

Environmental Assessment

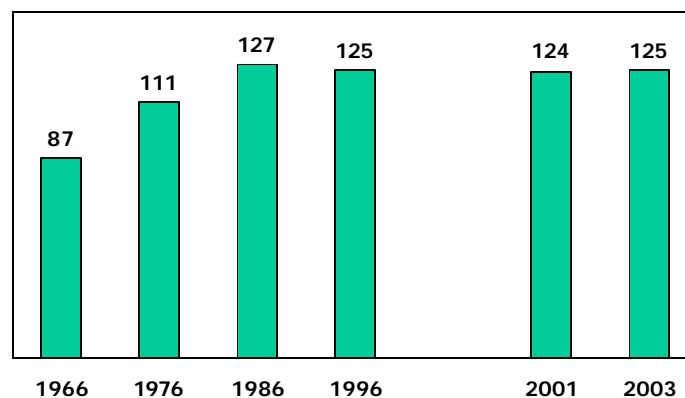
ACADEMIC MEDICAL CENTERS

The promise of academic medicine has never been greater. Society has made an enormous investment in academic medicine during the last half century. That investment has fueled extraordinary progress in the prevention, diagnosis, and treatment of human disease and provided remarkable new insight into human biology. Previously unthinkable advances in the care of patients and the health of society are close at hand. At the same time, the challenges to academic medicine have never been greater, requiring new approaches to education, research and clinical care while adapting to sweeping changes in the economic, legislative, and cultural landscape.

Academic medical centers (AMCs) are complex organizations, with many missions, constituencies, and operating environments. AMCs – which consist of a medical school, one or more teaching hospitals, and faculty physicians – combine education, research and clinical care in a rich and unique environment designed to continually advance the frontiers of science and medicine. They must balance a necessarily immediate focus on tactics and market responses with a long-range vision for evolving sustainable organizations that will continue to contribute significant improvements in quality of life.

There are 125 U.S. medical schools. The number of schools increased nearly 50 percent in the twenty years between 1966 and 1986. In the last two years, two new schools have been announced and a third proposed.

Number of fully accredited U.S. medical schools



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Mission

The medical school missions of education, research, and patient care – traditionally, the “three-legged stool” of academic medicine – have expanded over time. In many cases, this was by design, as when schools adopt indigent care or community service as part of their mission. In other cases, the missions have been expanded by default, by variation in practice across schools, or by perception. These include: being an insurer of last resort, improving the health of the public, providing role models for clinical practice, developing new technologies, being the “first adopter” of new technologies, or providing brand identity for patients and faculty physicians. For most, if not all, of these somewhat diverse missions, it is difficult to establish expectations and measure performance.

Who are academic medical centers accountable to? Society as a whole? Their local communities? The sources of financial support such as the government, taxpayers, donors, and insurers? Constituencies whom we serve directly, such as patients, students, faculty, and staff? The academic, medical, and scientific disciplines? And should the focus of AMC accountabilities to any of these groups be on the present or on the near- or long-term future?

These diluted missions and multiple accountabilities are a governance challenge to academic medicine.

One of the most fundamental current issues in academic medicine is whether, or to what extent, the social contract with academic medicine has changed. Taxpayers and legislators are increasingly questioning what they are funding and what they are getting. Patients expect the best care and technology, regardless of cost. Debates continue over the amount and direction of funding on research. Questions persist about whether the federal government should be the primary funding source for graduate medical education. Some faculty physicians question whether they should be expected to teach. The president of the American Association of Medical Colleges has voiced concern about a decline in public trust in the wake of highly publicized incidences of medical errors, research misconduct, clinical trials subject deaths, and financial conflicts of interest.

Since the implementation of Medicare prospective payment system twenty years ago, more than \$200 billion has gone to academic medical centers¹, broadly defined. While we can see how this investment was spent, it is much more difficult to understand and demonstrate exactly what this “bought.” Perhaps the

¹ \$100B by Medicare (Direct Medical Education (DME) and Indirect Medical Education (IME) payments), \$75B by the National Institutes of Health, \$25B by states. Source: Institute of Medicine, Committee on the Roles of Academic Health Centers in the 21st Century, 2002

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more important question is: What should an equivalent investment buy over next twenty years?

Academic medical centers need to play a more visible role in educating the public on a number of key societal issues. These include: the importance of science and types of investments needed; the ethical implications of research and clinical practices; balancing the expectation of scientific advance with realistic expectations of costs; providing health information for patients and public; and the role of academic medicine itself, the extent to which it is a public good, particularly in research, education, and indigent care.

The Commonwealth Fund recently convened a task force and made recommendations for the future mission-area focus of academic medicine²:

In research: give higher priority to new and traditionally undersupported areas of biomedical science; focus on translating results of clinical research into everyday practice; and manage relationships with industry in a manner that promotes public interest, protects patient participants, and maintains academic values.

In education: incorporate training in leadership, team-building, continuous improvement, and measurement of clinical performance into basic curricula; develop capabilities to educate online and remotely; and provide leadership in training a culturally competent clinical and research workforce.

In clinical service: most AMCs will focus on high-technology and specialized services; some will specialize in primary and community-based services; develop partnerships to help provide optimal care and ensure that trainees have necessary clinical exposures; work to improve safety, quality, efficiency of services; act decisively to improve outcomes that fall below those of peer institutions or discontinue those clinical services; and become leaders in applying information technology to improve care.

In care for the indigent: ensure that the quality and efficiency of care provided to vulnerable populations are comparable to that available to other populations; work with partners in local communities to serve the needs of poor and indigent patients; adopt explicit programs to train staff at all level to provide care that is culturally appropriate and responsive.

Resources

In recent decades, academic medicine has experienced enormous growth.

² *Envisioning the Future of Academic Health Centers*, Commonwealth Fund, 2003

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Adjusted for inflation, revenues supporting U.S. medical schools, which now exceed \$34 billion, grew more than 700 percent from 1966 to 2001. This is a compound growth rate of nearly 19 percent per year for 35 years. Few, if any, other sectors of the economy have enjoyed parallel growth.

Changes in U.S. medical school revenue sources Source as percent of total revenues

<u>Source</u>	<u>1966</u>	<u>1976</u>	<u>1986</u>	<u>1996</u>	<u>2001</u>
Tuition & fees	4.6	4.6	5.7	3.9	3.5
Gifts & endowment	5.2	2.8	2.3	3.9	4.4
Gov't appropriation	13.6	21.3	18.8	8.9	8.1
Grants and contracts	64.3	53.2	36.4	29.0	31.7
Medical service	6.3	12.1	31.5	50.0	47.8
All other	5.9	6.0	5.4	4.2	4.6
<hr/>					
Detail					
Medical service					
Practice plans	2.8	12.1	21.2	34.3	34.3
Hospital-school programs	3.5	0.0	10.3	15.7	13.5
Grants and contracts					
Federal	54.0	36.8	23.6	17.9	22.4
all other	9.9	16.4	12.8	11.1	9.3

Source: American Association of Medical Colleges (AAMC)

Although revenue from each of these sources increased in real dollar terms, only one source increased in percentage terms: medical service, and that was primarily from faculty practice plans.

The financial underpinnings of medical schools are threatened as each of these revenue sources are under pressure. Each will be discussed in greater detail in the sections below. Federal and state government budgets are out of balance. Federal policy decisions have profound impact on academic medicine: Medicare accounts for 33 percent of total U.S. hospital revenues and 21 percent of total U.S. physician services, and over 50 percent of the National Institutes of Health (NIH) extramural award budget goes to medical schools and teaching hospitals. Patient care revenues to hospitals and physician practices have been under relentless pressure for years. Tuition and fees do not cover the full cost of medical education, yet student debt is at an all-time high and may be adversely affecting the specialty distribution of physicians. Academic medical centers are bearing an increased "market share" of indigent care and absorbing significantly higher costs. Additionally, costs are increasing for regulation and compliance in

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the protection of patients, research subjects, and employees, and in the conduct of research.

The financial model of academic medicine continues to rely on internal subsidies where revenues from clinical services contribute significantly to funding the academic mission. These subsidies are being subjected to higher level of scrutiny both outside and inside academic medical centers. Economic realities are limiting the resources available to fund the mission to care for uninsured, underinsured and to provide the best environment for the education of students.

Academic medical centers are vulnerable to – not immune from – economic cycles. The factors driving resources down (e.g. government deficits) also drive costs up (more uninsured). Government deficits impact research funding, educational support, patient care reimbursement, and other programs. The state of the economy directly affects the extent to which employers are willing and able to bear health care costs.

Philanthropy, also a traditional area of support for academic medical centers, is also under pressure. Charitable giving in the U.S. - which grew 11 percent in 2000 - was flat in 2001, and giving to the health care sector was down \$1 billion (6 percent) in 2001. In 2002, contributions to the 400 largest charities dropped for the first time in over a decade. This reflects not only a sensitivity to economic conditions but also to other needs, such as disaster relief and preparedness. A long-term change in philanthropy is under way. The baby boomers are a different kind of giver, trying to change institutions, not just support them. They look for measurable results, expect an increased level of stewardship and accountability, and they give where they believe they will have a high impact, often meaning they will give less to large institutions. A repeal of the estate tax may also drastically reduce giving in the future.

Governance

As many organizational and governance models exist within academic medicine as there are academic medical centers. Varying structures are found of the relationship between medical schools, hospitals, physician practices, and universities, ranging from common ownership to complete independence of all organizations. Many models of governance and organization also exist within universities and medical schools. Medical schools are typically decentralized with a flat structure; a dean often has several dozen direct reports, including chairs, center directors, and associate deans in various areas. The distribution of resources and span of control also varies. No ideal structure or model for an academic medical center exists. Each has advantages and disadvantages, and they all benefit and suffer from history, culture, and unique quirks. Yet, almost all

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academic medical centers are subject to similar pressures in their overall environment.

These are complex organizations that remain difficult to manage. Few have a single office or authority able to direct the organization as a whole, and half of their business takes place in a competitive marketplace and half is embedded within a university. These institutions are generally slow to react, often behind the curve, with management models a step behind the marketplace. The market realities may not be strong enough to overcome leadership and organizational issues.³

A 1998 study⁴ examined the relationship of dean tenure to organizational and financial characteristics of academic medical centers. Among the findings were that, on average, medical schools had at least two and sometime more than three deans in the 10-year period 1985-1994. This turnover rate among deans is significantly higher than a generation ago.

Significant impediments to responsiveness and accountability exist within academic medicine. The independence of faculty and chairs creates a “thousand points of veto” where small groups can stymie change.

Increasingly interdisciplinary approaches to research, clinical care, and curricula span traditional roles, missions, and units, creating management challenges. These include: how to manage the whole rather than sum of (individually managed) parts; how to balance the sphere of influence and span of control of individual departments and centers; and how to define and evaluate accountabilities across units and missions.

