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This article was published on May 14, 2014, at NEJM.org.

1. Health policy brief: graduate medical education. *Health Affairs*. August 16, 2012 ([http://www.healthaffairs.org/healthpolicybriefs/brief.php?brief\\_id=73](http://www.healthaffairs.org/healthpolicybriefs/brief.php?brief_id=73)).

2. Becker GS. Human capital: a theoretical and empirical analysis, with special reference to education. New York: National Bureau of Economic Research, Columbia University Press, 1964.

3. Iglehart JK. Support for academic medical centers — revisiting the 1997 Balanced Budget Act. *N Engl J Med* 1999;341:299-304.

4. Volpp KG, Konetzka RT, Zhu J, Parsons L, Peterson E. Effect of cuts in Medicare reimbursement on process and outcome of care for acute myocardial infarction patients. *Circulation* 2005;112:2268-75.

5. Seshamani M, Schwartz JS, Volpp KG. The effect of cuts in Medicare reimbursement on hospital mortality. *Health Serv Res* 2006;41:683-700.

DOI: 10.1056/NEJMp1402468

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## The Economics of Academic Medical Centers

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Most economists seem to view graduate medical education (GME) — training graduates of medical schools to become independently practicing physicians — as a stand-alone effort, without considering its relationship to other activities of major teaching hospitals within academic medical centers (AMCs). Payments with a GME label are often examined in isolation, rather than as part of the complex economics of AMCs, whose missions include training physicians, conducting groundbreaking research, providing a full

financial gains for themselves or affiliated physicians, to increase the volume of patients, to improve the quality of services, to provide community benefit, or to achieve some combination of these goals.<sup>1</sup> Nearly all AMCs are not-for-profit and have a responsibility to provide community benefit that goes beyond charity care, through intertwined missions and services that independently may not always generate a financial margin but are indispensable to the health of individuals and communities.

Residents and fellows are trained in a variety of clinical en-

services are often retained in AMCs because they benefit the community and are vital to training health care professionals.

Teaching-hospital members of the Association of American Medical Colleges (AAMC) represent only 5% of all hospitals, but their clinicians (who are on the faculty of AMC medical schools) provide a disproportionate share of care to vulnerable patients. Historically, AMCs have provided 37% of all charity care and 26% of all Medicaid hospitalizations, as well as a disproportionate share of many other community services, often at a financial loss (see graph). AMCs also provide highly specialized services for entire regions of the country and receive 38% of transfers from other hospitals that cannot care for patients with complex needs.<sup>2</sup>

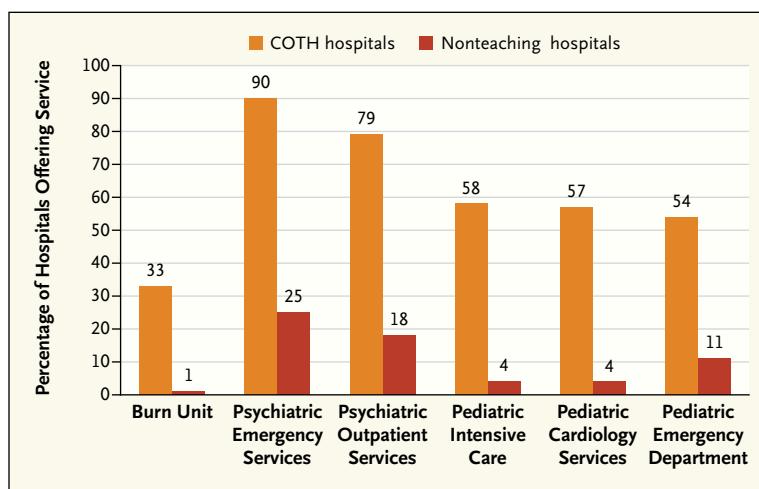
Teaching hospitals operate nearly all regional standby services — for example, 80% or more of level 1 trauma and burn centers. These services require specialized facilities, equipment, and personnel, including physicians in multiple specialties, that must be on site or within minutes of the hospital. The costs for these resources are incurred daily so the hospitals can be in con-

***The cost of GME extends well beyond the costs partially covered by direct GME support. Investments in research and complex clinical activities are critical to the environment for robust, diverse training programs.***

spectrum of clinical care, and improving community health.

The literature offers a variety of models to explain the economic behavior of hospitals, particularly not-for-profits — to clarify, for example, whether they are seeking primarily to maximize

environments and settings, many of which lose money but are critical for new physicians' experiential learning. Service lines such as obstetrics, geriatrics, and inpatient psychiatry are poorly reimbursed and often absent or undersized in nontraining settings. Yet these



**Percentage of U.S. COTH Member Hospitals and Nonteaching Hospitals Offering Selected Services.**

Data are from an analysis conducted by the Association of American Medical Colleges of data from the American Hospital Association from fiscal year 2012. COTH denotes Council of Teaching Hospitals.

stant readiness, regardless of when the next plane crash, tornado, bombing, or other mass-casualty incident occurs. Moreover, to be designated as a level 1 trauma center, an institution must engage in training and research, which further increase the costs of the standby service. Surgeons and many other physicians in training gain invaluable experience in these centers by learning how to stabilize the critically ill or injured, which benefits future patients.

