Access to Medical Dermatologic Care In the United States

Katherine L. Brown, M.D.

A Master's Paper submitted to the faculty of the University of North Carolina at Chapel Hill In partial fulfillment of the requirements for the degree of Master of Public Health in the Public Health Leadership Program.

Chapel Hill
2005

Access to Medical Dermatologic Care in the United States

by Katherine Brown, M.D.

Dermatological complaints account for approximately 6% of all outpatient visits.[1] Many dermatologic conditions necessitate timely and quality care to avert morbidity and mortality. Examples of conditions needing early and comprehensive dermatological treatment include melanoma, the 6th leading cause of cancer in the United States,[2-3] and psoriasis, a significant cause of disability.[4] Dermatologists provide special expertise in the care of patients with skin disorders. Unfortunately, despite projections of an oversupply of specialists, market demands suggest an undersupply as well as a geographic maldistribution of dermatologists in the United States.

Access to efficient dermatological care of high quality is an increasingly important and challenging problem. In examining issues of access, it is important to establish some general definitions. According to the *American Heritage Dictionary, 4th edition*, accessibility is "the quality of being at hand when needed" or "the attribute of being easy to meet or deal with."[5] For the purposes of this paper, access is defined as the ease with which one needing care can utilize existing, appropriate services. In this regard, good access to care means that appropriate services are readily available to the people who need them.

Measures of access to care provide an important means for evaluating the quality of existing health care delivery systems and informing sound policy decisions. To date, most research regarding access to dermatologic care has focused on workforce characteristics. Unfortunately, limitations in access to care extend beyond issues like a shortage of health care providers or facilities, as many factors affect access to health care services. These include, but are not limited to, the balance between supply (i.e. the amount of available and appropriate services) and demand (i.e. the number of needed services), as well as the proximity of the supply relative to the demand (e.g. geographic distribution) and the resources required in utilizing the supply (e.g. insurance, money, time, transportation, etc.).

Consequently, this paper will analyze the existing data regarding access to medical dermatologic care in the United States; the current measures used for quantifying and projecting supply and demand; and the feasibility of suggested policies for improving access to dermatological services.

Effects of Perceived Supply and Demand

Reviewing the history of the US physician workforce estimates illuminates the difficulty in making reliable estimates of physician supply and demand for shaping sound public policies,[6] as workforce research has generated successive alternating panics of shortage and oversupply.[7]

Historical Background

Rapid population growth in the years following WWII fueled fears that the supply of physicians would be inadequate to care for America's baby boomers. Throughout the 1950's and 1960's, reports like those from the Surgeon General, the Carnegie Institute, and the American Association of Medical Colleges (AAMC), predicted worsening shortages and a need for more physicians. In the 1950's, governmental efforts to increase physician training through support of academic medical centers were blindsided by the American Medical Association (AMA), which opposed federal efforts to produce more doctors. However, when the AMA was preoccupied with defeating Medicare, Congress passed the Health Professions Educational Assistance Act of 1963, significantly increasing the number of medical students. From 1960 to 1980, the number of medical schools increased by 50% and the number of medical students doubled.[6,8] The government also liberalized immigration restrictions so that international medical graduates (IMG's) could train in the United States.[7]

Particular attention was devoted to increasing the supply of primary care physicians. Beginning in the 1920's, a trend towards increasing specialization arose,[9] and was thought to be partially attributable to the higher prestige, military rank, and pay afforded board-certified specialists as compared with general practitioners.[10] In an effort to stabilize this trend and to increase the number of generalists, passage of Amendments to Title VII of the Public Health Service Act in 1971 and the Health Professions Education Assistance Act of 1976 gave federal grants to residents pursuing careers in primary care. The Emergency Health Personnel Act of 1970 created the National Health Service Corps to fulfill physician demands in rural areas.[7]

In 1974, the Assistant Secretary for Health of the US Department of Health, Education, and Welfare expressed the first concerns of an imminent oversupply of physicians, and by 1976, the Department of Health and Human Services created the Graduate Medical Education National Advisory Committee (GMENAC) to assess whether physician supply was leading to a surplus. In 1980, the GMENAC predicted an oversupply of physicians by 1990 and recommended that the number of medical school positions and international medical graduates (IMG's) be restricted.[8] Of utmost concern was the disproportionate number of specialists,[6]

which increased 121% between 1965 and 1992, while generalist growth only increased 13%[7] despite the previous legislative efforts of the 1970's.

In 1986, Congress formed the Council on Graduate Medical Education (COGME), which made several recommendations in 1994 regarding physician oversupply,[11,12,13] including efforts to increase the number of residents entering primary care programs as well as to limit the number of IMG's. Other organizations also joined in effort to adjust the workforce supply. While the AMA and AAMC supported limits on the training of IMG's and an end to programs allowing IMG's to remain in the United States after training by 1996,[7] the Veterans Affairs (VA) system responded to this and other physician workforce analyses available in the 1990's (e.g. reports like those from the Institute of Medicine) with the "Veterans Affairs Initiative to Align GME." The goal of this initiative was to achieve approximately equal numbers of specialists and generalists. Since the VA funds about 9% of all residency positions in the United States (constituting greater than 8900 positions among approximately 2000 training programs in 1995) and approximately one-third of all US resident physicians receive training in the VA healthcare system, consequent realignment of VA-supported GME significantly impacted VA funds available to several specialty fields.[14] Further addressing perceptions of physician oversupply was the Balanced Budget Act of 1997,[15] which reduced funding for teaching hospitals and specialty training.[9]

Coinciding the efforts to change the number and composition of the physician workforce were changes in the structure of medicine affecting demand for and pricing of health care services – particularly, the growth of Medicare and managed care. Since Medicare's inception in 1966, it has been used by the federal government to subsidize resident training,[16] and has determined the treatment guidelines for millions. However, when Medicare's payments for educational costs rose sharply during the 1990's, from about $4 billion in 1990 to $7 billion in 1997, Congress decided to cap the number of residents subsidized through the Medicare program.[16]

Medicare was not the only organization affected by cost inflation or affecting training and treatment guidelines. By the 1990's, health services' proportion of the gross national product reached new, alarming levels, while many medical specialties exhibited a clear oversupply. Managed care organizations, comprising the majority of insured coverage, focused on cost-containment. As a result, significant emphasis on training more generalists, who could play a central role in managed care organizations, coordinate care, and keep costs down, developed.[6]

Although the growth of HMO's has waned in recent years,[17] the market forces created by managed care penetration further affect subspecialist demand. Research findings suggest that graduates of US medical schools completing general internal medicine training in areas of high

HMO penetration are significantly less likely to subspecialize.[18] In addition, many managed care organizations have eased gatekeeper policies due to market demand,[17] resulting in more visits to specialists.[19]

All the changes in the structure of medicine make accurately predicting physician demand difficult, since demand becomes a constantly moving target. In complex systems like medicine, the nature of the original problem often shifts by the time the solution is fully in place.[6] For several years, conventional wisdom maintained views of an overall surplus of physicians, particularly of specialists, by the year 2000 with few dissenting views along the way. When the year 2000 finally arrived, however, no signs of a vast surplus of physicians materialized.

Starting in 2002, the first reports heralding a pending undersupply of physicians took prominence.[20] One forecast, by Richard Cooper, MD, director of the Medical College of Wisconsin's Health Policy Institute, predicts a deficit of 200,000 physicians by 2020.[21] Another report, by Ed Salsberg of COGME, anticipates a shortage of 85,000 physicians by 2020 and calls for an increase of 3,000 US medical graduates by 2015 with a corresponding expansion in the number of resident positions to reflect market demand.[8,22] In a dramatic change in policy recommendations, the COGME adopted Dr. Salsberg's report in 2003, calling for a 15% increase in medical school graduates.[22] Now, the AAMC is getting onboard by calling for allopathic medical schools to increase their enrollment by 15% over the next decade and for the federal cap on GME-spending to be lifted to allow parallel increases in the number of training medical residents.[23]

Physician workforce issues are again center stage with much debate regarding the adequacy of physician supply and proposed solutions for averting future manpower problems. Not everyone shares the sentiment that there is an overall undersupply of physicians or that training more physicians will solve problems undersupply. In 2004, the AMA acknowledged a physician shortage in some areas of the US and in some specialties, but admitted to not knowing the correct mix and needing more data to better direct policy decisions.[24]

As policymakers and medical community leaders determine the best response to physician shortage predictions, the question of whether the public will need more generalists or more specialists is back on the table.[9,25] After all, many new scientific advances have come from greater specialization, and having a sufficient supply of specialists may mean more available therapies that all doctors can utilize in future patient care. Consequently, the issue of when care afforded by a specialist or subspecialist is superior to that given by an internist is now a prominent issue. So, how does this affect the role of the dermatologist?