A wave of consolidations and attempted consolidations⁵ in the late 1990s consumed resources and effort and led to increased complexity with no resulting improvement in market share or cost recovery. Significantly more consolidation and merger activity – and success – has been found in the hospital and physician provider markets, both academic and nonacademic.

Three recent evaluations of the governance and management challenges to academic medicine are noteworthy.

³ Snyderman, R., Institute of Medicine, Committee on the Roles of Academic Health Centers in the 21st Century, 2002

⁴ *Academic Medicine*, 1998, 73:6, 640-644

⁵ UCSF-Stanford; Mt. Sinai-NYU; Columbia-Cornell; MCP -Hahnemann

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A senior executive at General Electric analyzed the challenges for academic medical centers.⁶ His conclusions: multiple missions make focus difficult; horrendous underlying IT platforms make management difficult; the key workers (clinicians) do not have aligned incentives; community and academic obligations lead to unprofitable product lines; the payment system does not consistently reward efficiency and effectiveness.

The Hunter Group, a health care consulting and management practice noted for its tactics in hospital turnaround situations, analyzed the problems of academic medical centers⁷. Problems: real financial pressures, such as decreased revenues and increased costs; subsidizing programs that should be self-supporting; the independence of faculty results in poor accountability for organizational outcomes; organizational “denial”, for example, the expectation of higher rates and payments despite availability of alternatives in the community or maintaining faculty or resident complement level despite changes in funding capacity; and the tendency to avoid tough decisions with a strong constituency for the status quo.

A Commonwealth Fund task force urged a re-engineering of nation’s academic medical centers.⁸ Recommendation for AMCs are: think and act more strategically; be more responsive to needs of the communities they serve; dramatically improve internal accounting and financial management abilities, and develop capabilities for performance measurement and improvement.

In addition to – or directly related to – fundamental changes in their financial underpinnings, academic medical centers are challenged to develop a new, stable management model.

Perhaps the most significant challenge to academic medicine is to deliver on the enormous promise of advances in science, medicine, and technology and their impact on the health of the public and the direction of society.

⁶ Institute of Medicine Committee on the Roles of Academic Health Centers in the 21st Century, *conference proceedings*

⁷ *ibid.*

⁸ *Envisioning the Future of Academic Health Centers*, Commonwealth Fund, 2003

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Faculty workforce

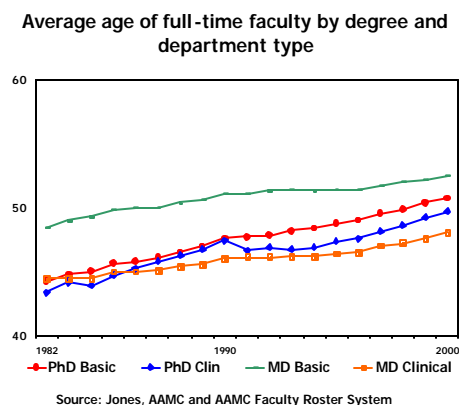
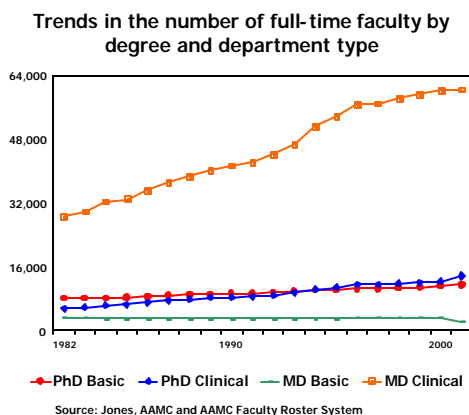
In many respects, the institution is its faculty. The American Association of Medical Colleges (AAMC) recently reported on some noteworthy demographic trends in medical school faculty complement⁹.

Full-time PhD faculty in clinical departments now outnumber those in basic science departments. The percentage of faculty on the tenure track is declining.

PhDs in basic science departments are a growing but aging population, with 17 percent age 60 or older. Impending retirements over the next decade present both an opportunity and a challenge. More than half (56 percent) of PhDs in clinical departments are under 50 years of age. The number of new PhD graduates in the life sciences continues to grow.

MDs in clinical departments are the youngest and fastest growing faculty group overall, with 62 percent under age 50. The growth in their ranks has been driven by clinicians and clinical-educators, many additions being the result of acquisition of clinical practices by an academic health system or hospital.

The ranks of clinical investigators are shrinking¹⁰. During the past 15 years, while the number of other biomedical researchers has been growing, the number of physicians reporting research as their primary career has dropped from 23,214 to 14,357.



⁹ Jones, R., Presentation to the AAMC Group on Business Affairs and Group on Institutional Planning Joint Meeting, 2001.

¹⁰ "The Biomedical Research Bottleneck", *Science*, July 27, 2001.

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EDUCATION

UNDERGRADUATE MEDICAL EDUCATION

Education is the primary mission of any school, and the education of medical students is the defining mission of a medical school. The excitement and promise of changes in the science and practice of medicine present key challenges to the educational enterprise. These advances must be incorporated into curricula and training; their rapid pace demands not only a change in program content but also in a movement towards teaching information management and lifelong learning skills. Scientific and economic factors are both driving changes in the tools and venues of preclinical and clinical training. In addition, there is an increasing recognition of the need to include other issues important to the education of future physicians, such as communication, ethics, cultural sensitivity and professionalism.

The Institute of Medicine identified some critical future areas in medical student education¹¹ and the skills and knowledge needed in medical practice. These include: the use of information technology to support clinical decision-making and manage practices; working within teams and learning to improve efficiency and quality; communication and support skills to function as patients' partners, especially in managing chronic conditions; population-based care; self-evaluation – reflective practice, lifelong learning, and accountability. Community service should be integral part of educational experience, not an add-on; students and physicians should understand the social context of care.

The AAMC Medical School Objective Project has identified key competencies medical students should possess upon graduation which will align medical education with evolving societal needs, practice patterns and scientific developments. New curricular areas corresponding to these competencies are: geriatrics, evidence-based medicine instruction, professionalism, complementary and alternative medicine (CAM), cultural competence, medical informatics, and computer-based instruction.

In the 1999-2000 academic year, an average of 37 weeks were required in M1, 36 weeks in M2, 46 weeks in M3 and 35 weeks in M4.¹² This is a limited time in which to cover an ever-expanding field of the science of medicine and clinical practice.

¹¹ Institute of Medicine, Committee on the Roles of Academic Health Centers in the 21st Century, 2002

¹² *JAMA*, 2000; 284(9): 1114-1120

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The wave of reforms in pre-clinical curricula during the 1990s has not yet been matched by changes to clinical curricula and practices.

Technology has become an integral part of medical education. Nearly half of all U.S. and Canadian medical schools require students to have their own computers upon admission, an increase from the 29 percent in 1998-1999. And almost all medical schools electronically distribute some basic science syllabi, lecture notes, and handouts.¹³

Nearly half of medical schools have experienced decreases in the number of patients available to students and/or the approved procedures performed by students due to hospital mergers, government regulations, and managed care payer policies. The number of medical schools affiliating with for-profit hospitals to administer required clerkships has increased by 30 percent since 1997.¹⁴ Approximately 55 percent of medical schools require time in community-based, ambulatory settings as part of their students' experience.

An increasing number of medical schools are using standardized patients and objective structured clinical examinations. Almost all medical schools use standardized patients to instruct and evaluate students on physician-patient communication and interpersonal skills, history taking and other noncognitive skills such as empathy and ethical decision-making. Many use standardized patients for assessment in basic courses teaching history and physicals, in one or more clerkships and/or as a final comprehensive exam. Concerns have arisen about the cost and logistics of standardized patients. The trend is to develop a regional standardized patient consortia. The National Board of Medical Examiners is developing a clinical skills test using standardized patients for licensure.¹⁵

Some medical schools are securing international affiliations. Cornell University and Sheikh Hamad Bin Khalifa Al-Thani, the emir of the small Persian Gulf nation Qatar, have established the Weill Cornell Medical College in Qatar. The medical college will offer a complete medical education leading to a Cornell University MD degree, based upon the same admission standards and curriculum as the New York campus.¹⁶ Ohio State University College of Medicine and Public Health and the Graduate School Of Medicine at the University of Tokyo signed a five-year academic cooperation agreement to promote mutual cooperation in education and scientific research.¹⁷

¹³ *ibid*

¹⁴ *ibid*

¹⁵ AAMC CIME May 1998, Vol. 1, No. 7, *Academic Medicine* 2000; 75(10): 960-961

¹⁶ AAMC STAT 4/16/01

¹⁷ AAMC STAT 7/2/01

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Responsibility for the curriculum is moving away from the traditional discipline/department based structure to one that is integrated and centrally coordinated. The number of medical schools with individuals, offices and funds devoted to medical education has increased by approximately 70 percent since 1990.¹⁸

The LCME recommends that medical school accreditation standards be better aligned with the public's expectations. It is investigating the consequences of using competencies as measurable outcomes for evidence-based accreditation.

Teaching has traditionally been subsidized by revenue sources other than tuition. Demands for increased productivity along revenue-generating lines is putting increasing pressure on faculty involvement in education. The continued development of the medical school faculty must be focused upon meeting these evolving organizational needs.

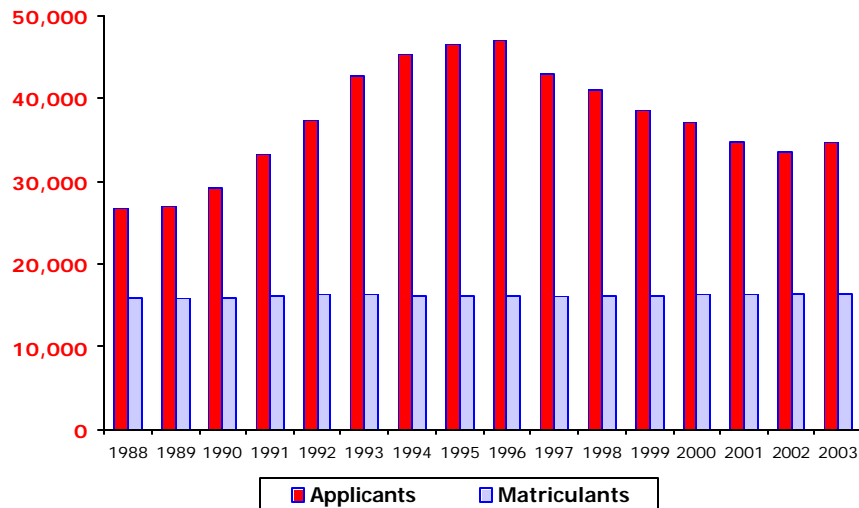
Several schools are experimenting with mechanisms to recognize educational contributions and foster educational leadership. In 1998, UCSF created the Academy of Medical Educators to promote interdisciplinary medical student teaching, to provide funding for innovative educational programs, to sponsor faculty development and to facilitate mentoring of teachers. In 1980, the Harvard School of Medicine began utilizing the "teaching dossier" in the promotion process. The dossier was later refined to include a broader range of scholarship (integration, application, and teaching).

