended that the vast majority should be shuttered, leaving only 31 schools after closings and consolidations. Only schools with a strong commitment to original research and academic rigor should remain. Additionally, Flexner recognized that to excel in education, medical schools needed adequate funding to support modern laboratories and hospital facilities, and he advocated for this in his report. But two decades after his report, most medical schools still had limited research programmes in place, reflecting the limited funding available for biomedical research.

In 1930, legislation from the US Congress transformed the National Hygienic Laboratory into the National Institutes of Health (NIH) and authorized the distribution of public resources for the funding of biological and medical research. NIH funding grew from an annual allocation of US\$ 400 000 in 1938 to more than US\$ 23 billion in 2007, fuelling exponential growth in biomedical research.^{1,2} With funding support from the NIH, research productivity expanded rapidly and became the metric by which faculty accomplishment was judged. But as the culture of ‘publish or perish’ took hold in medicine, some faculty found it difficult to maintain their teaching and clinical responsibilities alongside the demands of research and publishing.

The rapid growth and ever-increasing importance of biomedical research relegated clinical practice to secondary importance at many medical schools, resulting in low numbers of clinical faculty. However, the pendulum soon began to swing the other way, largely owing to the creation of Medicare and Medicaid in 1965, which allowed revenues to be generated by faculty treating elderly and/or indigent patients. The net result—in the context of medical schools—was a rapid expansion of clinical faculty and clinical productivity.⁴ In 1965, clinical productivity totalled 6% of medical schools’ revenues. By 2007, clinical practice had grown to nearly US\$ 36 billion, accounting for 50% of overall revenue.^{1,2} Clearly, as Medicare/Medicaid reimbursement is calculated by productivity, there is ample motivation for physicians to be as clinically productive as possible.

During the past two decades, some have argued that this uptick in clinical productivity has led to a decline in physicians’ time to conduct research and teach the next generation of physician-investigators.⁵⁻⁷ Several studies have evaluated the relationship between clinical and academic productivity, the latter determined by the number of articles published and presentations delivered. Eschelmann *et al.* found a significant inverse relationship between clinical productivity and the number of publications and presentations over a period of 2 years.⁷ They observed that clinical productivity was not affected by age, academic rank or administrative responsibilities and that senior faculty had significantly more non-peer-reviewed articles, presentations and abstracts than junior faculty. Taylor reported similar results. He evaluated the relationship between clinical and academic productivity during a period of 6 years and found a 46% increase in clinical productivity alongside a 69% decrease in peer-reviewed publications and a 16% decrease in presentations at national

meetings. He reported that increasing clinical productivity was a strong predictor of decreasing publication rate.⁸

One general perception about modern medical schools is that, as clinical workload increases, time for teaching decreases.⁵⁻⁷ Berger *et al.* found no statistically significant relationship between clinical productivity and teaching quality.⁹ On the other hand, Johnson *et al.* found that clinical productivity significantly decreased with responsibility for teaching residents, although the effect varied across resident training years. First-year residents were associated with the largest decrease in the clinical productivity of supervising physicians, whereas third-year residents were associated with the smallest decrease. This decrease in productivity equated to a loss of US\$ 164 000 in yearly revenues, or US\$ 49 per resident per session.^{10,11} Similarly, Vinson and Carrie reported that most physicians experienced an increase in time spent at work (mean±standard deviation, 46±32 additional minutes per day) when a resident student was part of their practice.¹²

Flexner could not have fully anticipated the complicated, push-and-pull relationship between teaching, research and clinical responsibilities that would result from the growth of academic medical centres and the expansion of biomedical research. As Flexner recognized, novice physicians require time and space under the guidance of experienced physician-investigators to acquire skills and attain a high level of proficiency. Investigations by several authors indicate that physician faculty often find that the demand of increasing clinical productivity limits their research and teaching activities and jeopardizes their ability to achieve the traditional faculty goal of 'See one, do one, teach one'—concerns Flexner highlighted in his report.