Dermatology: Supply and Demand

Concerns regarding a pending oversupply of dermatologists first surfaced in the 1970's,[6,11] as the number of trainees entering residencies rose dramatically. From 1965 to 1989, the number of dermatologists doubled from 3538 to 7341.[7] Even when adjusted for population growth, the increase in the number of dermatologists vastly exceeded that of the US population, rising from roughly 1.4 to 1.9 dermatologists per 100,000 people in 1970 to 2.76 per 100,000 in 1999 to 3.5 per 100,000 in 2002.[6,26] By the 1980's, several articles were predicting an excess number of dermatologists and questioning future job security should the residency supply continue to grow.[7]

Although the number of dermatology residents increased substantially from the 150 graduating residents in 1967,[7] dermatology programs have not exhibited the degree of expansion experienced by other specialties. While the number of medical schools stabilized in 1981, many residency programs continued to expand[6,10] due to available government medical education subsidies. By the 1990's, many specialties experienced an oversupply. There were increasing reports of difficulty finding jobs, decreasing compensation, and low job satisfaction. In addition, more trainees entered and some retrained in primary care fields, leading to speculation of an impending oversupply of generalists in the future.[6]

The field of dermatology, however, did not experience the same trends. While most residency fields increased their residents by 31% from 1985 to 1994, the number of dermatology residents remained quite stable. This is likely because additional residency positions in dermatology, a field that is predominantly considered an outpatient specialty, did not share the same priority or financial advantages to academic hospitals as compared to more inpatient specialties.[6,27] In addition, signs of a possible undersupply of dermatologists have materialized despite the fact that the dermatologist-to-population ratio has almost doubled over the last three decades and that numerous reports predicted a specialist oversupply. [13,26,28]

DEMAND

Factors Signifying High Demand

Punctuating the market demand for dermatologists are the lack of difficulty securing prosperous employment opportunities,[6,7,26] increased waiting times for appointments,[27] physician perceptions of an undersupply, and the increased use of non-physician clinicians (e.g. physician assistants, nurse practitioners, etc.).[26]

The specialty of dermatology experiences quite prosperous employment opportunities, with residency graduates having less difficulty than other specialists in securing desirable positions and enjoying possible increases in available employment opportunities. Dermatology typically ranks in bottom decile of specialties reporting difficulty in finding a desirable position.[6] According to a recent survey, most new graduates entering the workforce (86-93%) do not describe any difficulty finding desirable positions and fewer than 10% of recent graduates are dissatisfied with their current jobs.[26]

Graduates are often flooded with letters from recruiters, who report dermatologists as one of the most challenging specialists to recruit, and from practices across the country.[29] Many practices (33%) are looking for new associates, with 10% trying to fill multiple dermatologist positions at once.[26] In 2000, the American Academy of Dermatology (AAD) listed 387 practices seeking clinical dermatologists, exceeding the number of annual graduates. Also, several academic centers and private practices are reporting difficulty in filling available positions.[7]

Increases in waiting times for non-emergent appointments to see a dermatologist further highlight the heightened demand for dermatologists. Although there is no well-established standard for what constitutes an acceptable new patient appointment waiting time, there is a growing sense that the current lengthy waiting times are too long.[26] According to an early study, more than 60% of dermatologists surveyed exceeded "acceptable" appointment waiting times (averaging 34 ± 24 days for new patients).[27] Successive studies validate these findings. Data from 2002 show mean wait times for new patient appointments at 36 days though ranging from 9 to 120 days. Of these reported wait times, 25% were ≥60 days and 12% were ≥90 days.[26] In a 2004 survey conducted by Merritt, Hawkins & Associates, a prominent national physician search and consulting firm, dermatology wait times were at or exceeded 21 days in 9 out of 15 (60%) metropolitan service areas surveyed.[30]

Aside from observations of plentiful employment opportunities and increased waiting times are physician perceptions of an undersupply of dermatologists. According to a recent poll of members of the American Academy of Dermatology Association (AADA), an organization representing approximately 96% of all US practicing dermatologists,[31] 49% of practicing dermatologists perceive a need for more dermatologists in their communities while only 20% describe the local supply as too high. Of note, only 7% reported an oversupply in rural areas and no state had a majority reporting that the local supply was too high. Also, the majority of respondents (90%) reported a need for more medical or general dermatologists. The fact that dermatologist perception of supply strongly correlated with wait times for new appointments (F-ratio: 61.3, $P<0.001$) helps validate physician perceptions as a measure of demand.[26] In

addition, patient perceptions are likely less lenient with regards to ease of access and lengthy appointment waiting times than those of the physicians providing these services.

Increased use of non-physician clinicians (NPC's) in the field of dermatology also exemplifies an increased demand for dermatologic practitioners. In a capitalistic society, when there is a gap in the supply of practitioners offering highly sought after services, other providers often will move in to capitalize on the market demand. Other economic trends also have an impact. For example, growth in the gross domestic product (GDP) correlates with growth of the health care workforce – though most of the growth has involved ancillary personnel with physicians becoming a proportionally smaller component.[21] This increase in the proportion of ancillary personnel likely results from increased demand for medical services in the face of a steady number of students graduating medical school over the past several years.

These trends apply to the field of dermatology, a field whose scope of services has increased with the economy and where the numbers of NPC's are mounting. While the Society of Dermatology Physician Assistants could identify only 6 dermatologic physician assistants in 1993, there were over 750 members in April 2003. In 2002, 33% of polled dermatologists reported using NPC's in their practices. This explosion in the use of NPC's suggests an unmet demand for dermatologic care.[26]

Factors Affecting Demand

Increases in dermatologist demand are influenced by many factors. These include changes in disease prevalence, utilization of new technologies, population demographics, the economy, the scope of services offered by dermatologists, the health care delivery system, and professional characteristics of dermatologic providers.

The job market for specialists, like dermatologists, may be improving because of the increased prevalence of conditions requiring specialty care and the increased use of medical technology.[32] For example, the incidence and mortality due to cutaneous melanoma have risen dramatically in the last 50 years. Based on data from the National Cancer Institute (NCI) Surveillance, Epidemiology, and End Results (SEER) database, the incidence of cutaneous melanoma increased 619% from 1950 to 2000 and mortality rose 165% over the same time period.[33] Furthermore, many expect the aging of the population to escalate further the already rising incidence of skin cancers.[34] Since dermatologists offer expertise in the management of skin disease as well as additional technological services for diagnosis and treatment (e.g. dermoscopy, digital body scanning and imaging, Mohs' surgery, etc.), this heightened demand for dermatologic care will likely translate into a growing need for medical dermatologists.

In addition to changes in disease prevalence are the growing needs of an aging population. The demographics in the US have changed significantly over the years. As of 2002, approximately 1 in 8 Americans (12.6%) is 65 years or older, an 11-fold increase since 1900. Today, there are more than 33 million senior citizens in the United States. By the years 2010, 2020, and 2030, these numbers are expected to rise to 40 million, 53 million, and 70 million respectively.[35] This dramatic expansion in the number of older Americans is in part due to an increase in life expectancy at birth, which rose from 48.3 years for men and 51.1 years for women at the beginning of the 20th century to 74.2 years for men and 79.9 years for women in the year 2000.[36]

The growing population of elderly individuals and increasing life expectancy elevate the demand for additional access to dermatologic care.[36] The elderly have substantial medical dermatologic needs, a burden that increases proportionately with the size of the geriatric age group. Many skin diseases affect older populations, including potentially fatal diseases like malignant melanoma and cutaneous T-cell lymphoma as well as more common diseases affecting quality of life – nonhealing ulcers, herpes zoster, xerosis, and pruritus, to name a few.[36] Consequently, long-term care dermatology is a growing specialty, currently serving more than 2.7 million patients.[35]

The aging population also results in a burgeoning demand for cosmetic services.[36,37] Many cite the rising numbers of baby boomers concerned about their aging appearance and the increase in disposable income from the booming economy of the 1990s as major factors contributing to the increasing number of cosmetic procedures performed by dermatologists.[38] After all, a better economy generally equates more dollars for health care spending and increases in the availability of new service lines.[21]

With regards to cosmetic services, formal instruction in cosmetic surgery was uncommon twenty years ago. Today, however, training in cosmetic surgery is standard in most residency programs, accounting for over 12% of course offerings.[34] As a result, dermatologists offer several more service lines in these areas, including chemical peels, cryosurgery, dermabrasion, electrosurgery, hair transplantation, soft tissue augmentation, injection of filler materials, phlebology, tumescent liposuction, laser therapies (for hair removal, tattoo removal, and treatment of veins), sclerotherapy for leg veins, cutaneous reconstruction, and botulinum toxin injections.[39-40] Ultimately, some postulate that the increased demand for cosmetic services may be increasing the demand for dermatologic services by 5-10%.[6]

Another trend affecting demand for dermatologists are shifts in our health care delivery system. In the 1990's, managed care, the predominant health care delivery system, placed

significant emphasis on increasing primary care services and reducing referrals to dermatologists and other specialists. As a result, more than 60% of visits became managed by non-dermatologists[41-42] though the number of visits to dermatologists remained steady despite managed care penetration.