Until this year, the pool of applicants to medical school had declined steadily since 1996 but is still more than double the number of available slots.

¹⁸ *Academic Medicine* 2000; 75(9): Sxi-Sxiv

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Medical school applicants and matriculants



Despite the decrease in numbers, the quality of medical school applicants has improved, as measured by Medical College Admissions Test (MCAT) scores and undergraduate grade point averages.¹⁹

Some potential reasons for the change in size of the applicant pool include: a greater self-selection on the part of individuals considering applying to medical school; attraction of other career paths; impact of managed care on the field of medicine, particularly specialization and salaries; the rising cost of medical education and student debt load; physician job satisfaction issues.

A notable demographic shift has been seen in applicants and matriculants to medical schools in the last thirty years.

Women made up the majority of applicants for the first time ever in 2003; 51 percent of applications were from females, continuing a steady increase from 20 percent in 1974. The sharp decline of males applying to medical schools, a trend that started in 1997, continued through 2002 but leveled off in 2003. A total of 17,113 males applied this year compared with 18,142 in 2001. The number of females applicants increased to 17,672 after a declines to 16,454 in 2001.

The number of black applicants rose nearly five percent in 2003, fueled by an almost 10 percent increase in black women applicants who comprised 67 percent

¹⁹ AAMC, Student Applications and Facts

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of the pool of black applicants. However, the number of black students who entered medical school declined by 6 percent to 1,056. Female underrepresented minority applications overall increased by nearly 300 percent between 1974 and 1999, while applications from black men declined by 33 percent. The number of underrepresented minority applicants (Black, Native American, Mexican American and Mainland Puerto Rican) had decreased by 8 percent from 1996 to 2002.

The ruling of the U.S. Supreme Court cases on affirmative action in admissions at the University of Michigan will have an impact on admissions procedures and policies at all institutions of higher education, and will likely also have an impact on the applicant pool for medical schools.

The current demographic profile of the cohort of U.S. medical students²⁰.

Table 5. Race and Ethnic Background of Medical Students, 2001-2002

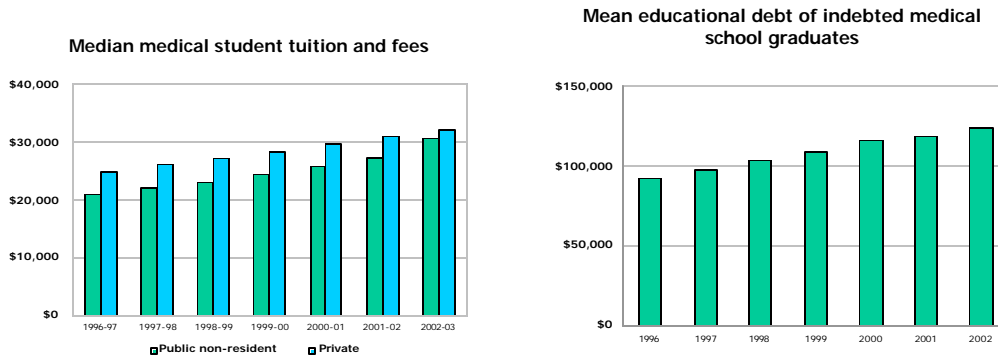
	Black (Non-Hispanic)	Native American*	Mexican American	Puerto Rican		Other Hispanic	Asian/Pacific Islander	All Other Students†	No. (%) of Total
				Other	Mainland				
First-year enrollment‡									
Men	482	66	245	109	47	192	1746	5958	8845 (52.2)
Women	856	60	197	119	50	150	1544	5112	8088 (47.8)
No. (%) of Total	1338 (7.9)	126 (0.7)	442 (2.6)	228 (1.3)	97 (0.6)	342 (2.0)	3290 (19.4)	11 070 (65.4)	16 933 (100)
Graduates									
Men	413	71	214	102	48	164	1751	6077	8840 (56)
Women	730	58	172	83	43	139	1363	4382	6970 (44)
No. (%) of Total	1143 (7.2)	129 (0.8)	386 (2.4)	185 (1.2)	91 (0.6)	303 (1.9)	3114 (19.7)	10 459 (66.2)	15 810 (100)
Total enrollment									
Men	1793	269	938	401	215	737	7127	24 479	35 959 (54.3)
Women	3119	251	770	393	209	590	5945	18 983	30 260 (45.7)
No. (%) of Total	4912 (7.4)	520 (0.8)	1708 (2.6)	794 (1.2)	424 (0.6)	1327 (2.0)	13 072 (19.7)	43 462 (65.6)	66 219 (100)

*Includes Native American, Native Alaskan, and Native Hawaiian.
†Includes white (not of Hispanic origin), international, and students of unknown race and ethnic backgrounds.
‡First-year enrollment data include students repeating the year.

²⁰ JAMA. 2002;288:1067-1072

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Medical education costs and student debt continue to rise.



The number of students owing \$150,000 or more has grown from 8.1 percent in 1997 to 13.9 percent in 1999.²¹ Educational debt may play a role in the specialty choice of graduates, and, therefore, in the specialty maldistribution of physicians. It appears that a threshold exists above which choices are significantly influenced. Two recent studies found that a debt level between \$75,000 and \$100,000 or above influences specialty choice.²²

GRADUATE MEDICAL EDUCATION

Graduate medical education – the training of residents and fellows – is a mission-critical activity for academic medical centers. Strong residency programs enhance physician recruitment and foster leading-edge patient care. Residents and fellows serve a variety of roles. First and foremost, they are students and trainees, learning specialty and subspecialty care under the direction of faculty in programs established and accredited by specialty and discipline. The length of these programs ranges from three to eight years. They are, as licensed physicians, a workforce providing clinical care to patients. A critical question about the sizing of GME programs is the extent to which they fulfill a societal need (number and specialty distribution of physicians) or an institutional need (local physician workforce). The size of programs has generally been determined by clinical service needs, not physician manpower needs. Residents are also educators, playing key roles in the clinical training of medical students and other residents.

The Accreditation Council for Graduate Medical Education (ACGME), which, along with the various medical specialties, accredits residency programs has returned to a focus on residency programs as educational experiences.

²¹ AAMC

²² JAMA, 1998; 280(21): 1879-80.

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Programs must define the knowledge, skills and attitudes and provide the educational experiences required to enable residents to obtain competencies in patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism and systems-based practice to the level expected of a new practitioner²³. The AAMC has issued new policy guidelines for GME in four major areas: institutional oversight and program support, the educational program, supervision of residents in patient care, and resident duty hours²⁴.

The federal government, through Medicare, is by far the primary funding source for residency program slots. The demand for residents to provide clinical care exceeds the number of U.S. medical school graduates, and many programs rely on international medical graduates (IMGs) to staff their programs.

A variety of proposals have been advanced to change GME financing, but they have proceeded slowly and sweeping changes are unlikely. Proposals have included: creating of an all-payer GME fund, making payments to clinical sites other than hospitals, and fundamentally changing the Medicare GME reimbursement formulas. Prior to the 1997 Balanced Budget Amendment, growth in GME programs was fueled by a positive marginal contribution of each new resident to institutional Medicare reimbursement. That margin is now maximized by maintaining program size at a resident count cap. The effect of this change is seen in the resident numbers in the figure below.

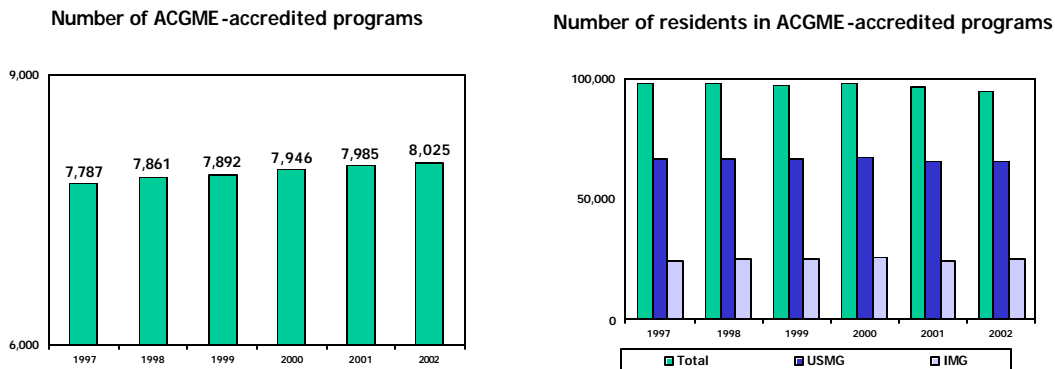
Data on the number of ACGME-accredited programs and residents²⁵ illustrates some of the forces pressuring graduate medical education. The increase in the number of programs in the last five years is due, in part, to the growth of new specialties and subspecialties fueled by advances in medical practice. However, the modest decrease in the overall number of residency slots shows the impact of governmental belt-tightening. GME programs are vulnerable to the availability of federal funding.

²³ ACGME Outcome Project, Minimum Program Requirements Language, Sept 1999

²⁴ AAMC STAT 10/29/01

²⁵ *JAMA*. 2002;288:1073-1078.

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In providing clinical care, residents are still a “bargain” for hospitals compared with cost of alternatives. One study²⁶ noted that the cost of replacing one resident or fellow could range from \$70,000 to \$300,000 (depending on year and training and specialty) plus the loss of additional Medicare reimbursements (which are based on the number of residents at an institution). By contrast, in 2002, the mean stipend for a 6th year resident was less than \$50 thousand.²⁷

A reduction in the overall GME complement has occurred but the numbers of faculty physicians have increased. This is having an impact on the “availability” of residents to faculty physicians (see Faculty Workforce, above).

A class-action lawsuit is currently pending which challenges the National Resident Matching Program, the sharing of stipend data, and the accreditation and limitation of residency programs and size on anti-trust grounds. The potential impact of this suit is enormous. The defendants, include national accrediting organizations, hospitals, and medical schools.

