Academic Internal Medicine in the United States: Current Trends, Future Implications for Academic Nephrology

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The American Society of Nephrology will celebrate its 50th anniversary in 2016. At the time of this commemoration, the United States will spend approximately 20% of its gross domestic product on health care, the Medicare program will face bankruptcy, and an estimated 67,000 people will have end-stage renal disease (1-3).

Compared with other countries, the United States spends considerably more of its gross domestic product on health care (4). When total health spending is analyzed, public support (federal and state spending) in the United States is consistent with countries with government-run health systems (5). However, in contrast to those nations, private support is higher in this country, accounting for more than half of overall health spending.

Despite this spending on health care, the number of uninsured Americans, which has increased from 40 to 47 million since 2000, is expected to swell to 56 million by 2013 (6). Millions more have gaps in their coverage, are underinsured, or face annual decisions about continuing coverage due to higher deductibles and copayments. Nearly 20% of the uninsured are children, and a disproportionate share of the uninsured are members of racial and ethnic minority groups (7).

For decades, the United States has led the world in educating the next generation of physicians and other health professionals, conducting groundbreaking research, and providing cutting-edge care to patients. For example, more than half the recipients of the Nobel Prize for Physiology and Medicine since 1970 have been U.S. citizens (versus less than 10% of the recipients of the Nobel Prize for Literature) (8,9).

Nonetheless, the Institute of Medicine in 1999 declared that 98,000 people die in the United States each year as a result of medical errors. The report raised awareness about healthcare quality and spawned a cottage industry for organizations that evaluate performance, including the National Quality Forum, the Leapfrog Group, and HealthGrades. Regulators, insurers, and providers are still trying to meet the Institute of Medicine’s ‘minimum goal’ of cutting medical errors in half by 2004 (10).

Beyond medical errors, the quality of care varies depending on ethnicity, socioeconomic status, and level of education (11).

Current Trends in Academic Internal Medicine

Starting in January 2009, the 44th U.S. President and 111th Congress will discuss options for reforming health care, particularly in terms of keeping the Medicare program solvent. Public and private payers will institute innovative, but currently undetermined, mechanisms for constraining costs. Communities will experiment with creative approaches to providing care, especially for the escalating number of elderly patients.

When combined with the projections for the cost-access-quality triangle, these unpredictable events will influence the future of academic nephrology in the United States. At least 10 current trends in academic medicine and internal medicine will also affect academic nephrology during the next decade.

The Balkanization of Departments of Internal Medicine Is Accelerating

Emerging disciplines (such as hospital medicine from general internal medicine, sleep medicine from pulmonary medicine, and transplant hepatology from gastroenterology) are creating new divisions in departments of internal medicine at medical schools and teaching hospitals. For example, the Department of Internal Medicine at Brigham and Women’s Hospital in Boston, Massachusetts, has 25 divisions, including clinical biometrics, social medicine and health inequalities, and women’s health (12).

At the same time, medical schools and teaching hospitals are creating more centers, institutes, and interdepartmental structures. These entities appeal to external funding sources, pool limited resources, and emphasize patient care and research. In addition to threatening the traditional structure of academic departments, these entities deemphasize the educational mission. Centers are usually established for financial reasons and for patient care or research, so their leaders lack incentives to help teach medical students, residents, and fellows.

How departments relate to these new entities varies among institutions. In some cases, divisions have completely left the department of internal medicine and created separate departments. For example, cardiovascular services is a separate department at Marshall University Joan C. Edwards School of
Medicine. These separations raise questions about how divisions of nephrology will interact with departments of internal medicine as well as with new divisions, centers, and departments in the future.

**Medical Schools and Teaching Hospitals Are Centralizing Control**

Since 2005, the Liaison Committee for Medical Education (LCME) has accredited four new medical schools: the Florida State University College of Medicine in 2005, as well as the Florida International University School of Medicine, the Texas Tech University Paul L. Foster School of Medicine, and the University of Central Florida College of Medicine in 2008. Of these, only the Paul L. Foster School of Medicine has a department of internal medicine.

In recent reports (‘Project on the Clinical Education of Medical Students’ and ‘Edu cating Doctors to Provide High Quality Medical Care: A Vision for Medical Education in the United States’), the Association of American Medical Colleges (AAMC) recommended that medical schools consolidate control of undergraduate and graduate medical education (13,14). Some medical schools are having serious discussions about replacing specialty-based clerkships for third-year students with integrated clerkships (15).