Several reasons may account for this lack of change in visits to dermatologists. There likely is an overall increase in the aggregate number of patients presenting with skin disease[43] (e.g. due to increased disease prevalence, an aging population, and increased availability of diagnostic and therapeutic services). Gatekeeping became increasingly ineffective as doctors and patients found ways to overcome the barriers initially intended to limit use of specialty services.[19] Savvy patients with resources maneuvered the system, undeterred by increases in co-payment. Also, states like Georgia and Florida, mandated direct access to dermatologists under the premises that patients can readily identify whether they have a skin problem, dermatologic care by dermatologists is superior and more cost-effective relative to that of non-dermatologists,[44] nearly one fourth of primary care physicians report that they are expected to provided a larger scope of care than they feel comfortable delivering,[45] and studies suggest higher patient satisfaction when dermatologists treat skin disorders.[46] Additionally, such policy changes are likely affected by the very effective lobbying strategies of dermatologists.[6]

Whatever the reasons, many managed care organizations have eased gatekeeper policies in response to market demand.[17] Today, more patients are afforded increased access to dermatologists through less-restrictive managed care[6,8,26] and approval of direct access to dermatologists by Medicare and many state Medicaid plans.[19,47] These changes result in more visits to and increased demand for dermatologists.[19]

In addition to the aforementioned factors increasing demand are factors setting the field of dermatology apart from the rest of the medical specialties – particularly, the supply of new dermatologists and the changing professional characteristics of dermatologic providers.

SUPPLY ISSUES

The Supply of New Dermatologists:

In contrast to the physician supply of other medical fields, the number of dermatology residents has remained fairly stable over two decades[48] with the exceptions of a modest increase in residents during the 1980's and a 5 to 10% decrease in the number of graduating trainees in the late 1990's due to reduction in size or elimination of dermatology programs.[6] This reduction in dermatology programs was in part due to decreases in GME funding of specialty fields by the "Veterans Administration's Initiative to Realign GME" as well as

restrictions in Medicare funding.[14,16] Today, there are roughly 300 dermatology graduates per year.[7]

With a high market demand for dermatologic services and a plentiful supply of eager dermatology residency applicants for the limited number (i.e. 30 PGY-1) of program positions available nationally, there are other notable differences between field of dermatology and other medical fields. Because admission into dermatology residency programs is highly competitive, residency programs have no difficulty finding applicants to fill their positions. This differs from less competitive residencies that may have increased difficulty filling their available residency slots, especially when the economy is in the lulls.

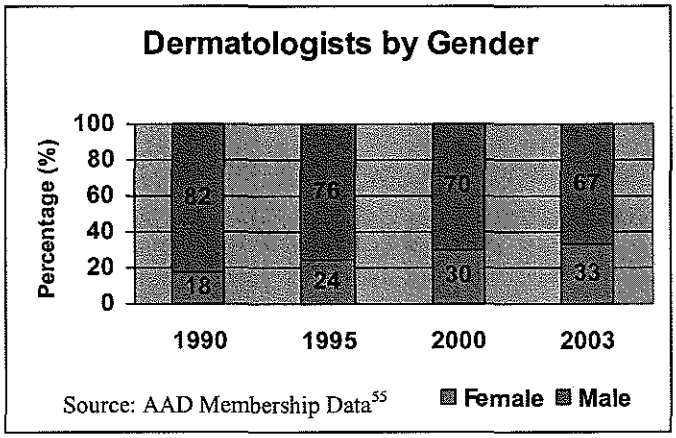
Increasing the economy and GDP historically correlates with increases health care spending and resultant increases in the overall physician workforce.[21] On the other hand, a worsening economy (as exemplified through drops in the stock market) increases proportionally larger student interest in pursuing specialty careers.[49] Similarly, student debt drives students away from lower-paying specialties and certain practice locations.[24] While the net effect of these economic trends is a little more clear-cut for primary care fields – that is, a decrease in the economy correlates with less physicians overall and a lower proportion of these physicians choosing primary care, – the case for competitive specialties is somewhat paradoxical. With more financially lucrative fields, a slump in the economy theoretically leads to a decrease in the overall supply of physicians but a higher proportion of these graduates choosing specialty careers. While these market forces could potentially result in increases in the number of graduating specialists, it is unlikely to affect notably dermatologists since available residency positions consistently fill and the field of dermatology keeps the number of available positions constant. In contrast to other fields that adjust the number of residency positions based on perceived demands and availability of resources, the number of dermatology graduates have remained constant (i.e. ~300 graduates/year).

Changing Professional Characteristics:

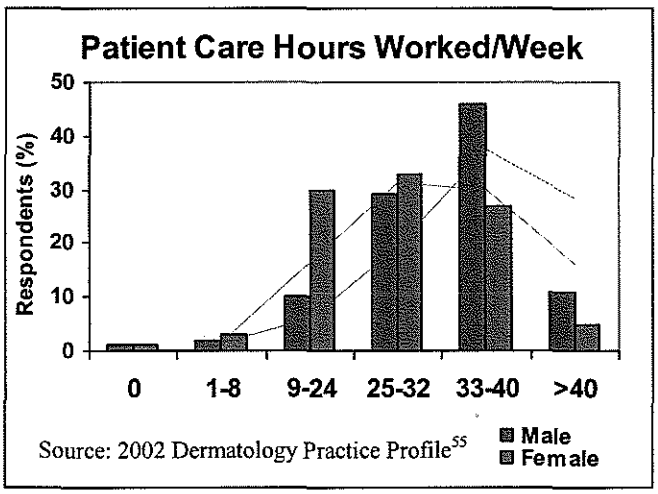
The impact of changing professional characteristics also affects dermatologist supply. Analysis of dermatology workforce issues, like demographic and practice patterns, help explain why current demand appears to outstrip supply. Over the years, workforce demographics and practice patterns have evolved considerably in the field of dermatology. Practice patterns across generations of dermatologists[50] evince notable differences from those of the past. More dermatologists are training in advanced surgical and cosmetic skills.[51-52] In addition, the 478% increase in the number of female medical students over the last thirty years has contributed

significantly to the rising number of women entering dermatology.[53] Other important workforce issues include trends towards earlier retirement;[6,7] shifts into other professional areas (e.g. management or administration);[6] changes in the number of work hours or productivity that physicians deliver; and the uneven distribution of dermatologists in the US.[6,7] Most recently, the field has witnessed an influx of other dermatology-care providers (e.g. non-dermatologist MD's, osteopathic doctors, and NPC's)[54] with significantly less formal training in dermatology.

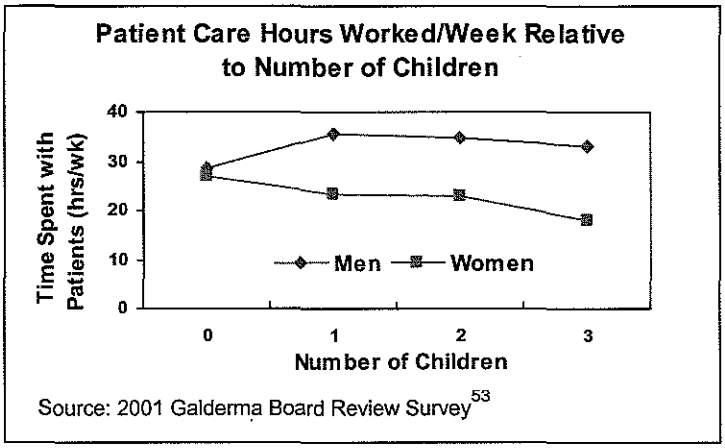
Perhaps one of the most dramatic changes in the field of dermatology is the increasing number of women. Dermatology has proportionately more female practitioners than most other medical fields, excluding obstetrics/ gynecology, pediatrics, and rheumatology.[55] Women make different choices about their work hours. The increased proportion of women could decrease the number of full-time equivalents (FTE's) in graduating cohorts by roughly 5 to 10%, since 50% of graduating cohorts are females and women work about 5 hours per week less than their male counterparts. Because the estimates of physician supply are derived almost solely on male physicians, forecasts regarding the need for dermatologists are likely underestimates.[6]



Consequently, successive studies have investigated practice patterns of women in the field of dermatology. Female dermatologists report working 80-85% of the hours that male dermatologists report working (28 hours/week versus 34 hours/week).[55] The trend lines on the chart (left) exemplify this difference. A more recent cross-sectional study further analyzed this issue by stratifying for various demographic characteristics (like parenting status) and found that while men and women without children worked almost the same hours, parenting in combination with gender

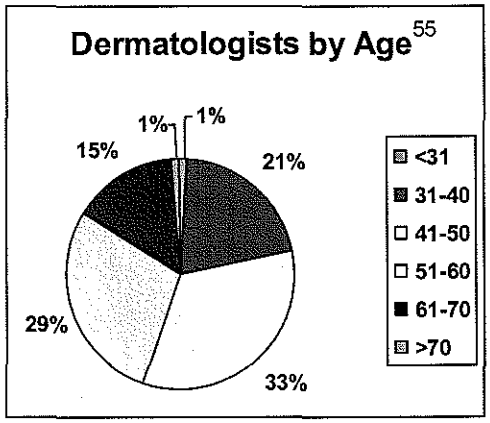


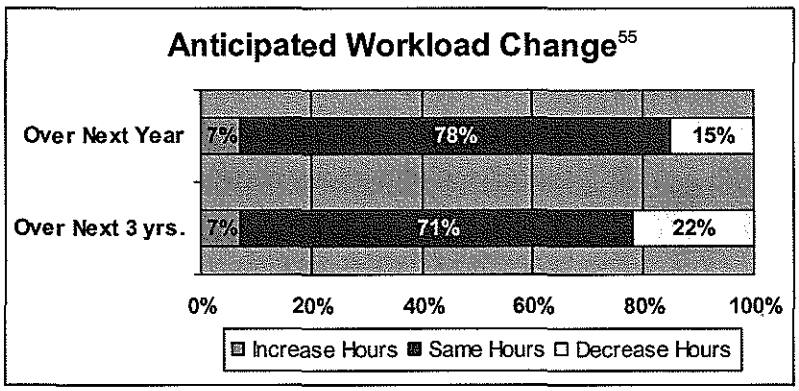
greatly influences workforce choices for professional with young families. Women with children spent fewer hours per week seeing patients than women without. In contrast, men who were parents spent more hours per week seeing patients than men who were not (see graph to left). Overall, male dermatologists saw patients 34 hours/week whereas female dermatologists saw patients 24 hours/week ($p < 0.01$).[53]