Limiting resident work hours has been a key focus of a variety of legislative efforts and litigation. The State of Illinois is the only state that requires hospitals by statute to comply with the ACGME’s residency physician duty hour requirements. After talking to surgical residents who say they routinely work more than 100 hours a week, the ACGME has threatened to withdraw accreditation for the general-surgery residency at Yale University’s School of Medicine, effective July 1, 2003. Yale officials said that the university’s teaching hospital would spend more than \$1 million per year to hire additional physician

²⁶ Approaches to Measuring the Value of Medical Education, ECG Management Consultants, Inc., April, 2000 presentation

²⁷ AAMC Data Book, 2003. Table G1, Mean Housestaff Stipends in COTH (Council of Teaching Hospitals) Hospitals.

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assistants and moonlighting physicians in order to allow it to cut the residents' workweeks to less than 80 hours.

GRADUATE (PhD) EDUCATION

Medical schools engage in biomedical research as part of their mission to advance and disseminate knowledge, and the education of future scientists is an important part of that mission. More than 70 percent of NIH-funded research training programs are in medical schools and hospitals.

Like residents, who are both students and a physician workforce, graduate students in the life sciences are both students and a research workforce. They also assume an important role in medical student teaching. And, like residency programs, strong graduate programs help to attract and retain top faculty members even as they require considerable faculty effort for education and supervision.

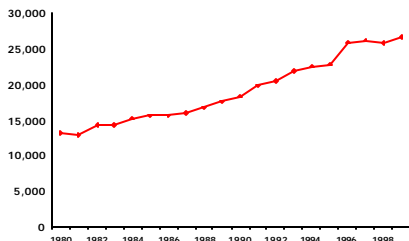
Training of life scientists is highly decentralized. Even with heavy dependence on federal funding, most important decisions are made locally by universities and their faculty. The numbers and qualifications of students, allocation of institutional funds for tuition and stipend, the requirement for degrees are all local decisions.

Institutions with graduate programs bear a dollar cost and realize a dollar benefit. Costs for stipends and faculty teaching effort are real. Graduate students are a workforce in the laboratories, enabling faculty to take on more projects.

In 1998, the National Research Council issued a report in response to concerns about an increasing disconnect between the supply of jobs for PhDs with the demands by faculty for trainees to assist in the laboratory. The number of life science PhDs increased 52 percent between 1987 and 1996. The number of life-scientists holding faculty positions has increased at only 2.5 percent per year since 1973, and so the opportunity to secure academic appointment has steadily declined since the 1960s. The growth in federal funding for research, now restrained after the NIH "doubling period" (see section, below), is unlikely to compensate for the imbalance of PhDs and their employment prospects, whether in academia or industry.

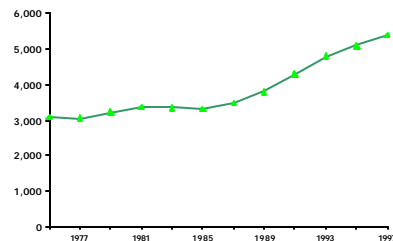
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The Number of Basic Science Graduate Students Has Doubled since 1980



Source: LCME

PhDs Awarded Annually in Biomedical Sciences



Source: National Research Council

The majority of the increase in PhD trainees and postdoctoral fellows are foreign nationals. While the NRC felt it unwise to place arbitrary limitations on number of visas issued for foreign students, it recommended that U.S. institutions not continue to enroll unlimited numbers of foreign nationals.

The NRC also recommended: constraining the rate of growth in the number of graduate students and halting expansion of existing graduate programs in the life sciences; improving the education experience of the students by supporting them on training grants rather than research grants; establishing "career-transition" grants for senior postdoctoral fellows providing financial independence to begin new scientific projects of their own; and identifying specific areas of biological and biomedical sciences for which master's level training is more appropriate.

A critical question, then, is how to balance these recommendations with the attendant need for graduate trainees to accompany an expansion of the research enterprise, both nationally and institutionally.

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CONTINUING MEDICAL EDUCATION

Given the incredible pace of change in the science of medicine, academic medical centers have both an opportunity and a responsibility to provide ongoing programs to keep physicians up to date. Licensing bodies and specialty societies have an interest in establishing and maintaining physician competencies in an evolving practice environment. And industrial manufacturers routinely provide or support programs to familiarize physicians with new techniques and technologies, often their latest product and service offerings. As a result, the environment for continuing medical education is complex and changing.

The Accreditation Council for Continuing Medical Education (ACCME) lists approximately 2500 ACCME-accredited providers — medical schools, specialty societies, hospitals, and for-profit educational companies. In 2001, the ACCME reported more than 53,000 CME activities conducted, with less than one-third having been sponsored by a medical school.

The American Board of Medical Specialties (ABMS) has identified six general areas of competency to be maintained by all physicians, only some of which relate to the scientific basis of medicine. They are medical knowledge, patient care, interpersonal and communications skills, professionalism, practice-based learning and improvement, and systems-based practice. The ABMS no longer uses the term “recertification”, opting instead to use “maintenance of certification”, indicating that, once certified, individuals are expected to maintain their certificate on a continuous basis rather than an episodic one.²⁸

The role of the pharmaceutical industry in continuing medical education is an ongoing concern. An article in JAMA stated, “... CME is now so closely linked with the marketing of pharmaceuticals that its integrity and credibility are being questioned.”²⁹ The U.S. Office of the Inspector General (OIG) announced new Compliance Program Guidance for Pharmaceutical Manufacturers stating that some long-standing practices -- including gifts to doctors, medical education sponsorship, and physician consulting arrangements -- may violate federal anti-kickback laws.³⁰ The Pharmaceutical Research and Manufacturer’s Association adopted new marketing guidelines to govern industry interactions with physicians and other providers.

²⁸ “Maintaining Lifelong Physician Competence – a Goal of the Medical Profession”, Alliance for CME Almanac, 24:7, July 2002

²⁹ “Separating Continuing Medical Education from Pharmaceutical Marketing”, JAMA. 2001;28:2009-2012

³⁰ American Medical News, May 19, 2003

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Schools of medicine are providing less support for their CME operations³¹, although total live activities have increased 30 percent. Now, 40 percent of medical schools provide no direct central funding of their CME operations, up from 25 percent eight years ago. These operations will be even more affected by national factors altering pharmaceutical advertising expenditures and the scrutiny on potential conflicts of interest.

More than half of U.S. states require physicians to acquire CME credits for license renewal. The State of Illinois requires physicians to have 50 hours of CME credit per year.

More web-based continuing medical education activities are being offered. The ACCME implemented a new accreditation system that addresses content, educational methodology, and learner competency-based criteria, and a new policy applicable to delivering CME programs via the Internet by accredited providers.

³¹ Society for Academic Continuing Medical Education, "Highlights of SACME Survey Report", Intercom 15:2, June 2002.

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RESEARCH

The scientific basis of modern medicine depends on research. Research is a cornerstone of an academic medical center, where new knowledge is created, disseminated, and applied. In many respects an institution's reputation and standing rests firmly on its research enterprise. Beyond the advancement of the frontiers of knowledge, research informs how our faculty practice state-of-the-art medicine and the content of curricula with which we educate future physicians and scientists.

Revolutionary changes in medical practice have resulted from research. Advances such as genetic screening and therapy, MRI and PET imaging, and minimally invasive surgery were almost unimaginable a half century ago. Physicians are now able to diagnose and treat many previously incurable diseases. The track record of success and the promise of a new age of medicine has created a public expectation for new breakthroughs.

One of the key challenges of the coming years is the translation of basic science into clinical application. The leading institutions of the future will be those that succeed in translational research.

Health care payors and providers want academic medical centers to take a leadership role in the following research areas³²: describing what makes care safe, effective, and efficient; developing processes of care that are more patient-centered and defining how to implement them; defining important and relevant measures of quality of care and practice; identifying effective methods of health promotion and disease prevention; understanding what works and doesn't work in basic and applied science in order to shorten the time between scientific discovery and implementation into practice

Costs and competition

Research is a competitive, costly, and negative cash flow business, requiring internal subsidies for each extramural dollar. These subsidies support the physical infrastructure and the non-research time of investigators, seed and bridge new and unfunded projects, support administrative systems such as compliance and grants management, and cushion the impact of capped salary and administrative costs. The gap between the actual indirect costs of doing research and indirect cost recoveries has been widening.

A sellers market for top-tier research talent leads to competition among institutions. The current building boom in academic medicine is putting

³² Cutler, IOM Committee on the Roles of Academic Health Centers in the 21st Century

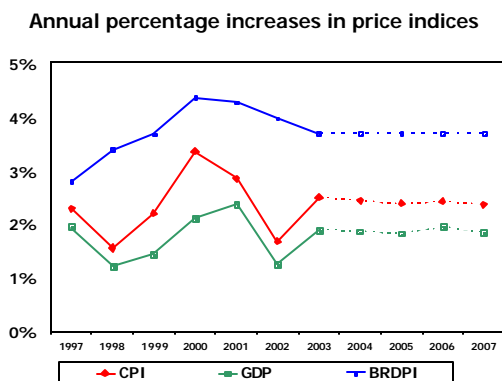
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pressures on institutions to fill new space productively. Funded researchers, particularly the top 20 percent, are increasingly valuable. Recruitment packages may escalate as a result, and will not be based on salary and benefits alone but will include costs for infrastructure, animals, and housing. However, private institutions may have an opportunity to attract talent from public institutions, given that many state budgets are under considerable pressure.

The recent period which aimed to double the NIH budget will not translate into a doubling of research activity for a variety of reasons. The growth in the number of awards has been limited by multi-year commitments, and institutional costs have increased for compliance, facilities, and cost-sharing, to name a few. Notably fiercer competition for federal funding is likely in the near term.

President Bush's proposed FY2004 budget limits the rate of NIH growth to about two percent after years of fourteen to fifteen percent growth, and this may reverse the gains of recent years. The budget requires a reduction in number of (non-bioterrorism) proposals funded, something that has only happened once since 1989. Since four percent "cost of doing business" increases – an expected annual inflationary factor – are built into current multiyear grants, an overall funding growth rate of two percent will lose ground relative to inflation and reduce the number of new proposals and new investigators that can be funded.

The costs of scientific research have escalated as more sophisticated equipment and facilities are needed to conduct analyses at increasingly smaller scales and faster rates. The figure below shows that the rate of growth of the Biomedical R&D Price Index (BRDPI) has significantly outpaced the growth of both the Consumer Price Index and the Gross Domestic Product and is projected to continue to do so³³.



³³ AAMC Data Book, 2003, Table L1, Historical Price Indices

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Specialized facilities – for animal research, genetics and proteomics, nanotechnology, and imaging, to name a few – require significant investments of capital and operating support. The implications of this are not purely financial. It is becoming more difficult to invest uniformly across the enterprise or across disciplines. Institutions must essentially make high stakes gambles on research areas and are, in a very real sense, limited in their future choices by the need to leverage prior investments, even in the face of other research opportunities that may come along soon after. Increasingly, investments will be made in areas where groups of investigators will share facilities and technologies.