REFERENCES

1. Cooke M, Irby DM, Sullivan W, Ludmerer KM. American Medical Education 100 years after the Flexner Report. *N Engl J Med* 2006;**355**:1339–44.
2. Duffy T. The Flexner Report—100 years later. *Yale J Biol Med* 2011;**84**:269–76.
3. Ludmerer K. Understanding the Flexner Report. *Acad Med* 2010;**85**:193–6.
4. Yeh M, Cahill D. Quantifying physician teaching productivity using clinical relative value units. *J Gen Intern Med* 1999;**14**:617–21.
5. Tarquino GT, Dittus RS, Byrne DW, Kaiser A, Neilson EG. Effects of performance-based compensation and faculty track on the clinical activity, research portfolio, and teaching mission of a large academic department of medicine. *Acad Med* 2003;**78**:690–701.
6. Colleti J, Flottemesch T, O'Connell T. Teaching and clinical efficiency: Competing demands. *West J Emerg Med* 2012;**13**:186–93.
7. Eschelmann D, Sullivan K, Parker L. The relationship of clinical and academic productivity in a university hospital. *AJR Am J Roentgenol* 2000;**174**:27–31.
8. Taylor GA. Impact of clinical volume on scholarly activity in an academic children's hospital: Trends, implications, and possible solutions. *Pediatr Radiol* 2001;**31**:786–9.
9. Berger TJ, Ander DS, Terrell M, Berle D. The impact of the demand for clinical productivity on student teaching in academic emergency departments. *Acad Emerg Med* 2004;**11**:1364–7.
10. Johnson T, Shah M, Rechner J. Evaluating the effect of resident involvement on physician productivity in an academic general internal medicine practice. *Acad Med* 2008;**83**:670–4.
11. Kelly SP, Shapiro N, Woodruff M. The effects of clinical workload on teaching in the emergency department. *Acad Emerg Med* 2007;**14**:526–31.
12. Vinson D, Carrie P. The effect of teaching medical students on private practitioner's workloads. *Acad Med* 1994;**69**:237–8.

DAVID B. SEWELL
DANIEL BUITRAGO

PRASAD S. ADUSUMILLI

Memorial Sloan-Kettering Cancer Center
New York
USA

Letter from Chennai

THE ADYAR CANCER INSTITUTE

Dr Muthulakshmi Reddy was unique in many respects. She had a head start when she was born in 1886 to an educationist with progressive ideas, who was keen on her having a complete education, not the tradition for women in those days. She graduated in 1912 from the Madras Medical College, and was one of the first women doctors in India. In 1914, she married Dr Sundara Reddy and thus acquired the name by which she became famous in the years to come. After some years in the practice of medicine, she took to politics and became a member of the Madras Legislative Council in 1926. She started the Avvai Home for orphans, pressed the government to open a paediatric section in the hospital for women, pushed through a bill for the suppression of immoral traffic in women, and started the Cancer Relief Fund. Her achievements and initiatives are too numerous for me to cover here, so I shall focus on her interest in cancer relief, which led her to establish the Adyar Cancer Institute in 1954.

The institute has just started celebrating its Diamond Jubilee year. By now, it has 423 beds, of which 297 are free, and it is served by 78 doctors and 150 nurses. It was not an easy journey. The Women's India Association was the institution's first sponsor

and continues to run it. Dr Muthulakshmi Reddy struggled to obtain a patch of land for the institute from the government, and was finally granted a strip along the Buckingham Canal in the Gandhinagar area of Madras (presently Chennai). A residential area that was just being developed in the early 1950s, this was a most unsuitable location. However, the then health secretary wrote that the government could not afford a separate institute for cancer, that in any case this was not a priority area, and that land was all they could spare. The first two medical officers of the institute were Dr S. Krishnamurthy, the son of Dr Muthulakshmi Reddy, and Dr V. Shanta. Dr Krishnamurthy was the Director till 1979 and on his retirement, Dr Shanta took over and continues to remain in charge.

Dr Shanta is an institution in herself. She has lived for the institute and has devoted herself to it throughout her medical career. When she started working for it in 1954, she was one of its first employees. At the time, she was a raw graduate and worked without a salary for the first 3 years, before she was granted the princely sum of ₹200 a month. Dr Krishnamurthy and she were the only two staff members and had to do everything, with the aid of an honorary anaesthetist who came in only in the late evening. She