Source: 2001 Galderma Board Review Survey[53]

Age is another demographic characteristic affecting workforce supply and demand. The average age of dermatologists is 50, with 78% over the age of 40 (see pie chart, below). There are changes in the number of workforce hours with age, as many approaching retirement age often decrease their hours and newer cohorts of younger physicians desire fewer work hours, placing more emphasis on balancing work with their private lives.[22,55] In addition, many dermatologists report plans to decrease their hours of operation and there is anecdotal data of a trend towards earlier retirement. As the chart below illustrates, the proportion of dermatologists who anticipate having the same hours of operations is smaller over the next three years as compared with over the next year. The percentage of dermatologists intending to decrease over the next few years is increasing while the percentage of those anticipating an increase in hours remains relatively constant. In addition, some believe that a shift to earlier retirement is just beginning to materialize. Assuming these anticipated trends prove true, one would expect a net decrease in the availability of

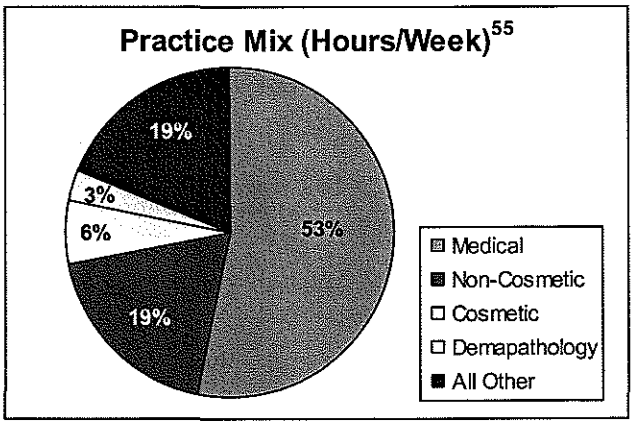




dermatologist appointments and that current models overestimate the sufficiency of the projected workforce (implying a further undersupply of dermatologists).

An aging profession looks to the supply of new professionals to refresh its ranks. If older dermatologists reduce their practice hours, newer dermatologists desire fewer work hours, there are more women in the field that may also further reduce their hours due to parenting, and anecdotal evidence of earlier retirement patterns proves true, theory would suggest that the current supply of dermatologists will be further outstripped by demand. For these reasons, differences in practice patterns from one generational cohort to the next are important for anticipating workforce needs and informing sound policy decisions. Generational analyses demonstrate significant positive correlations between age and the percentage serving urban areas and working in solo practices, the time spent practicing medical dermatology, and physician productivity. How much of these differences are due to actual cohort differences or to life cycle changes is difficult to determine.[53] It is likely, however, that differences in cohort preferences exist, given the changing context of the practice of dermatology (e.g. shifting demographics, changing health care system, and the broadening scope of practice).

Aside from gender and age, differences in subspecialty choices (i.e. medical, surgical/ Mohs,[52] cosmetic, academic, pediatric,[56] etc.) also impact workforce demands -- affecting the relative supply of dermatologists available within each field. For example, the increasing numbers of cosmetic and surgical procedures performed by dermatologists limit the amount of time and number of dermatologists available for general medical dermatology. The increasing scope of dermatologists' practice and services offered results in relatively less time for medical care. The pie chart illustrating practice mix, above, used to be consumed by medical care. Now, however, medical care constitutes a little over half of the hours of care dermatologists provide per week.



Unfortunately, shifts towards more specialized arenas of dermatology, including cosmetic and surgical services, not only create a relative shortage of medical dermatologic services,[7] but also increase reliance on non-dermatologists for treatment of skin disorders. This may threaten patient access to optimal quality care, as non-dermatologists typically have limited training in dermatology and demonstrate less proficiency in diagnosing and treating skin disease

than dermatologists.[57,58,59,60,61] Supplanting medical dermatology with other dermatologic services (i.e. cosmetic and surgical) results in: difficulty filling positions in research, academics, and private practice; further maldistribution of dermatologists (who favor more urbanized markets);[7] and frustration of patients and referring physicians faced with long waiting times for appointments.[27,36]

Dermatologists are not the only practitioners offering dermatologic care – many primary care physicians, osteopathic doctors, physician's assistants, and nurse practitioners provide skin services as well. In fact, dermatologists constitute the minority of providers of dermatologic care, as only 33% of visits for skin disease in the US in 1995 were to dermatologists.[62] As previously mentioned throughout this paper, the number of NPC's providing dermatologic care is increasing. Primary care providers, like family doctors, provide a substantial amount of care as well – particularly, in areas (e.g. rural) underserved by dermatologists and other specialists. Determining the amount and quality of services provided by non-dermatologists and the capabilities for their expansion is important in analyzing the adequacy of current and future dermatologist supplies affecting access to timely and high-quality patient care.

Other Factors Affecting Access to Medical Dermatologic Care:

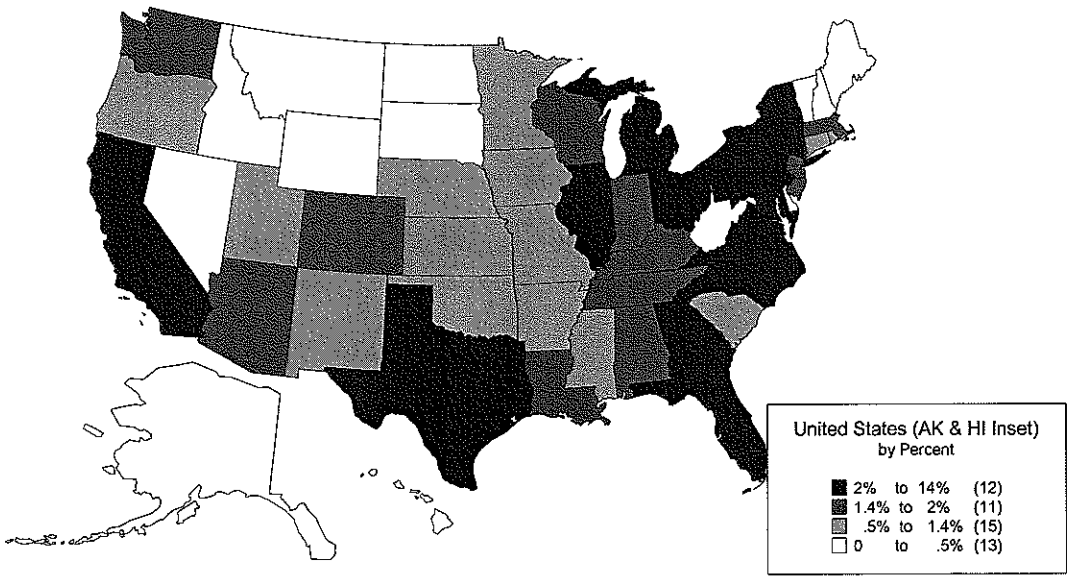
Aside from the adequacy of the dermatology workforce, many other factors affect access to medical dermatologic care. These include the physical barriers to accessing services, like the geographic distribution of dermatologic providers and the availability of adequate transportation, as well as barriers involved in patients' ability to effectively utilize available services – like the availability of financial resources (e.g. insurance coverage versus money for out-of-pocket expenses), the convenience of clinics' hours of operation, and the patients' health care literacy (e.g. understanding how to access the health care system and how to participate effectively in their care). Other obstacles limiting access to care might include high rates of professional liability insurance deterring physicians from setting up shop in particular areas[24] (although this is more applicable to medical fields having high malpractice rates, like obstetrics) and other political priorities. According to Richard Cooper, a prominent researcher of physician workforce issues, historical data from the US and other countries suggest that shortages become a political problem when the supply of doctors deviates by 10% or more from long-term economic trends.[63] Until access issues become a national priority, there likely will be insufficient support for increasing equity in access to care.

Despite the fact that many factors affect access, there is a paucity of information about factors extending beyond analyses of workforce numbers. There is, however, information about the effects of a geographic maldistribution of physicians and variances in care afforded patients with different types of insurance. Considering disparities in the resources of various populations is important in assessing access and quality of care issues.