Through its Clinical and Translational Science Awards, the National Institutes of Health (NIH) is promoting more concentrated management of medical research. According to the NIH National Center for Research Resources, ‘the program allows for local flexibility so that each institution can determine whether to establish a center, department, or institute in clinical and translational science’ (16).

For financial, legal, and promotional reasons, medical schools and teaching hospitals have also centralized practice plans. Simultaneously, academic institutions have become more dependent on revenue from clinical operations. This income accounted for 36% of all medical school revenues in 2003, up from 6% in 1961 (17). In addition, recent proposals to change the reimbursement system (such as the patient-centered medical home) or to link payment to high-quality outcomes (through pay-for-performance) depend on data that only a centralized plan can produce.

**Health Information Technology Is Advancing at an Exponential Rate**

In 1965, Intel Co-Founder Gordon E. Moore observed that the number of transistors that could fit on an integrated circuit had doubled every two years. He predicted that this trend would continue. Nearly 50 yr later, ‘Almost every measure of the capabilities of digital electronic devices is linked to Moore’s Law: processing speed, memory capacity, even the resolution of digital cameras’ (18).

As information technology improves at an exponential rate, the healthcare industry is forced to adapt. Within academic medicine, these advances are beginning to move from physicians-in-training (using online references, such as UpToDate) to educators (using tools, such as simulation) to researchers (pushing medical journals to embrace ‘open access’) to faculty (relying on electronic media, such as podcasts, to stay current) to administrators (investing in technologies, such as electronic health records and e-prescribing) to profession-sanctioned evaluators (pursuing web-based portfolios to track compliance).

The U.S. public is also increasingly comfortable with digital medicine. For example, the WebMD Health Network averaged 44.8 million unique users a month during the fourth quarter of 2007, an increase of 26% from the previous year (19). Unfortunately, only about one out of four people ‘check the source and date of the information they find,’ a problem exacerbated by the fact that less than 2% of health-related sites include these facts (20).

Another website, PatientsLikeMe, ‘seeks to go a mile deeper than health-information sites like WebMD or online support groups like Daily Strength’ (21). In November 2007, researchers in Italy discovered that taking lithium ‘seemed to slow the progression’ of amyotrophic lateral sclerosis. Before the Italian study was published in a peer-reviewed medical journal, 34 subscribers to PatientsLikeMe with amyotrophic lateral sclerosis received prescriptions for lithium and created an ‘ad-hoc clinical trial’ on the website. ‘There are now 109 members using lithium and tracking their progress with the data tools on the site,’ hoping ‘to lend credence—or cast a little doubt—on the Italian study in a matter of months’ (21).

**The Healthcare Workforce Is Struggling to Keep Pace with Demand**

Every 20 yr, the projections for the physician workforce in the United States change from boom to bust. In 1960, the experts projected a shortage of 40,000 physicians by 1975. During the 1980s and 1990s, some of the same experts predicted a surplus of 73,000 to 165,000 physicians by 2000. The country is now expected to face a shortage of 55,000 to 200,000 physicians by 2020 (22,23).

Although daunting, this projection is relatively insignificant compared with the global dearth of physicians and other healthcare providers. In 57 developing countries, the current shortfall of healthcare workers is estimated at more than 4 million (24). This scarcity is particularly dire in Africa, where illness (an estimated 18% to 41% of healthcare workers are infected with HIV) and the ‘brain drain’ have created dual crises (25). For example, nearly 70% of the physicians trained in Ghana, Malawi, and Zimbabwe now practice abroad.

During the past 20 yr, the number of U.S. medical school graduates (USMGs) remained relatively flat, increasing from 15,830 in 1987 to 16,139 in 2007 (26). Meanwhile, the total number of accredited residency and fellowship positions in the United States increased 37% (from 76,815 in 1987 to 104,879 in 2007); the number of fellows in accredited nephrology fellowships grew 289%, from 206 in 1987 to 802 in 2007 (27).

Because of the gap between students and residents/fellows, residency and fellowship directors turned to international medical graduates (IMGs) to fill positions. As a result, approximately 25% of U.S. physicians hold J-1 visas (and remain in the United States as part of a waiver program that requires them to work in an underserved area for 3 yr), hold H1-B visas, have become naturalized U.S. citizens, or are U.S. citizens who trav-
eled abroad for medical school (28). Nearly 40% of the nephrologists in the United States graduated from an international medical school, making nephrology more dependent on IMGs than other specialties, aside from geriatrics and neonatal medicine.