Research is increasingly conducted by teams working across disciplines, departments, and institutions. The administrative mechanisms for tracking and managing research projects have not adapted to these newer realities in the direction of science, and can impose costs on collaborative efforts.

Ongoing investments of capital and effort must be made to develop and maintain systems that insure investigators and institutions are in compliance with an increasing array of regulations for the expenditure of funds, the conduct of research, the safety of research subjects, staff, and students, and conflict of interest and commitment.

Public policy

The public is increasingly interested in securing an appropriate return on NIH investment. This may ultimately affect the direction of research and funding opportunities away from basic research. NIH Director Elias Zerhouni cautions that what is optimal to the scientific community may not be perceived as optimal by disease advocacy groups or the Congress or Administration. Even within the scientific community, different views exist about the optimal activities of the NIH.

Legislative scrutiny and regulation of research will increase. Congress has already acted to limit some research areas and directions, such as stem cell research. Progress in genetics is likely to lead to additional legislative action, such as the ban on human cloning.

Several high profile cases involving the death of research subjects and scientific fraud will likely lead to further legislative intervention in human subjects protection, patient data confidentiality, ownership, and access, and conflict of interest and commitment in industry-school collaborations.

The National Academy of Science is undertaking a study of the potential reorganization of NIH with a 15-month project beginning in August, 2002. The group is examining whether the NIH should be restructured, and what that structure would look like to improve the NIH's ability to conduct research and

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training, overcome current weaknesses, and accommodate organizational growth. Former Congressman John Porter testified to the NAS that: "The NIH has gotten one or two new institutes each Congress almost since the beginning. They have been proliferating at a huge rate." The result is that "every NIH director has been very concerned privately if not publicly about the excessive independence of each of the institutes. There has been worry about duplication of research effort; a lack of cooperation and collaboration in some instances that is not healthy for the entire [NIH]." He referred to the NIH director's position as "where you are accountable but do not have the kind of control...the director should have."

The NIH will continue to focus on interdisciplinary research, despite organizational challenges. The NIH Director hopes to "break down departmental barriers" and help facilitate multidisciplinary research to improve internal cooperation³⁴. He proposed the creation of better mechanisms for funding multidisciplinary grants, such as the "glue grant" mechanism, a method of supporting large, multifaceted groups of scientists taking on problems beyond the reach of individual investigators.

Late in 2003 the NIH leadership published a Roadmap³⁵, outlining new initiatives and priorities designed to build upon the strengths in research that NIH efforts have seeded in the past. The roadmap identified three major themes and new initiatives in each: New Pathways to Discovery (Building Blocks, Pathways, and Networks; Molecular Libraries and Imaging; Structural Biology; Bioinformatics and Computations Biology; and Nanomedicine), Research Teams of the Future (High-risk research, Interdisciplinary research, and Public-Private partnerships), and Reengineering the Clinical Research Enterprise.

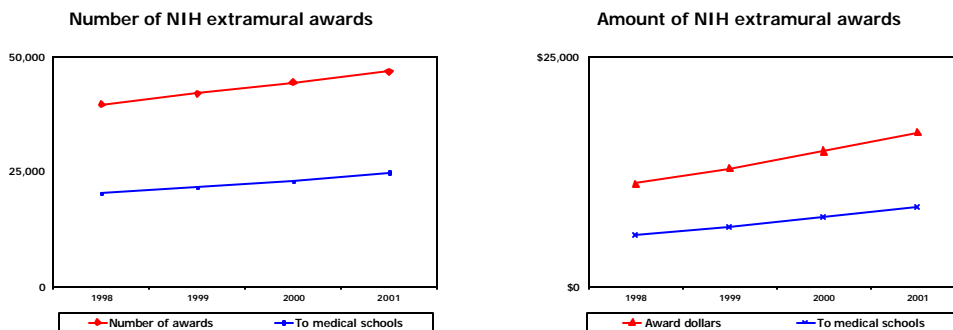
Resources

The NIH budget has grown significantly in recent years, nearly completing the targeted doubling begun in 1997. As described above, this increase does not translate into a doubling of research activity. More importantly, the past will likely not be prologue.

³⁴ Washington Fax 6/2/99

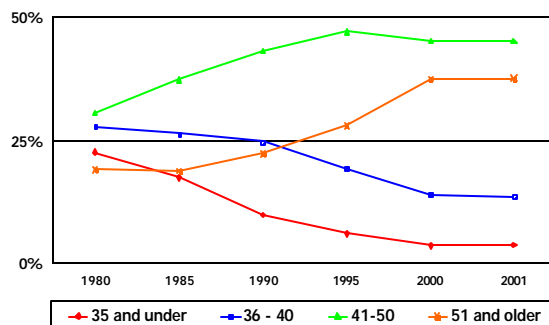
³⁵ Zerhouni, The NIH Roadmap, *Science* v 302, 10/3/2003

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The FY2004 budget submitted by the Bush administration severely constrains NIH growth in the years ahead. The 2.2 percent increase proposed this spring will largely flatten NIH awards in a period where biomedical research costs are increasing at a faster rate and institutions are bringing new space online. This is expected to have a significant impact on the number, type, and size of awards. Current multiyear award commitments, coupled with an increasing share of funding to bioterrorism-related research will reduce the pool of available funds in traditional research areas. This could be particularly devastating to young investigators, exacerbating the already troubling trend shown in the figure below.

Percentage of NIH awards by age of investigator

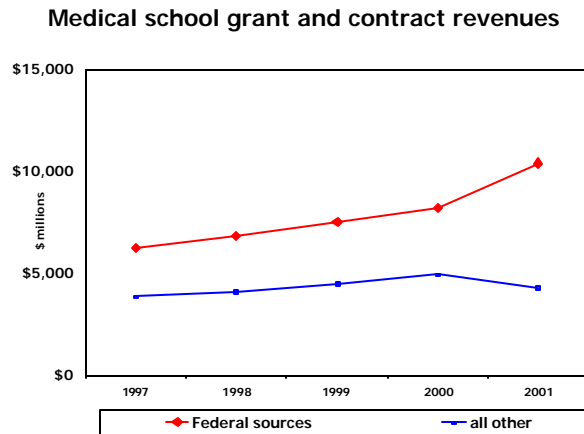


Throughout the NIH “doubling period”, success rates for NIH grant applications in the aggregate have run about 35 percent. A recent analysis³⁶ in *Science* warns that the overall success rate may drop to 27 percent.

Total research grant and contract activity from all sources to medical schools has also been growing rapidly, but that growth has been fueled by federal spending on research.

³⁶ *Science*, 2002 Vol 296, P1401

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Clinical research, clinical trials, and translational research

It is increasingly difficult to fund protected time for researchers in clinical departments. The ranks of clinical investigators are shrinking, as described in the Faculty Workforce section, above. Clinicians are under real financial pressures to increase productivity in the face of declining patient care reimbursements. Practicing clinician-investigators must balance the needs for appropriate number of procedures and patient contacts to maintain clinical performance, residency training program requirements, and a patient base for research; while these needs may overlap somewhat, they also compete. A threshold of effort exists below which a clinician cannot sustain a competitive research program.

Other factors contributing to the decline in clinical investigators are the length of time it takes to prepare for a clinical research career, the high cost of medical education and student debt, the complexity of mastering both basic and clinical sciences, and intense competition for research grants.

The federal government has increased its efforts to support training and work of physician-scientists, such as career development grants and loan program-debt relief. But the fundamental challenge remains to protect the time for research and still give physicians the necessary clinical experiences and volumes.

Most PIs on federal clinical research grants are PhDs, although some evidence exists that this might be changing.

Clinical researchers in high managed care areas publish in peer-reviewed journals less than in low managed care markets. This indicates either less

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institutional support for research or increased effort towards clinical duties. The decline in publishing in peer-reviewed journals was not found for basic researchers suggesting that time for traditional NIH-funded research is more likely to be protected.

The Commonwealth Fund reports that AMCs undervalue clinical researchers³⁷. They are treated as “second class citizens,” especially in “elite academic medical centers”, with limited access to discretionary research resources, a lack of role models, and a more difficult path to promotion.

Clinical research projects pose different management challenges for academic medical centers than basic research: compliance issues, legal and public relations risks, and the management of industrial relationships and conflict of interest.

Sponsors are having increasing difficulty filling clinical trial slots³⁸. In 2001, the Annals of Internal Medicine reported that 86 percent of all clinical trials failed to meet enrollment goals, causing delays of up to a year, up from 80 percent in 1999. Mistrust, subject deaths, and reports of misconduct contribute to patient reluctance to participate.

Industry-sponsored research now accounts for over half of national biomedical research expenditures. One-third of industrial research is spent on clinical trials.

The NIH reports it has increased its financial support of clinical research and that spending on clinical research has kept pace with total NIH research spending³⁹. In fiscal year 2001, NIH reported that overall it spent approximately \$6.4 billion on clinical research, or about 32 percent of its total research dollars. Total clinical research expenditures increased by 44 percent (adjusted for inflation) from fiscal year 1997 to fiscal year 2001, while the proportion of NIH's total research dollars spent on clinical research remained constant. NIH has increased its support of General Clinical Research Centers (GCRCs), although the program has grown more slowly than NIH's overall spending on clinical research. Funding for the GCRCs increased by 24 percent (adjusted for inflation) in 2001, while the number of GCRCs grew from 74 to 79.

Academic centers are facing Increasing competition from for-profit Clinical Research Organizations driving some, like Duke, to create an internal equivalent.

³⁷ From Bench to Bedside: Preserving the Mission of Academic Health Centers, Commonwealth Fund, 2000

³⁸ LA Times 12/2/02 via AAMC STAT

³⁹ GAO report, September, 2002

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Virtually every academic medical center now has a technology transfer operation. Royalties are a growing source of income for AMCs, with licensing income up 29 percent and patent applications up 14 percent from 1997-1998. Annually, Stanford receives over \$60 million from technology transfer, the University of California and Columbia each over \$40 million. However, most university technology transfer programs have very few, if any, products in the market. Many universities operate their technology transfer programs at a net loss.

While some institutions have made big hits, others have had legal problems, raising both expectations and questions. The most recent example was the patent settlement involving the University of Rochester over the discovery of COX 2-inhibitors.

The NIH is concerned that it cannot track the extent to which its research support is responsible for universities' revenues from technology transfer. They encountered difficulty cross-referencing grants and contracts that gave rise to inventions with any patents or licenses covering the final product, as well as an inability to identify other federal and/or non-federal sources of funds that contribute to an inventive technology.

Translational research is the key growth area for academic medical centers. There is no clear model for success, and the organizational, structural, and cultural barriers to these collaborations are substantial. However, recent advances in genomics and imaging, to name a few, promise a rapid stream of clinical applications. The institutions that lead in translational research will become the leading academic medical centers in the future.