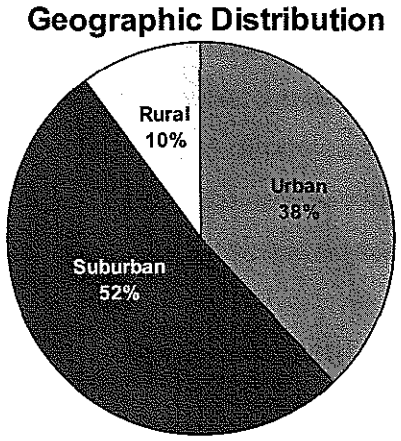
Geographic Maldistribution of Dermatologists:

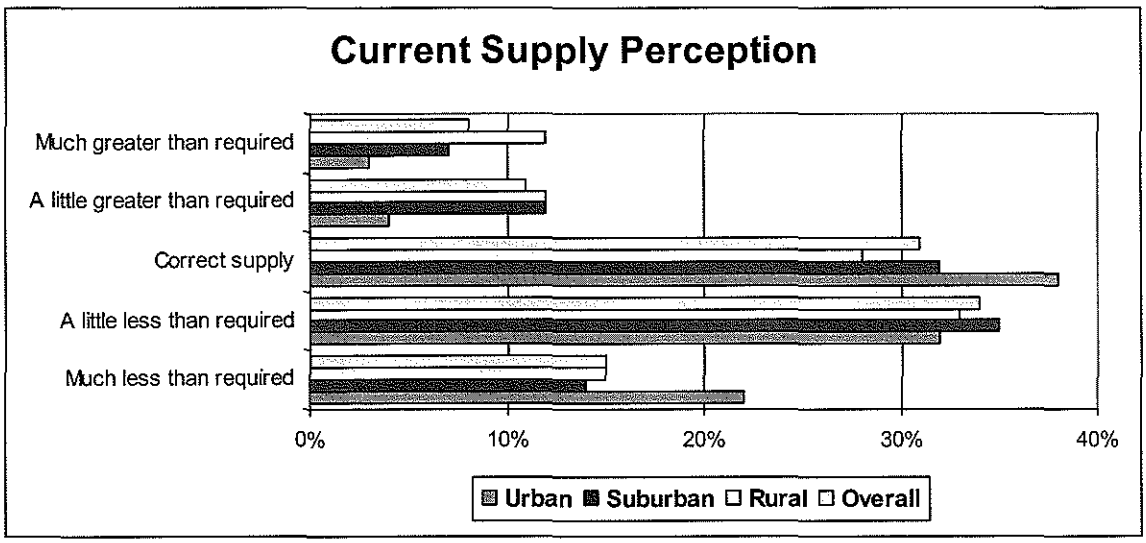
The geographic distribution of dermatologists affects the availability of care afforded patients in different locales. After all, a maldistribution of dermatologists in the United States results in regional surpluses and shortages affecting access to care.[7] Looking at the breakdown of supply by state, the states with more substantial supplies of dermatologists (i.e. the states in dark blue on the map below) are also those with well-known large cities with large metropolitan areas – Miami, Atlanta, Charlotte, Richmond, the District of Columbia, New York, Cincinnati, Chicago, Los Angeles, and Houston.

AAD/A Dermatologist Members by State & by Percent[55]



It is important to note, however, that a breakdown of supply by state is inadequate in appreciating the presence of more local maldistributions of dermatologist. For example, in any state, rural areas are often areas where access to care is of utmost concern and only 10% of dermatologists report working in rural areas (see pie chart, right).[55] A survey of dermatologists practicing in a variety of locations found that 49% of all respondents felt a need for more dermatologists in their communities. A slightly larger percentage (54%) of dermatologists in rural areas perceived a shortage of dermatologists as compared with those serving in urban (48%) or suburban (49%) communities (see graph, below).[55]





The fact that these differences are not larger could be in part due to the fact that non-dermatologists, like primary care doctors, likely provide the bulk of dermatologic care in these areas or that there is an overall undersupply of dermatologists throughout all locations.

There are many reasons for a dearth of dermatologists in less populous areas. Smaller communities may be unable to financially support a dermatologist(s). Some dermatologists may want to practice cosmetic and surgical dermatology – services that are typically better marketed in more affluent communities and metropolitan areas. In this regard, market forces can actually exacerbate maldistribution of dermatologists because underserved areas are often

unattractive or economically deprived.[7] Economics also influences student decisions, as student debt drives students from lower-paying specialties (and, in the case of dermatology, possibly into providing highly lucrative cosmetic services) and practice locations. This endangers access to care for minorities, indigent, and underserved populations.[24] Several policies to address this issue are under investigation, including: the possibility that technological advances like real-time interactive teleconference clinical consultations and teledermatology (which uses digital images) could "redistribute" the workforce,[64,65,66,67] means of incentivizing dermatologists to provide medical care in these communities, and ways of better utilizing the primary care physicians and other practitioners that already serve these populations.

The Effect of Differing Insurance Types:

Aside from possible disparities in access born from geographic maldistribution are disparities resulting from differing financial resources for reimbursing health care providers. Before talking about differences in care afforded patients based on inequitable insurance types, it is important to comment on the uninsured. According to the US Census Bureau, there were 45 million uninsured Americans in 2003. Though the number with health insurance coverage rose from 242.4 million in 2002 to 243.3 million in 2003, the percentage with coverage dropped from 84.8% to 84.4%.[68] Although the uninsured constitute a significant faction of the population, there is little information about the dermatologic needs or the magnitude of disparities in access to care of this population.

Some information is available, however, for differences in access to dermatologic care across insurance types – particularly, comparisons of availability of care afforded to private, Medicare, and Medicaid insurees. For example, a number of physicians appear to be unwilling or unable to schedule Medicaid patients.[30] Such comparisons are increasingly important since total private health insurance coverage has dropped from 69.2% in 2002 to 68.6% in 2003 (thought secondary to a decline in employment-based health insurance coverage) while the percentage of people covered by government health insurance programs rose in 2003 from 25.7% to 26.6% (largely a result of increases in Medicare and Medicaid coverage).[68]

To analyze better these issues, a review of government insurance policy trends is helpful. In 2002, the Centers for Medicare and Medicaid Services implemented a 5.4% cut in the annual conversion factor used to update fees paid to health care providers by Medicare. Congress blocked an additional 4.4% cut in physician payment for 2003 and replaced it with a 1.6% increase in reimbursement fees. Despite this update in the conversion factor, the relative payment units for biopsies and cryosurgery were reduced, resulting in a projected decrease in

Medicare payments to dermatologists by 2% in 2003. Because the formula-driven update is linked to the national gross domestic product, an anticipated additional 4.2% cut in physician payments was projected in 2004. In November 2004, the Centers for Medicare and Medicaid Services (CMS) published the 2005 Medicare Fee Schedule (MFS), which anticipates a 1.5% increase in reimbursement with the additional 56-cent increase in reimbursement per relative unit (RVU) of service. While these increases come as welcomed news, a 7% drop in Medicare reimbursements is expected in 2006 should Congress not address this further. These reductions raise concerns that Medicare patients will face problems obtaining physician services.[69]

The Community Tracking Survey (CTS), used by the Center for Studying Health System Change, has been following health system trends in 60 metropolitan areas since 1996, and shows an increasing percentage of Medicare patients experiencing delayed care or denial of needed care, longer waits for doctor appointments, and a declining number in physicians accepting new patients with Medicare. The Medicare Payment Advisory Commission, an independent federal advisory body created by Congress, recommended adoption of a new payment formula to avoid compromised patient care.[69]

Recent research by Resneck et al. investigated these differences in access to dermatologists based on whether patients had Medicare, Medicaid, or private insurance. They found that while overall access to dermatologists appears similar for patients with Medicare and private insurance, there are some access limitations in areas where Medicare payments are low relative to private insurers. Medicaid patients, on the other hand, clearly had inequitable access to dermatologists, partly because of highly variable state-to-state payment rates. In communities with lower Medicaid payment rates, Medicaid patients clearly experience significant barriers to accessing dermatologists, including higher rejection rates and longer wait times for office visits. This research suggests that access to dermatologists is related to reimbursement rates and that patients in communities with Medicare and Medicaid payment rates lower relative to other insurance plans will be the first to experience effects should further cuts in Medicare or Medicaid be made.[69] Disparities in payment methods coupled with the probable increased demand for dermatologists allows for market selection, favoring increased access for patients with more favorable reimbursement plans.

The Need for Better Measures of Access

There are many factors that affect patient access to health care and, more specifically, dermatologic care. Unfortunately, most research performed to date has focused predominantly on workforce issues. Because access is not limited to market demand and workforce sufficiency, more research that focuses on other aspects of access is needed. In regards to workforce issues, however, models for measuring current and forecasting future supply and demand are seriously flawed. As exemplified through the historical background, improving access to care through adjustments in the physician workforce is complicated by the fact that the nature of the problem may change before the original solution is fully in place.[6] In order to anticipate future shortages and surpluses of physicians, we must create better measures of supply and demand. The number of future trainees, number of IMG's, and physician retirement rates are just a few of the assumptions that permit calculation of future supply. Beyond these assumptions, we should include several other factors in the prediction of the future demand of dermatologists, such as the impact of managed care and shifting health care systems, changing professional demographics,[26] and the availability of new technologies facilitating more broad-based care.

There are many barriers to accurately measuring supply, as national headcounts give an incomplete picture.[6,21] Even when trying to estimate current supply, obtaining accurate estimates are made difficult by the fact that registries (e.g. the AMA Masterfile and the AAD Membership Roster) are differentially updated. That is, information about new members/physicians is updated readily (partially due to professional credentialing) whereas information about physicians leaving practice (i.e. retiring) is less readily available. Consequently, using registry data for measuring supply inevitably leads to overestimates that are difficult to rectify. For example, in the year 2000, the AMA Masterfile showed 9138 active nonfederal dermatologists and the AAD Membership Profile had 9336 active members. While these numbers appear somewhat similar, the AAD data includes dermatologists working for the federal government, retired dermatologists who continue to pay dues, and excludes dermatologists who are nonmembers.[7] Furthermore, these estimates are simply headcounts and fail to consider differences in professional characteristics and practice patterns.