However, the number of IMGs entering the country on J-1 visas dropped from 11,471 in 1996 to 6033 in 2006 (29). This trend has at least three implications. First, residency and fellowship program directors need to rely more on IMGs who are U.S. citizens (or graduates of osteopathic medical schools) to fill training positions. Second, underserved rural and urban communities are trying to meet workforce needs with a smaller pool of J-1 visa holders. And third, the number of H1-B visa holders who have no requirement for work in underserved areas is increasing.

The United States Is Starting to Produce More Medical Students

Responding to concerns about an impending shortage of physicians, AAMC reversed a decade-long policy in 2005 and recommended that enrollment in LCME-accredited medical schools increase 30% by 2015 (30). In urging the production of 4946 more medical students annually, AAMC advocated that the number of residency and fellowship positions expand by an ‘aggregate number’ of approximately 15,000.

In response, LCME-accredited schools plan to increase enrollment by at least 15.9%; the entering class in 2007 was the largest in history (31,32). Meanwhile, approximately 20 new medical schools (or branch campuses) are now applying for LCME accreditation, hiring deans, seeking state approval and funding, working through the review process at universities, or being proposed by state officials (33).

Outside LCME, the number of Caribbean medical schools has increased from four in 1980 to 20 in 2007; both St. George’s University and Ross University graduate more medical students than any U.S. medical school; and a significant proportion of the graduates of these (90% at Ross University) and other Caribbean schools are U.S. citizens (34,35). The number of students enrolled in U.S. osteopathic medical schools has more than doubled from 6614 in 1988 to 15,586 in 2007, whereas the number of osteopathic graduates in internal medicine residency and fellowship programs increased 72% from 1996 to 2007 (27).

The Practice of Medicine Is Becoming More Specialized

Medical students have more career options in 2008 than they did 20 yr ago. For example, emergency medicine started to participate in the National Resident Matching Program in 1983, hospital medicine was identified as a new specialty in 1996, and the Accreditation Council for Graduate Medical Education (ACGME) started to accredit fellowship programs in sleep medicine in 2007.

Meanwhile, the American Board of Internal Medicine (ABIM) recognized the reductionist nature of medical practice and decided in 2007 to develop ‘focused practice in hospital medicine’ for maintenance of certification (MOC). Because initial certification is limited to 10 yr, all certified internists must complete the MOC process to maintain ABIM certification. Approxi-

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tors are considered, such as ‘lost productivity, the stress of covering inadequately staffed practices, and the impact this stress has on intent to go part-time or retire early’ (45).

Generational preferences, increased specialization, and lower reimbursement rates have decreased the interest of medical students in careers in internal medicine, particularly general internal medicine. In 2008, 1224 fewer USMGs selected categorical residency programs in internal medicine than in 1985 (27,43). Many have commented that radiology, ophthalmology, anesthesiology, and dermatology are the ‘ROAD’ to successful careers in medicine (49).

Globalization Is Changing Health Care in the United States and Abroad

A ‘convergence of technology’ and other factors (such as global supply chains) is causing the developing world, particularly India and China, to provide opportunities for well educated people to work in efficient systems (50). A ‘flatter’ world is beginning to influence the physician workforce and result in the outsourcing of health care in unprecedented ways. This trend raises at least three key questions.

First, will IMGs from India and China (which together account for more than 20% of IMGs in this country) continue to seek education and employment in the United States (51)? After September 11, 2001, the immigration process became more restrictive with its move from the Department of State to the Department of Homeland Security. Efforts to expand the number of physicians-in-training, particularly the investment required to build new medical schools, may have overextended the nation’s ability to produce excellent physicians; conduct pioneering research in the future; and appeal to physicians, residents, and fellows from abroad.

Second, will more transportable medical specialties, such as radiology, pathology, cardiology (particularly routine echocardiograms), dermatology, and elective surgery, globalize as much as other parts of the economy (52)? Hundreds of U.S. hospitals already use teleradiology services provided overseas by companies, such as Nighthawk Radiology Services, Teleradiology Solutions, and Virtual Radiologic (53). Moreover, how much research will move overseas? From 2005 to 2006, the biotechnology, medical device, and pharmaceutical industry doubled research and development (R&D) in China and India (54).

And third, will medical tourism become even more popular? The estimated number of U.S. patients traveling annually to other countries for care ranges from 60,000 to 1.3 million (55). The majority of these patients seek higher-quality care rather than lower costs. However, McKinsey and Company recently estimated ‘that about 710,000 procedures a year—procedures that currently bring $35 billion of revenue—could be done overseas at a savings of about $15,000 a procedure.’ The Joint Commission developed a mechanism in 2006 to accredit medical institutions in foreign countries, while insurers are beginning to consider covering the costs of care delivered outside this country.