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PATIENT CARE

The major scientific and technological advances of late (in genetics, imaging, and information technology, to name a few) pale in comparison to the promise of future breakthroughs – such as tissue engineering – that will revolutionize the practice of medicine. Such sweeping changes create challenges, however, both for the future and the current health care system. New research results are being published at an incredible pace, creating a challenge to continually re-evaluate what constitutes best practices in clinical care. New advances are adding further pressure to ever-growing health care costs. Economic realities will further change the relationships between physicians, patients, hospitals, insurers, and employers. Physicians will need to be continually educated, and the sites of care re-tooled and re-equipped. And the explosion of information available to patients is already changing patient-physician relationships and society's expectation of the medical profession.

But other changes, perhaps less headline-grabbing but equally sweeping, are affecting the practice of medicine. A demographic shift in the population is under way, a growing number of people are afflicted with chronic health conditions, and the ranks of un- and under-insured are swelling. The supply of physicians keeps growing. Health care costs are rising at a rate nearly triple that of other sectors of the economy. Today's health care delivery models often span departments, disciplines, and jobs, utilizing teams of professionals focused on diseases or organ systems. Public attitudes about physicians are changing, and physicians themselves are thinking differently about the profession of medicine.

Patient safety

A 2001 report by the Institute of Medicine noted significant problems with patient safety and the quality and consistency of health care delivery. The report went so far as to identify physician errors as a significant health problem⁴⁰. One conclusion of the study was that "Health care has safety and quality problems because it relies on outmoded systems of work. Poor designs set the workforce up to fail, regardless of how hard they try. If we want safer, higher-quality care, we will need to have redesigned systems of care, including the use of information technology to support clinical and administrative processes." Academic medical centers are uniquely positioned to play a critical role in addressing these issues given their unique position at the nexus of research, physician education, and patient care. Yet many AMC strategies, including "mission-based management", are designed to improve the efficiency and effectiveness of traditional systems, not to define new ones. Aetna found that AMCs could not compete on efficiency or price with private vendors or disease management programs, even though the

⁴⁰ Crossing the Quality Chasm, Institute of Medicine, 2001

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models are developed by AMCs.⁴¹ A renewed focus will be placed on patient safety and the organization, as well as the delivery, of consistent, high-quality care.

The World Health Organization rates the United States 37th overall in the performance of its health system. Despite spending more on health care than any other nation, the U.S. lags most industrialized countries in measures such as life expectancy (25th overall in 2000) and infant mortality.

Technology and information

Technology will be the single most influential driver of change in health care delivery, and the pace of this change will continue to accelerate. While the introduction and refinement of technologies will result in improved diagnosis, treatment and outcomes, it also requires greater investments and may necessitate higher costs. (For example, the replacement of a \$200 dollar stethoscope with a \$2,000 hand-held ultrasound device.) Key areas of technological-driven change are genomics and genetic testing; proteomics; drug discovery and development of preventive and therapeutic vaccines; stem cells, regenerative medicine, and tissue engineering; minimally invasive surgery; imaging, sensor technologies, and telemetry; and nanoscience. Despite the promise of these new vistas, the Institute for the Future has questioned whether the "... explosions in technology will exceed our capacity to make rational decisions intuitively."⁴²

A greatly enhanced, electronic medical record has the potential to improve care and the physician practice environment. Patient information – both medical and claims data – will be mined as a data source. Using medical records, rather than billing data, promises to provide better patient data for research, quality assessment, and decision support. Developing these systems and databases will require large investments in technology and training. It is unclear whether the promise of new patient record systems – such as improvements in quality of care, physician communication, or as competitive tools to attract physicians to provider networks – will generate significant savings to justify these investments. Privacy and data ownership issues will be the key bottleneck in implementing new systems and may ultimately drive legislative solutions, such as the Health Insurance Portability and Accountability Act of 1996 (HIPAA).

Members of the public have become more active and aware “consumers” of health care services. Advertising to consumers by hospitals, physicians, and drug companies is now commonplace and growing. Higher health insurance premiums and deductibles and an increase in the numbers of the uninsured are

⁴¹ Rowe, IOM Committee on Roles of Academic Health Centers in the 21st Century

⁴² Institute for the Future, presentation to AAMC Group on Business Affairs, 2001

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also leading to more of a “shopping environment” in selecting health care providers. Information technology is creating more informed - and misinformed – consumers. Since late 1990s, more than half of the U.S. population has been using the Internet for information on fitness, disease, and injury.⁴³ Patients are increasingly engaged in shared decision-making with physicians. Physicians now expect many patients to have access to data about their health – some of it misinformation – and the increased questioning and scrutiny this may bring.

The public also has a growing interest alternative medicine. Recent changes by insurers and HMOs to cover some services and practices is recognition of a large market that previously paid out-of-pocket. The NIH established in 1992 the National Center for Complementary and Alternative Medicine, which began making awards in 1999 and in 2002 awarded more than \$80 million.

Patient populations

Americans are living longer. The population is shifting towards older demographic groups. The percentage of the population aged 65-84 grew from 9 percent in 1960 to 11 percent in 2000; it is projected to grow to 14 percent in 2020 and 17 percent in 2040⁴⁴. The U.S. is also becoming more ethnically diverse. The percentage of white Americans, currently about 75 percent, is projected to decrease to 64 percent by 2010.

Chronic diseases are among the most prevalent and costly health problems. The Centers for Disease Control reports that 7 in 10 Americans die of chronic disease and 1 in 10 (25 million people) suffer from chronic, disabling conditions.

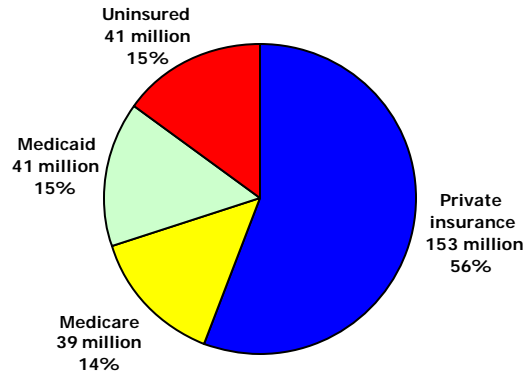
Access to health care in the U.S. is tiered. The number of uninsured and underinsured is a large and growing. In 2001, 41.2 million people were uninsured, an increase of 3.5 percent from 2000. This population is less healthy and often postpones receiving necessary care, which has an impact not just on health care costs but on the overall quality of public health. More than 41 million Americans are covered by Medicaid and 39 million by Medicare; together representing nearly one-third of the total U.S. population. Of these patients, 38 percent had no prescription drug coverage; that figure is rising.

⁴³ The Knowledge Economy, Ernst&Young 1999, cited by AMA, 2002

⁴⁴ National Center for Health Statistics

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How Americans are covered



Tiers also exist within the insured group. Some have insurance coverage but little choice, and some are “empowered” consumers with significant discretionary income, education, and access to information.

Academic medical centers bear a disproportionate share of the costs of providing care to the indigent. Although the 120 AMC hospitals represent less than 3 percent of the nation’s hospitals, they provide more than 20 percent of all Medicaid days. The “market share” of indigent care at AMC hospitals has grown nearly 40 percent in the last six years, from 20.4 percent to 27.9 percent⁴⁵. At the Detroit Medical Center, a new policy redirects poor patients needing elective care to government clinics⁴⁶. The University of Colorado Hospitals screen referrals of indigent patients from clinics and restricts access to its ER and clinics⁴⁷. And the L.A. Times reports that physician specialists increasingly refuse to drop what they are doing to care for strangers in emergency rooms

Health care costs

Health care costs have been increasing faster than the rate of inflation and are rising as a percentage of gross domestic product (GDP)⁴⁸. In 2001, national health expenditures were 14 percent of GDP, up from 12 percent in 1990, and are predicted to be as high as 16 percent by 2010⁴⁹. Some are predicting long-term double-digit annual increases in health care expenditures, driven primarily by technology, pharmaceutical prices, an aging population, and aggressive

⁴⁵ AAMC, Council on Teaching Hospitals

⁴⁶ Detroit news via AAMC STAT October 2002

⁴⁷ Denver Post via AAMC Stat, July, 2002

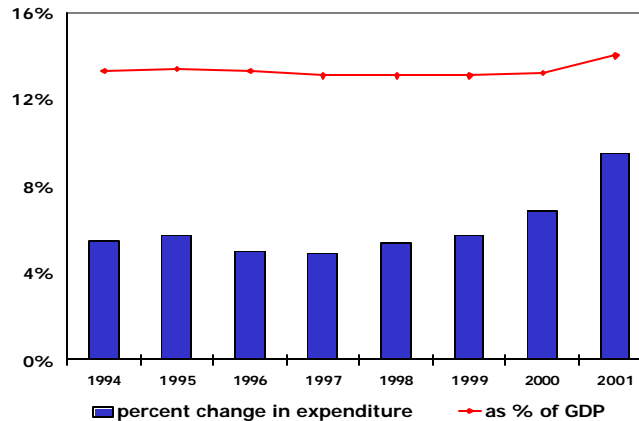
⁴⁸ U.S. Centers for Medicare and Medicaid Services, “Health Accounts”

⁴⁹ Saloman Smith Barney

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negotiation on the part of providers. This is not inflationary, per se, since the costs are purchasing a different set of goods in the form of new treatments, diagnostics, and services. On a per capita basis, U.S. spending of \$4,094 in 1998 was 50 percent higher than the next highest country.

Annual percentage increase in total national health expenditures and as percent of GDP

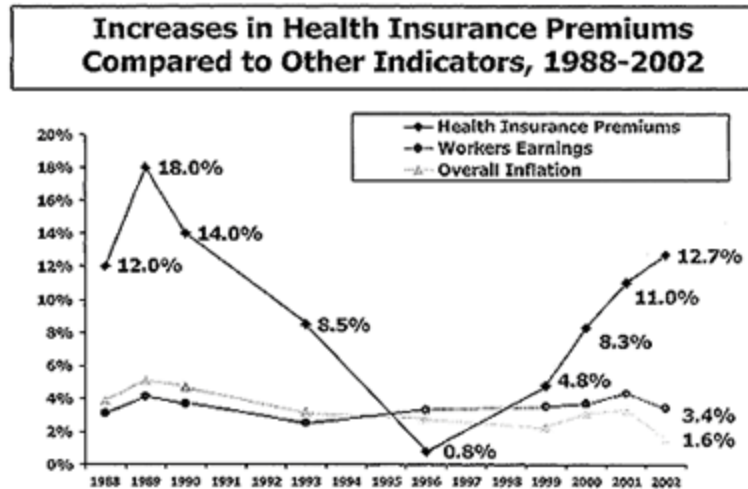


Medical costs have been increasing more than five times faster than the overall inflation rate, driven by several key factors. Drug costs have been increasing at three- to four-times the inflation rate. The pharmaceutical industry argues that new drugs reduce other treatment costs and that it is necessary to recoup funds from sales to invest in research. A recent study, however, showed that hypertension is treated more effectively by water pills (costs \$0.10/pill) than by ACE-inhibitors (cost \$2.00/pill).