Since it is difficult to measure accurately the current workforce, forecasting future workforce measures seems next to impossible. One model for doing such entails taking a registry headcount, removing dermatologists after 35 years of practice, stratifying the workforce by age, and advancing the cohort year by year.[7] Unfortunately, practice patterns and other

changes in the supply of practitioners providing dermatologic care as well as trends impacting the workforce market are not factored into this model even though they have important implications on accurately quantifying the current workforce supply and for anticipating future workforce needs.

Aside from estimates of workforce supply are those of workforce demand. To date, studies of the nation's total physician demands generally have used three methodological approaches: (1) epidemiological models of disease prevalence, population estimates, and health care utilization patterns; (2) comparisons of our health care workforce with that of other countries; and (3) managed care staffing patterns to anticipate future needs. According to many researchers, the accuracy of these methods is questionable and we need a better means of anticipating demand.[7,21]

GMENAC report figures, which relied on an epidemiological approach, have historically underestimated need since projections of an oversupply of physicians never materialized as expected. In making their estimates, GMENAC used modeling to predict many diseases' future prevalence and estimated the care required to treat the anticipated burden of disease. Disease prevalence, however, is not entirely predictable. Also, changes in patient access even when disease prevalence is static may affect the number of visits to dermatologists.[7] In addition, estimates of the amount of care required to treat future disease cannot account for new advances in diagnosis and treatment nor the broadening scope of dermatologic services – all of which would result in heightened demand.

International comparisons suggest an overt excess of specialists in the US as compared with European countries. COGME relied on this approach when it recommended that the US train 50% of its residents in primary care. One problem with estimates derived from these comparisons is the fact that many of the European nations used for comparison are quickly catching up to the rates of specialists in the US.[7] The external validity or generalizability of rates derived from foreign countries is another issue. Is the average European nation an appropriate target for US workforce goals? Do differences in economies or markets exist that would confound such comparisons?

HMO staffing patterns may also be inappropriate for demand forecasts. Using managed care or community-based program staffing patterns to anticipate future needs relied on assumptions that HMO's control a significant share of health care and are making "rational" hiring decisions. These studies projected future demand by estimating the percentage of patients who would be moving from traditional insurance to managed care in future years. There are many issues in relying on such forecasts. Managed care has changed significantly

throughout the years, allowing increased access to specialists. Underinsured patients may have less access than those in managed care. Forecasts using HMO staffing patterns further underestimate need by failing to account for undocumented outsourcing of care to outside physicians.[6]

According to Dr. Cooper, many previous studies failed to account accurately for population growth, work-effort of physicians, contribution of services by non-physicians and economic expansion. GMENAC reports in 1981 as well as several other reports incorrectly estimated a US population of 270 million in 2000, while the latest figures show 285 million. The population estimate errors account for roughly 25% of the physician surpluses previously predicted. Also, many estimates made inaccurate assumptions about physician productivity and failed to account for the increase in female physicians and the aging physician population (both of which have been associated with diminishes in average work-effort).[21]

In an effort to create a better model for anticipating workforce needs, Cooper's model considers the economy, work-effort, population growth, and NPC contributions. His model does not, however, consider changing retirement rates, geographic distribution, differential productivity of age cohorts (with younger physicians desiring increased personal time), decreasing amount of resident hours permitted, other accessibility issues, or new service lines. His model also relies on several assumptions. It assumed that: the number of first year residents remains constant (# trained), 20% of IMG's in US emigrate back to their homelands (i.e. constant rates of attrition), current retirement patterns hold, and incremental growth of NPC's continue.

Applying this model to the dermatology workforce may not be ideal. While the number of first year residents remains stable, some believe that a shift to earlier retirement is just beginning to materialize. Such a trend would mean that this model would overestimate the projected workforce.[7] Also, IMG's typically have a minimal impact on the field of dermatology and the impact of NPC's on the workforce is difficult to predict. Assuming that NPC's will incrementally provide more dermatologic services is rather ambiguous. Finally, according to Cooper, "the greatest uncertainty rests with the demand for physician services and with the economic growth that underlies it." After all, if accurate predictions could be made of the stock market, many of us would be richer than we are!

As far as the case for dermatology goes… How do we plan for future workforce needs given that changes in economy will likely result in changes in demand for cosmetic and other services? How much demand is created by increases in the scope of dermatologic practice? What are the effects of new service lines on the availability of medical dermatologic care? Is an

increase in demand generated by the growth of new services lines (e.g. cosmetic dermatology) a durable trend, or might increases in demand be reversed if the current economic boon end and patients spend less for these services? We need to learn more about trends impacting dermatology and their durability in order to anticipate better future workforce needs.

In an effort to better estimate workforce demands for dermatologic care, many researchers perform cross-sectional studies utilizing surrogate markers for workforce demand (e.g. waiting times for clinic appointments, ease of desirable job placement for recent dermatology residency program graduates, number of dermatologists seeking partners, length of search for new practice partners, etc.). Such data have been derived from:

- Internet surveys of members of an Internet dermatology discussion group.[27]
- Telephone polls utilizing the membership roster of the American Academy of Dermatology (AADA).[27]
- 2002 Dermatology Practice Profile Survey (sent to 4,090 AADA members with a response rate of 34.8%, representative of all states and Puerto Rico)[26,50,55]
- 1996 Dermatology Practice Profile Survey (sent to 10,090 AADA members with a response rate of 91%)[55]
- 2002 Resident Workforce Issues Survey (completed by approximately 190 dermatologists taking the Galderma Dermatology board preparatory course in Chicago, this survey is repeated annually)[26,53,55]

Unfortunately, there are many inherent drawbacks as well as potential methodological issues regarding cross-sectional studies. Models using graduates' experiences with job availability to project the demand for the overall field may be inappropriate, since graduates' experiences may not reflect the same experiences as those already in the workforce.[6] Also, data collected at a single point in time preferentially detects more long-standing conditions, and does not allow for changes over time, estimates of incidence, or causality. Causality requires a correlation between two variables, temporality, and ruling out alternative explanations. At best, descriptive studies can elucidate a correlation between two variables. They offer no temporal information and offer no comparison group for causal inferences.[70] In addition, there is no good way to account for omitted explanatory variables[71] or to control for individual and environmental confounding variables.[72] Because these studies rely heavily upon subjects' memory and honesty, they may be prone to recall and interviewer biases. As a result, cross-sectional studies often have low internal validity (i.e. how accurately the study results reflect the true situation or how well we measure what we claim to be measuring).

A major threat to external validity (i.e. generalizability of study results) of these studies is sample selection bias – that is the sample is skewed and is not representative of the greater population. This may be due to biases like non-response/volunteer bias (i.e. subjects who

refuse to participate differ from those who voluntarily enroll in the study) or membership bias (i.e. when one or more characteristics that cause people to belong to a preexisting group are related to the outcome of interest).[73] Consequently, it is important to consider recruitment techniques, including inclusion/exclusion criteria. It is also important that measures be properly specified to ensure that measurements measure what they are intended to.[74] Consequently, the potential drawbacks of descriptive data from cross-sectional studies have important implications for their application.

Anticipating workforce needs is difficult and efforts to better inform policy decisions are not without drawbacks. We need to know more about the impact of trends on the workforce before an appropriate and more properly specified model that more accurately predicts workforce needs can be built. Although cross-sectional studies are not ideal, they are a realistic means of detecting workforce trends. Aside from workforce measurements, more research should be devoted to investigating other access issues in dermatology. Such data could help not only people with disparities in access to care, but also the workforce, itself, since changes in access to dermatologic care impact the needs of the future workforce.

Proposed Policies for Perceived Workforce Inadequacies

We need more information about how changing trends affect workforce needs in order to better inform policy decisions. Of the policies on the table for improving perceived workforce needs, I will comment briefly on a few. It is important to realize, however, that we need to be able to more accurately identify and measure the problem (i.e. disparities in access to dermatologic care as well as supposed workforce inadequacies) before an appropriate solution can be formulated. Some of the promising approaches for filling the gap left by the perceived undersupply of dermatologists include training more residents in dermatology;[7] increasing incentives for dermatologists to move to underserved areas;[26] utilization of technological advances in telemedicine to compensate for the maldistribution of physicians;[64,65,66,67] and increasing the use of physicians with other training and other medical practitioners (e.g. physicians assistants, nurse practitioners, etc.).[26] All of these approaches carry their own repercussions.

Training More Residents in Dermatology

Without good measures of supply and demand, quantifying the actual need for more dermatology residents is problematic. Training too few residents affects patient access and

quality of care, while training an excessive number of dermatologists could drive costs up and lead to physician underemployment.[75] Many suggest that increasing the number of dermatology residents will help improve disparities in access to care (i.e. lengthy waiting times, etc.). Interestingly, interest in dermatology by fourth-year students with AAMC GQ career choice rose from 1.6% in 1996 to 2.5% in 2002, emphasizing the intensely competitive nature of dermatology residency positions and the fact that many students with a dermatology career goal fail to attain it.[32] In 2004, there were 373 applicants for the available 31 first year residency positions available through the National Residency Matching Program (NRMP).[76] Based on such data, the supply of dermatologists theoretically could be increased to meet future demands if residency programs expanded.[6]

In November 2004, the AAD announced its Workforce Initiative to increase the number of residency positions by 10% over the next five years using pharmaceutical monies. Unfortunately, the initiative failed because of concerns about ethical issues posed by financing residency positions with pharmaceutical company subsidies, dermatologists' worries about defending their "turf," skepticism that increasing program graduates would result in more graduates pursuing medical dermatology careers in underserved areas, and perceptions that there many not actually be a workforce shortage.