Government Is Beginning to Limit Funding for Medical Education, Research, and Care

The budget situation is dire for both federal and state governments. The federal government is projected to have a deficit of $410 to $425 billion in 2008, while 35 to 40 states will face budget cuts in 2009 (56,57).

Each year, the federal and state governments provide nearly $15 billion in funding for medical education (58). More than 80% of this public support comes via four sources (from most to least): the Medicare indirect medical education adjustment, state appropriations, the Medicare direct graduate medical education payment, and the Medicaid program. The remaining public support comes from various discretionary programs, particularly the Department of Veterans Affairs (VA).

The Medicare Payment Advisory Commission in 2007 recommended reducing the indirect medical education adjustment by 20% (59). This cut would reduce public support for medical education by approximately $1 billion annually. For the past 2 yr, the Bush Administration has proposed eliminating the federal share of support for medical education from Medicaid, which would cut an estimated $1.8 billion over 5 yr and $6.2 billion over 10 yr (60).

After doubling from 1998 to 2003, the NIH budget was cut for the first time in 30 yr in 2006. As a result of this reduction and several years of flat funding, NIH’s ‘purchasing power’ has decreased by more than 13% since 2003 (61). Ironically, the community may have fared better with historical funding increases for NIH and without the doubling. In response to the doubling, academic institutions made huge investments in building and renovating research facilities, while the number of applications for NIH grants reached a record high. These simultaneous forces (less funding for NIH, expanded research capacity, and more grant applications) have caused a ‘recession’ in the U.S. medical research community.

From a funding perspective, the situation in the patient care arena is equally disconcerting. Medicare is expected to go bankrupt by 2019 because of the ‘continuing growth in the volume and intensity of services provided per beneficiary,’ the effect of a ‘large increase in beneficiaries starting in about 2010 as the leading edge of the . . . baby boom generation reaches age 65 and becomes eligible to receive benefits,’ and the introduction of the Part D (prescription drug benefit) program in 2004 (2).

To complicate the situation, a reverse correlation exists between quality of care rankings and the amount each state spends per Medicare beneficiary (62). For example, Louisiana spent $8239 per beneficiary and ranked 50th in quality, whereas New Hampshire spent $4864, $1127 below the national average, and ranked first.

Society Is Starting to Question the Relationship between Physicians and Industry

In 2007, drug sales in the United States increased at their slowest rate since 1961, the Food and Drug Administration approved the fewest new drugs (22) in any year since 1983, and therapies that generated $17 billion in sales in 2006 lost patent protection (63). Indeed, nearly $30 billion worth of patents will terminate worldwide in 2008 and 2009 (54).
This situation is surprising because the pharmaceutical industry increased its support of R&D to approximately $180 billion in 2004, up from approximately $100 billion in 1995 (64). This growth in funding sets pharmaceutical research funding at a significantly higher level than that of the federal government, which spent approximately $80 billion on R&D in 2004.

In a 2006 report, the Government Accountability Office identified several causes for this decline in productivity (65). As understanding about the complexity of disease improves, it is difficult to predict the efficacy of new drug compounds, which leads to an increase in failures during clinical trials. Between 2000 and 2003, 91% of drugs failed during phase III clinical trials. The development process has become more precarious, so companies have turned to less risky drugs to guarantee revenue. Of the 47 new drugs approved by Food and Drug Administration in 2006, only 18 contained new molecular entities. Finally, Government Accountability Office found that a shortage of physician-scientists impeded industry innovation.

Responding to public unease about industry’s potential influence over clinical research, the media has increased coverage of the relationship between physicians and industry. NIH ‘abolished all corporate consulting activities by NIH researchers, and all 18,000 NIH employees must sell any investments in health-related industries’ (66). And, following the lead of Minnesota and Vermont, the 110th Congress is considering legislation to create a national registry of industry gifts and payments to physicians.

**Potential Implications for Academic Nephrology**

The 10 current trends and the projections for the cost-access-quality triangle will change academic nephrology in the United States. During the next decade, the leaders of academic nephrology, particularly division chiefs and fellowship training program directors, will face unprecedented challenges and extraordinary opportunities. To survive in this environment, division chiefs and program directors must think differently about the tripartite mission than did their predecessors.