The period of HMOs offering low premiums to attract market share has ended. These firms are choosing profit over volume and premium increases have spiked. In some markets, consolidation of hospital and physician networks have put them in a better position to negotiate higher payment rates. Cost shifting has also increased, as Medicare and Medicaid reimbursements to providers have not kept pace with inflation. Malpractice insurance premiums have soared after the exit of the country's largest insurer, further driving up costs and their rate of increase. Finally, the introduction of new technologies and treatments previously unavailable have improved care but also have pushed costs upwards.

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The figure below shows that health insurance premiums for a family of four have been rising much faster than workers' earnings and overall inflation⁵⁰. The dip in the graph leading to its low in mid-1996 was due to largely to increasing penetration of managed care.



Employee health care costs are expected to rise by the highest level in a decade, with a predicted increase of 15 percent in 2003⁵¹. In addition to increases in premiums, employees are also seeing annual increases in fees for co-payments and prescription drugs in the 15 to 20 percent range.

Employers are increasingly shifting health care costs to employees and retirees⁵². Large employers asked workers to pay 30 percent of costs in 2002, up from 25 percent in 2001. Two-thirds of surveyed firms planned to shift cost increases to their workers, up from one-half in 1999. Employers have sought to control costs by reducing coverage, passing on premium costs, and increasing access restrictions. Many employers are still buying coverage based on costs alone, but some sectors are moving to measure and buy on quality. More small firms are unable to offer health care benefits to employees. A Dun & Bradstreet survey of 540 small firm (25 employees or less) executives found that 66 percent offered no coverage in 2001, up from 47 percent in 2000. Large employers appear to be waiting to see the impact of a move by small employers to providing

⁵⁰ Kaiser Family Foundation KFF/HRET Survey of Employer-Sponsored Health Benefits: 1999, 2000, 2001, 2002; KPMG Survey of Employer-Sponsored Health Benefits: 1993, 1996. The Health Insurance Association of America (HIAA): 1988, 1989, 1990. BLS Consumer Price Index (April); BLS Current Employment Statistics.

⁵¹ Hewitt Associates, annual benefit survey results

⁵² Hewitt Associates, Washington Post

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defined contribution plans, which essentially cap firms' overall expenses and shifts excess costs to workers.

Employers believe that financing academic medicine is not their responsibility. Princeton University professor Uwe Reinhardt has long argued that employer-sponsored health plans should not be viewed as open-ended money pump for the health sector. An informal survey of major purchasers of health care by a leader of GE⁵³ highlighted an important contradiction and opportunity for academic medicine. Academic medical centers are viewed by purchasers as bloated, inefficient, and "just not getting it." However, academic medical centers are also their own personal choices for where to go if someone in their family were seriously ill. Quality and results are the reasons "customers" have been loyal despite their problems. The survey raised questions of whether AMC's are customer-focused and whether they consider their customers to be insurers or patients. They acknowledge that purchasers of health care services have not yet created a payment system than rewards customer-focused care. On the patient care side, purchasers value the highest quality, evidence-based care, best practices, listening to the patient and real customer service. On the cost side, they seek—no duplication, minimal billing errors, "electronic everything", and supply chain innovation. In short, they want the administrative quality to be on a par with the patient care.

The proportion of for-profit health insurance plans – HMO and otherwise – has increased. Total enrollment in HMOs has increased since 1990, but the rate of growth has fallen dramatically since 1996. Preferred provider options (PPO) and point of service (POS) plans have increased enrollments. Traditional indemnity plans now cover less than 10 percent of the enrollees. Managed care organizations are sharply dropping Medicare HMO programs or reducing their offerings, forcing more than half a million seniors to find new coverage⁵⁴.

Legislative issues

Major government reforms are unlikely in the near term. Federal and state budgets are out of balance. Medicare and Medicaid payments are not expected to keep pace with growing costs of care for beneficiaries, many are without prescription drug coverage in an era of soaring costs. The strong support for the current form of the Medicare and Social Security programs, and the high cost of improvements to those programs, such as prescription drug benefits, implies that changes will be slow in coming.

⁵³ Conference proceedings, AHC response to health care reform, Duke University, 1996.

⁵⁴ Health Care Advisory Board, 2001

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However, more regulation of health plan activities is likely. Disclosure rules, mandatory clinical protocols, and so forth have limited government costs and so are relatively easily passed. Nascent efforts have arisen to incorporate measurement of quality and access in policy.

Nevertheless, efforts continue on some important pieces of legislation in the pipeline, notably some relief for hospitals from the terms of the 1997 Balanced Budget Act, which slated ongoing reductions in Indirect Medical Education payments and the market basket through 2003. The “American Hospital Preservation Act” to restore Indirect Medical Education benefit was not acted on in 2002, nor was the “Medicaid safety net hospital preservation act” aimed at restoring Disproportionate Share (DSH) payments.

A professional liability insurance crisis exists in the U.S., but it is unclear whether it will have a near-term impact on legislative tort reform. Premiums have skyrocketed in 2002, due in part to the impact on insurance industry of the September 11th attacks, a market downturn impact on investments, the size of potential future claims, and the exit of a major insurer from the market. Jury awards for malpractice continue to rise. States without legislative caps have been hit the hardest. As a result, some physician strikes and slowdowns have occurred, and some hospitals have closed obstetrics wards and trauma services.

Physicians and practices

The number of physicians per capita⁵⁵ in the U.S. has increased from 135 MDs per 1000 population in 1975 to 213 in 1995. Nearly three physicians enter the workforce for each one retiring, and yet geographic maldistribution exists as well as, by some measures, a specialty maldistribution of physicians. The late 1990s brought a number of reports on an excess supply of physicians and an overabundance of specialists. However, a 2001 COGME report projected a shortage in many specialist categories. The public often demands specialty care, a factor that is exacerbated by the aging population and prevalence of chronic disease. Advances in science and medicine have led to the development of new specialties, such as interventional radiology and genetic medicine.

JAMA reports annually on medical student career choice⁵⁶. “The percentage of students matching to primary care specialties declined in the early 1990s, peaked at 53.2 percent in 1998, and declined to 44.2 percent in 2002. Concurrent with the latter decline, the AAMC annual questionnaire for medical school graduates data showed a decrease in medical student interest in primary

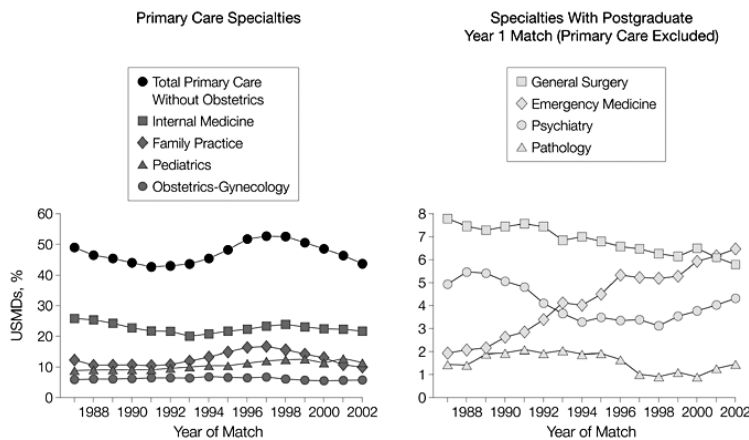
⁵⁵ - Health, United States

⁵⁶ - **Trends in Career Choice by US Medical School Graduates** *JAMA*. 2003;290:1179-1182.

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care careers (35.6 percent in 1999 to 21.5 percent in 2002), predicting an even greater decline than indicated by the NRMP numbers.”

“Several reasons have been suggested to explain this recent decrease in student primary care interest. The future market for primary care physicians may be decreasing because of an increase in the provision of primary care by nurse practitioners and physician assistants in the office setting and by hospitalists in the inpatient setting. Conversely, the job market for subspecialists may be improving, largely because of the increased prevalence of conditions requiring specialty care and the increased use of medical technology. Decreased career satisfaction of primary care physicians, declining income, and the widening gap in reimbursement between subspecialists and primary care physicians may all be influencing career choice.”



A recent survey of physician satisfaction reported in JAMA⁵⁷ found that, while evidence suggests that physicians are becoming less satisfied, not much change occurred between 1997 and 2001, although there was a notable decrease between 1997 and 1999. The study did observe a significant variation in satisfaction among sites. Although it was thought that declining incomes were a source of increased dissatisfaction among physicians, the study found that “threats to physicians' autonomy, to their ability to manage their day-to-day patient interactions and their time, and to their ability to provide high-quality care are most strongly associated with changes in satisfaction.”

⁵⁷ Landon, “Changes in Career Satisfaction Among Primary Care and Specialist Physicians 1997-2001” *JAMA*. 2003;289:442-449.

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Table 2. Physician Career Satisfaction, 1997-2001

Level of Satisfaction	Primary Care Physicians, No. (%)*					Specialists, No. (%)*				
	1997	1999	P Value, 1997 vs 1999	2001	P Value, 1997 vs 2001	1997	1999	P Value, 1997 vs 1999	2001	P Value, 1997 vs 2001
Very satisfied	279 (42.4)	308 (38.5)	<.001	286 (38.5)	.004	240 (43.3)	224 (41.4)	.03	172 (42.0)	.20
Somewhat satisfied	986 (38.3)	1059 (41.5)	.001	1044 (41.6)	.004	693 (37.7)	737 (38.4)	.46	617 (39.1)	.21
Neither satisfied nor dissatisfied	125 (1.6)	123 (1.6)	.91	132 (2.0)	.21	87 (1.6)	62 (1.2)	.07	67 (1.3)	.20
Somewhat dissatisfied	2817 (13.8)	3006 (14.0)	.69	3197 (14.2)	.56	1992 (12.9)	1930 (14.8)	.01	1903 (13.9)	.25
Very dissatisfied	2991 (3.8)	2756 (4.3)	.17	3001 (3.7)	.92	2293 (4.6)	2074 (4.3)	.73	1963 (3.8)	.19

*Percentages and raw numbers do not exactly match because percentages are weighted to be nationally representative. Sample sizes differ from those in Table 1 because of a small number of respondents missing this item.