Evidence substantiates many of these concerns. Despite more dermatologists, disparities in distribution have not disappeared.[7] It is less likely that new graduates will move to underserved areas given that survey data shows that location is ranked as the most important factor for job placement by new dermatology graduates.[26] Also, many graduates are interested in performing cosmetic and surgical procedures – services for which the market is better in more urbanized areas.[6]

Incentivizing Dermatologists to Move to Underserved Areas

In an effort to entice more dermatologists to areas of higher need, some suggest incentivizing dermatologists. While efforts to incentivize dermatologists may work for certain subpopulations of the workforce, new graduates rank location as the most important factor in job placement.[26] If location is the most important factor, then no sufficient incentive exists to entice this cohort of dermatologists to underserved areas that may be unattractive or economically disadvantaged. Furthermore, some regions may be less appealing and some communities may not be able to support economically specialists.[24]

Teledermatology

Many hope that telemedicine will virtually redistribute the workforce by allowing patients to access dermatologists from afar. Utilization of telemedicine, however, does spur concerns about preserving patient privacy; additional expenses necessary to finance telemedicine programs (especially for equipment and start-up costs), how to train practitioners how to properly use equipment, and the massive coordination efforts required to relay information amongst practitioners and patients.[64,65,66,67] Should telemedicine/teledermatology become accepted for widespread application… How will physicians be trained? How will standards for telemedicine be established? How will telemedicine be incorporated into GME? How will training be augmented to keep pace with technology? These and other questions will need to be answered before teledermatology become commonplace.

Increasing Dermatologic Care Offered by Non-Dermatologists

Utilizing more non-dermatologists for management of skin disease contradicts research suggesting that dermatologists are more capable and cost effective than non-dermatologists for the treatment of skin disease, as well as years of dermatologists lobbying for direct access. Ironically, if dermatologists cannot meet the demand they helped to generate, somebody else will deliver care to dermatologic patients.[26]

Since the field of dermatology is resistant to increasing the number of residency positions, non-dermatologists, especially those in underserved areas, could reasonably tend to patients' skin care needs and lessen the maldistribution of dermatologic services. Issues that would need to be addressed include: how to train better these providers in the field of dermatology and how to manage patients whose conditions extend beyond the scope of expertise of these practitioners.

POTENTIAL SOLUTIONS FOR DISPARITIES RESULTING FROM PAYMENT TYPE:

Aside from disparities in access due to purely workforce issues are those pertaining to inequitable forms of reimbursement. As far as unequal access by Medicare and Medicaid patients, reformulation of the conversion factor for physician reimbursement could equalize the disparity with other payment methods. Pursuit of appropriate legislation should address the plight of patients experiencing disparities in access secondary to inequitable forms of reimbursement. Possible legislation might include guidelines for standardizing state-to-state Medicaid reimbursement rates so that access to healthcare is similar to that of Medicare and privately insured patients. Government also could impose further mandates limiting denial of

care to these patients. Universal healthcare would eradicate this dilemma. All of these solutions, however, are unfeasible given the context of the problem and the current political climate.

Final Comment

Despite the paucity of measures for access, existing data suggests an undersupply of available dermatologic services. Though decades of discussion about an oversupply of specialists,[11,13,26] the actual workforce demand suggests an undersupply of dermatologists.[26] This relative shortage of dermatologists has many consequences. Effects include increasing reliance on non-dermatologists and even non-physicians to treat skin diseases, growing frustration from patients and referring physicians confronted with increasing waiting times for appointments,[27] worsening geographic maldistribution,[7] and difficulties filling positions in private practices, research, and academics.[36] Additionally, an undersupply of dermatologists threatens patient access to skin specialists and thereby affects quality of care,[36] especially for those with insurance with lower rates of reimbursement,[69] the elderly who are more prone to multiple chronic disease,[35] and those with disabilities or other obstacles to accessing available services.

Unfortunately, without better measures of supply and demand, identifying the actual causes of and potential solutions for disparities in access is difficult. Today, the pendulum of prospective workforce estimates now swings in the opposite direction, heralding an undersupply. Dermatologists need to address these issues with further research as failure to do so threatens action by regulatory bodies using outdated and possibly erroneous data.[7]

Future research should investigate further the impact of changing health care delivery systems, specialist usage patterns, trends impacting the workforce supply and their practice patterns, the effect of the economy on the demand for available service lines, the changing scope of dermatologic practice, and the role of non-dermatologist practitioners. Only after obtaining sufficient and accurate data can better models for predicting workforce needs and solutions for amending disparities in access to dermatologic care be made.

Appendix 1: Methods

Available literature exploring access to dermatologic care issues were identified by a computerized search of the MEDLINE database using the following terms: *dermatology workforce, dermatologist workforce, dermatology supply, dermatologist supply, dermatologist demand, dermatology demand, dermatologist access, and dermatology access.* Of the 443 articles returned, those articles with available abstracts in the English language and limited to human subjects were screened for relevance to access to dermatologic care. Articles were excluded if they predated 1985 and if full text articles were not available in English through the UNC-Chapel Hill library system. This resulted in 49 articles from which additional resources were found by cross-checking reference lists to arrive at the references used in this paper. Additionally, verbal communication with several researchers in the fields of health care workforce and dermatological access supplemented information derived from the literary search.

---

[1] Schappert SM. National Ambulatory Medical Care Survey: 1990 Summary. National Center for Health Statistics. Advance Data (213), 1992.
[2] Jemal A, Tiwari RC, Murray T, et al. Cancer statistics, 2004. *CA Cancer J Clin* 2004; 54:8.
[3] Rigel DS, Friedman RJ, Kopf AW. The incidence of malignant melanoma in the United States: isues as we approach the 21st century. *J Am Acad Dermatol* 1996; 34:839.
[4] Finlay AY, Coles EC. The effect of severe psoriasis on the quality of life of 369 patients. *Brit J Dermatol* 1995; 132:236-244.
[5] The American Heritage® Dictionary of the English Language, Fourth Edition. 2000 by Houghton Mifflin Company: 2000. Available online at: http://dictionary.reference.com/search?q=accessibility. Last visited on April 27, 2005.
[6] Kimball AB. Dermatology: A unique case of specialty workforce economics. *J Am Acad Dermatol.* 2003 Feb; 48(2):265-270.
[7] Resneck J. Too few or too many dermatologists? *Arch Dermatol.* 2001 Oct;137:1295-1301.
[8] Salsberg ES, Forte GJ. Trends in the physician workforce, 1980-2000. *Health Affairs* 2002; 21(5):165-73.
[9] Cooper RA. There's a shortage of specialists: is anyone listening? *Acad Med* 2002; 77(8):761-6.
[10] Donini-Lenhoff FG, Hedrick HL. Growth of specialization in graduate medical education. *JAMA* 2000; 284(10):1284-9.
[11] Stern RS. Dermatologists in the year 2000. Will supply exceed demand? *Arch Dermatol.* 1986;122:675-678.
[12] Weiner JP. Forecasting the effects of health reform on US physician workforce requirement. Evidence from HMO staffing patterns. *JAMA* 1994;272:222-230.
[13] Weary PE. A surplus of dermatologists. Wherefrom and whereto. *Arch Dermatol.* 1984;120:12195-1297.
[14] Stevens DP, Holland GJ, Kizer KW. Results of a nationwide Veterans Affairs Initiative to Align Graduate Medical Education and Patient Care. *JAMA* 2001; 286(9):1061-6.
[15] Meyers LL. AMA adopts resolutions on graduate medical education funding. *JAMA* 1999; 282(14): 1386.
[16] Jindal B, Dowdal T. Medicare's role in financing graduate medical education. *JAMA* 1999; 281(13):1228-1231.
[17] Draper DA, Hurley RE, Lesser CS, Strunk BC. The changing face of managed care: managed care plans face the challenge of satisfying marketplace preferences for less restrictive care while holding down costs. *Health Affairs* 2002; 21(1):11-23.
[18] Valente A, Wyatt SM, Moy E, Levin RJ, Griner PF. Market influences on the internal medicine residents' decisions to subspecialize. *Annal of Internal Medicine.* 1998 June;128(11):915-921.
[19] Ferris TG, Chang Y, Blumenthal D, Pearson SD. Leaving gatekeeping behind: effects of opening access to specialists for adults in a health maintenance organization. *N Engl J Med.* 2000;18:1312-1317.