While training at AMCs, residents also gain exposure to biomedical and health systems research, the opportunity to care for patients with rare diseases, and care-redesign efforts for acutely and chronically ill patients. More than half of all National Institutes of Health extramural research grant funding went to AMC faculty members in fiscal year 2011, according to AAMC analyses. Yet the indirect cost reimbursement associated with grant funding does not cov-

er the full cost of the infrastructure needed to support the research mission. As a result, AMCs must subsidize the research mission, contributing up to 30% of its support,<sup>3</sup> which often amounts to hundreds of millions of dollars in cross-subsidies from clinical or other revenue streams. AMC research activities contribute to the training of all M.D.–Ph.D.s and have resulted in advances such as the polio vaccine, the first pancreas transplantation, the first neonatal intensive care unit, and the first gene therapy for cystic fibrosis.

Many medical and surgical subspecialty fellows are required to spend at least 1 year conducting research with only institutional support. Although not all physicians will ultimately pursue careers in biomedical research, future clinicians need to understand the process of how new knowledge is acquired and validated, how to help their patients gain access to clinical trials, how

to participate in postmarketing surveillance by the Food and Drug Administration, and how to conduct community-based research.

The synergies among AMCs' four missions create an intellectual and learning environment that is ideally suited for the training of physicians. In this environment, questions are constantly asked, assumptions are challenged, and new approaches to care are tested. It is the AMCs' responsibility to support and nurture this atmosphere and ensure that it permeates the highly specialized inpatient settings, outpatient departments, community health centers, and private physician offices where physician training occurs.

In U.S. teaching hospitals, the direct costs of training residents and fellows — including trainee stipends and benefits, faculty supervision, simulation and other equipment, salaries for administrative staff, and overhead — amount to more than \$16 billion annually. Medicare is the largest explicit supporter of direct GME expenses, contributing just over \$3 billion,<sup>4</sup> while grant programs from Veterans Affairs, the Department of Defense, Medicaid, and the Public Health Service contribute more modest support. Most of the direct cost of GME is borne by the teaching hospitals themselves.

Some economists have suggested that trainees are low-cost, skilled labor that “make money” for AMCs despite their inability to bill directly for patient services. However, we are aware of no empirical analyses that suggest that trainees increase clinical revenue sufficiently to offset the investment required to support training. In addition, the

cost of training has increased substantially in recent years owing to a series of unfunded mandates, including more stringent educational requirements, decreased duty hours, and strict supervision requirements.

The cost of GME extends well beyond the costs partially covered by direct GME support. Investments in research and complex clinical activities are critical to the environment for robust, diverse training programs. No explicit investments in these additional costs are made in the current reimbursement system. When the Medicare inpatient prospective payment system was created, the adjustment for indirect medical education was made to serve as a proxy to partially reimburse teaching hospitals for the higher complexity of care and unique services that AMCs provide to communities. That adjustment is a hospital-specific payment intended to help support these institutional costs.<sup>5</sup> Highly specialized services such as burn centers would be at risk in the absence of this public support. For-profit hospitals that have a fiduciary responsibility to generate a financial return to shareholders are less likely to invest in burn centers and to have residency training programs.

Well-trained physicians require exposure to the full spectrum of health care for a broad patient population, diverse in demographic, economic, and health status, from the richest to the poorest, from the healthiest to the sickest, and with the most common to the rarest of conditions — all of which require investments beyond supervisory educational time. New physicians need exposure to the most well-established medical practices but also to the processes by which advances in prevention, diagnosis, and treatment are achieved.

As a potential physician shortage looms and the need for public investment in physician training grows, there have been calls for greater accountability for the public support that teaching hospitals receive to conduct physician education. The AAMC has endorsed legislation that would yield greater transparency of public support for AMCs but also more data on the costs incurred in maintaining a robust training environment. The same legislation would also create a reasonable system of rewards and penalties to ensure that AMCs train physicians who have the right mix of skills, can work in teams, are conscious of the finite nature of resources, and are able to de-

velop better and more affordable systems of care. A continued and more accountable investment in GME-writ-large will benefit U.S. health care for decades to come.

Disclosure forms provided by the authors are available with the full text of this article at [NEJM.org](http://NEJM.org).

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This article was published on May 14, 2014, at [NEJM.org](http://NEJM.org).

1. Newhouse JP. Toward a theory of non-profit institutions: an economic model of a hospital. *Am Econ Rev* 1970;60:64-74.
2. Huderson A, Haberman M, Conroy J. Medicare patient hospital transfers in the era of health care reform. Washington, DC: Association of American Medical Colleges, 2013 (<https://www.aamc.org/download/333654/data/april2013analysisinbrief-medicarepatienthospitaltransfersinthee.pdf>).
3. Dzau VJ, Cho A, Ellaissi W, et al. Transforming academic health centers for an uncertain future. *N Engl J Med* 2013;369:991-3.
4. Medicare payments for graduate medical education: what every medical student, resident, and advisor needs to know. Washington, DC: Association of American Medical Colleges, 2013 (<https://members.aamc.org/eweb/upload/Medicare%20Payments%20for%20Graduate%20Medical%20Education%202013.pdf>).
5. Anderson GF, Lave JR, Russe CM, Neuman P. Providing hospital services: the changing financial environment. Baltimore: Johns Hopkins University Press, 1989:107.

DOI: 10.1056/NEJMp1403609

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## Tuberculosis Control in New York City — A Changing Landscape

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Since the introduction of chemotherapy for treating tuberculosis, political commitment and stable, sufficient funding have been the primary predictors of success for tuberculosis-control

programs, and their absence has resulted in tuberculosis epidemics. Over the past decade, the federal funding for tuberculosis-control programs in the United States has decreased by more

than 15%, even without adjusting for inflation, according to the Centers for Disease Control and Prevention. The incidence of tuberculosis continues to decline nationally, but in recent years