More physicians are practicing in groups, and more are choosing community hospitals over academic medical centers. An increasing number of physicians are bypassing research posts at prestigious Boston AMCs, choosing instead to practice at community hospitals in the suburbs⁵⁸. Competition for physicians in lucrative specialty services, such as cardiac surgery, orthopaedic surgery, and oncology, is increasing. Recruitment of clinical “superstars” is an increasing strategy at academic medical centers. A pediatric cardiac surgery team was recruited from UCSF to Stanford⁵⁹, and Mount Sinai hired a team from Brigham & Womens who had accounted for 20 percent of their department’s volume⁶⁰. Recent reports indicate a building boom of subspecialty hospitals nationwide.

Faculty practices in competitive markets have declining margins, have had difficulty subsidizing the academic mission,⁶¹ and are providing an increasing amount of indigent care but without the federal subsidies available to hospitals.

Being associated with an academic medical center can be effective in marketing clinical services, building on positive reputation, image, and goodwill. Many academic centers face local geographic monopolies from nonacademic providers, with a strong clinical staff trained by the AMCs.

The insurance industry is developing new approaches to physician incentives. In "one of the largest initiatives in the country to shift the way managed care rewards physicians," General Electric, Verizon, other employers, and health plans are working to cut health care costs by launching programs in three states to pay bonuses to physicians who provide quality care. Under the program, for

⁵⁸ - The Advisory Board, 2001

⁵⁹ - San Francisco Chronicle 9/1/02 via AAMC STAT

⁶⁰ - Boston Globe 2/12/02 via AAMC STAT

⁶¹ - (Commonwealth Fund)

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example, physicians will receive \$100 per diabetic patient covered by participating health plans and employers and another \$50 per-nondiabetic-patient bonus for meeting three criteria: establishing clinical information programs such as EMRs in their offices, developing systems for regular follow-up care of chronically ill patients, and creating patient education programs⁶². The California Blue Cross HMO was the first to scrap cost control physician incentives. Patient surveys and other quality measures may replace cost control in calculating physician bonuses in the future.

A Gallup poll found that the public ranks physicians 4th in honesty and ethics poll among health care professionals. Nearly two-thirds surveyed in 2000 rated the profession “very high” or “high” for honesty and ethics, up from slightly over half in 1995. However, the poll found that physicians trailed behind nurses (79 percent), pharmacists (67 percent), and veterinarians (66 percent) on these measures.

Hospitals

The unique role of academic medical center hospitals is highlighted by their provision of a significantly disproportionate level of key services. Despite numbering only 3 percent of U.S. hospitals, they house 43 percent of burn units, 33 percent of transplant centers, provide 20 percent of all care to the nation’s indigent, and train nearly half of the residents.

The financial health of U.S. hospitals, in general, is tiered, with about one-third doing well, one-third with operating profits in the one to five percent range, and one-third on “life support.”⁶³ A record number of hospitals had their bond ratings downgraded in 2000. In contrast to the late 1990s, the hospital industry is now considered an attractive investment opportunity⁶⁴. The sector offers predictable growth of expenditures at about 6 percent rate of increase through 2010. Admissions continued to grow modestly and length of stays have declined steadily. Congress is working to reduce the impact of the 1998 Balanced Budget Act. Hospitals have a renewed focus on pricing discipline and internal operations.

An unprecedented number of eminent academic medical centers experienced fiscal difficulties beginning in 1999⁶⁵. Academic health center (AHC) hospitals aggregate total margins have declined since 1996, and operating margins were

⁶² - The Advisory Board, 11/2002

⁶³ Commonwealth fund

⁶⁴ Salomon Smith Barney

⁶⁵ Commonwealth fund

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negative in 1999 and 2000⁶⁶. The percentage of AHC hospitals with positive total margins declined from 87 percent in 1997 to 59 percent in 2000. Locally, ENH and NMH are two of the most financially successful hospitals nationally, two of only four to be rated AA+ or higher by Moody's.

Hospital consolidations and partnerships are building leverage in negotiating higher fees from payors⁶⁷. Hospitals are following a pattern set by airlines, telephone companies, cable corporations and banks, all of which are gaining new clout with consumers as they merge into giants. The Harvard-Partners system has won better-paying contracts from health insurance companies by negotiating more aggressively for higher rates of up to 30 percent over several years⁶⁸. Insurers and HMOs have begun "tiering" services and rate schedules by charging higher premiums for access to academic medical centers. In theory, this model is similar to price differentials for generic versus name brand prescriptions. In Boston, Blue Cross and Blue Shield of Massachusetts offers a new health plan that charges consumers extra when they seek treatment at Boston's expensive academic medical centers⁶⁹, and Aetna offers a separate HMO plan to utilize the Tufts medical center⁷⁰. Similar plans are being tried in Chicago by CIGNA⁷¹, and in eight West coast states by Pacificare HMO. It is unclear how many consumers will pay the higher hospital fees; it all depends on how many employers decide to buy the plans. Health plans also expect to save money if more patients end up in community hospitals, which generally charge insurers less for their services than do teaching hospitals.

Other staff

Labor shortages in related fields will continue to have a negative impact on the delivery of care, patient and physician satisfaction, and will drive up wages and health care costs. Not enough nurses, pharmacists, and allied health and technical professionals are being trained or retained to keep pace with growing demand.

⁶⁶ AAMC, Financial Performance of Academic Medical Center Hospitals, 1994-2000

⁶⁷ - Wall Street Journal April 12, 2002

⁶⁸ - Boston Globe, 12/22/01

⁶⁹ - Boston Globe 12/4/01

⁷⁰ - Boston Globe 8/28/01

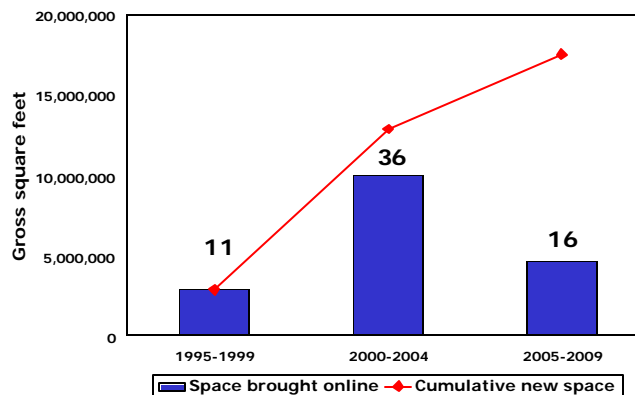
⁷¹ - Chicago Tribune 2/9/02

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FACILITIES Physical plant

Medical schools have an aging physical plant. Most major construction occurred in the 1960s and 1970s, and federal funds for capital projects are now limited. This places a burden on the institutions themselves, state and local government to fund infrastructure. Nevertheless, a research building boom is now under way. The figure below shows recent or planned completions of new construction at the NIH top 30 medical schools. From 1995 to 1999, 11 new facilities totaling nearly 3 million square feet were opened. In the current period, 2000-2004, 36 new buildings have opened or are under construction, adding over 10 million additional square feet. Already, more buildings and space are planned to open between 2005-2009 than during the 1995-1999.

A building boom at the top 30 medical schools



A recent National Science Foundation survey where two-thirds of medical schools report inadequate research space, and that one quarter of all medical school research space is in need of major renovation or replacement, up from 16 percent in 1988.

The cost of renewal and replacement of plant and equipment has historically been underfunded at academic institutions. Most investment is done *ad hoc*, owing to dire physical circumstances or startup costs for new programs or recruitment of chairs and senior faculty members. The costs of building, maintaining, and operating research and animal facilities has been escalating. This cost sharing is increasingly becoming a factor in institutional competitiveness when recruiting. While there has been some modest increase in budget of the National Center for Research Resources, it has not outpaced the increased cost of expensive facilities.

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Information technology

Information systems play a pivotal role in academic medicine. The capital and operating expenditures on information technology will consume an increasing percentage of budgets, and ongoing investment is required in every mission area. The pace of change in introduction of new technologies is rapid, and the useful life of systems is getting shorter.

The NIH recently studied these issues and issued a vision for the information systems environment in academic medicine⁷². Effective systems must span organizational boundaries. Investment in clinical information systems should be driven, and measured, by quality improvements, error reduction, and improved patient outcomes. Curricular materials should be available at a user's chosen workstation with embedded assessment and monitoring features. Learning resources should be continually updated and able to be personalized by students. Research computing should provide support for virtual teams and collaborations, tools for discovery and inference using loosely-coupled, network-accessible research, stewardship of research records (e-lab notebooks), e-publications with embedded data files and analytical tools, and large, multi-site clinical and research databases using standardized data definitions.

The NIH IAIMS consortium also envisioned a broader information management role for academic medical centers. Medical schools should serve as national peer-reviewed repositories for case studies and images and should develop measures of, and filters for, quality of Internet-accessible health science information. Links should be provided from an institution's knowledge store to knowledge that exists and is owned externally. Tools should be developed for manipulating an institution's knowledge store retrospectively and prospectively in real time and to create adaptive, autonomous intelligent agents (know-bots) to extract, cull, and deliver targeted information from unstructured data.

The current environment for information-seekers is noisy, with huge amounts of information available that is highly variable in type and quality. This requires time and energy to sift through and yet also suggests a role for institutions of learning in helping to identify and present high quality, relevant data from a sea of choices.

Significant capital investments in IT support infrastructure are necessary. Imaging, genomics, and biostatistics require high-bandwidth and rapid transmission. Internet and intranet applications require servers and constant vigilance for security. Wireless technology is emerging in support of portable

⁷² NIH IAIMS Consortium Steering Committee, 2001

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computing. Telecommunications and information technology are increasingly unified. Regulations such as HIP AA govern the design and sharing of data throughout the academic medical center enterprise.

It is noteworthy that a number of the new initiatives outlined in the 2003 NIH Roadmap have strong IT implications in areas such as imaging, biostatistics, bioinformatics, and the management of clinical research.

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Conclusion

Academic medical centers are complex organizations functioning in a complex and rapidly changing environment. Multiple missions and accountabilities make their success difficult to define, their many constituencies make them difficult to manage, and their culture makes them difficult to change. Their role is to discover, create, and disseminate knowledge, fomenting continuous changes that they must themselves incorporate. AMCs have driven – and been buffeted by – broad changes in our society.

Much as the excellence of the scientific, medical, and educational endeavors of our faculty requires ongoing intellectual effort, so must such effort be devoted to how academic medical centers function as institutions – their role, organization, and operations. Vigilance is required in the economic, political, industrial, and social arenas as well as in research, education, and clinical care. Committing an environmental assessment such as this to writing can be problematic, as consequential changes and events occur virtually daily and are as likely to be found in the business pages of the local newspaper as in cutting edge medical literature.

However, the rewards for this effort are great - the privilege of continuing to work to change – and improve – the world in which we live and our quality of life.