To educate the next generation of nephrologists, academic leaders will need to adapt to efforts to unify the educational continuum from undergraduate to graduate to continuing medical education. Using the ACGME’s core competencies as a foundation, ABMS and the Accreditation Council for Continuing Medical Education will begin to evaluate medical students, residents, and fellows, as well as academic and practicing physicians, within the same framework. LCME and ACGME will also apply this construct to educational programs.

While aligning the evaluation process for physicians and programs, the educational ‘evaluators’ will also encourage ‘learner-centered education.’ This concept means that residents and fellows will expect to shape their own educational experiences. The shift to learner-centered education will require academic nephrology to assert itself more with students and residents as well as consider significant questions about the amount of nephrology general internists should practice. ABIM’s willingness to recognize ‘focused practice’ raises the possibility that general internists could use the MOC process to become certified as internists recognized to practice nephrology or aspects of nephrology.

Learner-centered education will also continue to fuel increased subspecialization within nephrology. Some fellowship programs will continue to train every type of nephrologist, whereas others will begin to specialize, within the ACGME framework, on specific types of nephrology. Division chiefs and training program directors will have to determine how best to align their fellowship program with the internal medicine residency program, which will face similar decisions about training all versus specific types of internists. In all likelihood, the sponsoring institution’s overall financial situation will drive both decisions.

The ability to navigate changes to educational evaluation, expectations of physicians-in-training, and the implications of focused practice will depend on financial resources. To fund fellowship programs, academic leaders depend on the sponsoring institution, clinical income from the division of nephrology or department of internal medicine, grants, and philanthropy. As federal funding for medical education decreases, academic leaders will become more dependent on clinical income, grants, and philanthropy, plus new sources of revenue.

Nearly 40% of the nephrologists in the United States are IMGs. Because the number of IMGs is likely to decrease during the next decade, program directors will have to make their fellowships more appealing to USMGs (which means overcoming the additional burden of declining USMG interest in internal medicine residency programs) or accept more graduates of osteopathic medical schools who complete allopathic residencies.

To conduct groundbreaking research, academic leaders will adapt to an emphasis on ‘big science’ and centralized structures for research. When coupled with the demise in the physician-scientist workforce, both trends point to a future with less investigator-initiated research. As a result, division chiefs will develop more partnerships within the division, department, and institution as well as outside the institution. These collaborations will force academic leaders, particularly division chiefs, to function outside the confines of the divisional structure as never before.

Because the future outlook for government funding of medical research is bleak, academic leaders must generate funding from other sources. In addition to developing stronger relationships with the biotechnology, medical device, and pharmaceutical industry, division chiefs will seek funding from other economic sectors (such as information technology), philanthropy, and intellectual property. Of course, division chiefs will also focus limited resources on the most promising faculty, initiatives, and partnerships. When combined with the increase in part-time faculty, this concentration will change the selection process for academic tenure and promotion.

However, restrictions on industry funding will increase. These limits will force academic leaders to embrace complete transparency related to funding, implement unassailable conflict-of-interest policies, and apply zero tolerance to faculty and industry representatives who ignore transparency or violate the policies.
With the doubling of its budget, NIH is now one of the largest discretionary programs (and targets) in the U.S. government. Meanwhile, debates over stem-cell research and medical ethics politicize science, making it an election-related commodity. The interaction among science, politics, and ethics is more apparent than ever. In addition to increasing the oversight of the medical research enterprise, these factors force academic leaders to recognize that conducting research is now a public activity.

To provide high-quality health care to patients, academic leaders will adapt to a shortage of nephrologists in parts of the United States. From the perspective of academic nephrology, this shortage has several implications. Sponsoring institutions will force training program directors to increase the number of fellowship positions. Clearly, institutions with resources, such as those with large endowments, will have an easier time handling this expansion.

Fellowship programs will attempt to increase training in underserved areas. This effort will include having more fellows train in rural and urban areas as well as relying more on technology (such as telemedicine) and innovative models (such as Wal-Mart Health Clinics) to deliver care in communities that lack nephrologists. In addition, division chiefs and program directors will develop innovative programs for delivering care to underrepresented populations, particularly blacks, who have a disproportionate share of kidney diseases.

Regardless of the success of these efforts, general internists, nurse practitioners, and other providers will deliver more renal care. Academic leaders will need to develop educational material for these providers and determine how to link them to the educational continuum for nephrologists. To guarantee that everyone who provides renal care meets the same expectations of the patients, the nation’s health.

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References