[20] Greene J. Now forecast is for shortage of physicians: the future situation may rival the 1960's, when a lack of doctors spurred major efforts to build new medical schools. Available online at: http://www.ama-assn.org/amednews/2002/01/21/prl120121.htm. Last visited on May 25, 2005.
[21] Cooper RA, Getzen TE, McKee HJ, Land P. Economic and demographic trends signal an impending physician shortage. *Health Affairs* 2002; 21(1):140-154.
[22] Croasdale M. Federal advisory group predicts physician shortage looming. Available online at: http://www.ama-assn.org/amednews/2003/11/03/prsb1103.htm. Last visited on May 25, 2005.
[23] Croasdale M. Physician shortage? Push is on for more medical students bu some question whether there really will be a future shortfall of doctors. Available online at: http://www.ama-assn.org/amednews/2005/03/14/prl10314.htm. Last visited on May 25, 2005.
[24] Elliot VS. Physician shortage predicted to spread: the AMA becomes the latest of many expressing concern that there might not be enough physicians to go around, now or in the future. Available online at: http://www.ama-assn.org/amednews/2004/01/05/prl20105.htm. Last visited on May 25, 2005.
[25] Croasdale M. Work force study tackles specialty vs. primary care. Available online at: http://www.ama-assn.org/amednews/2005/04/11/prsb0411.htm. Last visited on May 25, 2005.
[26] Resneck J, Kimball AB. The dermatology workforce shortage. *J Am Acad Dermatol.* 2004 January; 50(1):50-54.
[27] Suneja T, Smith ED, Chen J, Sipperstein KJ, Fleischer AB, Feldman SR. Waiting times to see a dermatologist are perceived as too long by dermatologists. (reprinted) *Arch Dermatol.* 2001 Oct;137:1303-1307.
[28] Stern RS. Managed care and the treatment of skin diseases. Dermatologists do it less often. *Arch Dermatol.* 1996;132:1039-1042.
[29] Non-primary specialties now dominate recruiters' work, two surveys indicate. Available online at: http://www.findarticles.com/p/articles/mi_m0FBW/is_10_2/ai_7787889/print. Last visited on May 20, 2005.
[30] Merritt, Hawkins & Associates. Summary Report: 2004 Survey of Physician Appointment Waiting Times. Available at: www.merritthawkins.com. Last visited on June 2, 2005.
[31] Oral communication, Alexa Boer Kimball, Member of the American Academy of Dermatology. May 5, 2005.
[32] Newton DA, Grayson MS. Trends in career choice by US medical school graduates. *JAMA* 2003; 290(9):1179-1182.
[33] Tsao H, Atkins MB, Sober AJ. Management of cutaneous melanoma. *NEJM* 2004; 351:998-1012.
[34] Ringel EW. The morality of cosmetic surgery for aging. *Arch Dermatol.* 1998 Apr;134:427-31.
[35] Norman RA. Long-term dermatology. *Dermatologic Therapy* 2003;16:186-194.
[36] Kosmadaki MG, Gilchrest BA. The demographics of aging in the United States. *Arch Dermatol.* 2002 Nov;138: 1427-1428.
[37] Flynn TC. Elder care and the dermatologic surgeon. *Dermatol Surg.* 1999 Nov;25(11):896-9.
[38] Kimball AB. Dermatology: a unique case of specialty workforce economics. *J Am Acad Dermatol.* 2003 Feb;48(2):265-70.
[39] Coleman WP, Hanke CW, Orentreich N, Kurtin SB, Brody H, Bennett R. A history of dermatologic surgery in the United States. *Dermatol Surg.* 2000 Jan;26(1):5-11.
[40] The American Academy of Dermatology Joint AAD/ASDS Liaison Committee. Current issues in dermatologic office-based surgery. *Dermatol Surg.* 1999 Oct;25(10):806-15.
[41] Lowell BA, Froelich CW, Federman DG, Kirsner RS. Dermatology in primary care: prevalence and patient disposition. *J Am Acad Dermatol.* 2001 Aug;45(2):250-255.
[42] Stern RS, Nelson C. The diminishing role of the dermatologist in office-based care of cutaneous diseases. *J Am Acad Dermatol.* 1996;132:776-780.
[43] Feldman SR, Williford PM, Fleischer ABJJ. Lower utilization of dermatologists in managed care: despite growth of managed care, visits to dermatologists did not decrease: an analysis of National Ambulatory Medical Care Survey data, 1990-1992. *J Invest Dermatol.* 1998;134:1089-1091.
[44] Federman DG, Kirsner RS. The abilities of primary care physicians in dermatology: implications for quality of care. *Am J Manag Care* 1997;3:1487-1492.
[45] St. Peter RF, Reed MC, Kemper R, Blumenthal D. Changes in the scope of care provided by primary care physicians. *N Engl J Med.* 1999;341:1980-1985.
[46] Owen SA, Maeyens EJ, Weary PE. Patients' opinions regarding direct access to dermatologic care. *J Am Acad Dermatol.* 1997;36:250-256.
[47] Oral communication, Adam Goldstein, UNC Family Practice. DATE
[48] Newton DA, Grayson MS. Trends in career choice by US medical school graduates. *JAMA* 2003; 290(9):1179-1182.

[49] Schwartz MD, Basco WT Jr, Grey MR, Elmore JR, Rubenstein A. Rekindling student interest in generalist careers. *Ann Int Med* 2005; 142(8):715-24.
[50] Jacobson CC, Resneck JS Jr, Kimball AB. Generational differences in practice patterns of dermatologists in the United States: implications for workforce planning. Arch Dermatol. 2004 Dec;140(12):1477-82.
[51] Wu JJ, Markus RF, Orengo IF. The increased competitiveness of Mohs micrographic surgery training. Dermatol Online J 2002;8(2):24. Available from http://dermatology.cdlib.org/DOJvol8num2/correspondence/surgery/wu.html, accessed March 22, 2005.
[52] Nguyen JC, Jacobson CC, Rehmus W, Kimball AB. Workforce characteristics of mohs surgery fellows. Dermatol Surg. 2004 Feb;30(2 Pt 1):136-8; discussion 138.
[53] Jacobson CC, Nguyen JC, Kimball AB. Gender and parenting significantly affect work hours of recent dermatology program graduates. Arch Dermatol. 2004 Feb;140:191-196.
[54] Clark AR, Monroe JR, Feldman SR, Fleischer AB Jr, Hauser DA, Hinds MA. The emerging role of physician assistants in the delivery of dermatologic care. *Dermatol Clin.* 2000 Apr;18(2):297-302.
[55] Kimball AB, Resneck J, Jr. An analysis of the workforce shortage issue in dermatology. Available online at: http://www.aad.org/NR/rdonlyres/6704ADF9-E86E-422D-84B3-B39A1E2298B/o/AnAnalysisoftheWorkforeShortageinDermfinaldraft104.doc. Last visited on May 20, 2005.
[56] Hester EJ, McNealy KM, Kelloff JN, Diaz PH, Weston WL, Morelli JG, Dellavalle RP.Demand outstrips supply of US pediatric dermatologists: results from a national survey.J Am Acad Dermatol. 2004 Mar;50(3):431-4.
[57] Federman DG, Concato J, Kirsner RS. Comparison of dermatologic diagnoses by primary care practitioners and dermatologists: a review of literature. *Arch Fam Med.* 1999;8:170-2.
[58] Federman D, Hogan D, Taylor R, Caralis P, Kirsner RS. A comparison of diagnosis, evaluation, and treatment of patients with dermatologic disorders. *J Am Acad Dermatol.* 1995 May;32(5):726-9.
[59] Whited JD, Hall RP, Simel DL, Horner RD. Primary care clinicians' performance for detecting actinic keratoses and skin cancer. *Arch Int Med.* 1997;157:985-90.
[60] Gerbert B, Maurer T, Berger T, Pantilat S, McPhee SJ, Wolff M, et al. Primary care physicians as gatekeepers in managed care: primary care physcians' and dermatologists' skills at secondary prevention of skin cancer. *Arch Dermatol.* 1996;132:1030-8.
[61] Kirsner RS, Federman DG. Lack of correlation between internists' ability in dermatology and their patterns of treating patients with skin disease. *Arch Dermatol.* 1996;132:1043-6.
[62] Thompson TT, Feldman SR, Fleischer ABJ. Only 33% of visits for skin disease in the US in 1995 were to dermatologists: is decreasing the number of dermatologists the appropriate response? *Dermatol Online J* 1996; 2:3. Available online at: http://dermatology.cdlib.org.
[63] Greene J. Now forecast is for shortage of physicians: The future situation may rival the 1960s, when a lack of doctors spurred major efforts to build new schools. Amednews.com. 1/21/02. Available online at: http://www.ama-assn.org/amednews/2002/01/21/prl20121.htm. Last visited on May 24, 2005.
[64] High WA, Houston MS, Calobrisi SD, Drage LA, McEnvoy MT. Assessment of the accuracy of low-cost store-and-forward teledermatology consultation. *J Am Acad Dermatol.* 2000 May;42(5 pt 1):776-783.
[65] Qureshi AA, Kvedar JC. Patient knowledge and attitude toward information technology and teledermatology: some tentative findings. *Telemedicine Journal and e-Health* 2003;9:259-264.
[66] Hicks LL, Boles KE, Hudson S, King B, Tracy J, Mitchell J, Webb W. Patient satisfaction with teledermatology services. *J Telemedicine and Telecare* 2003;9(1):42-45.
[67] Gustke S, Balch DC, Rogers LO, West VL. Profile of users of real-time interactive teleconference clinical consultations. (reprinted) *Arch Fam Med.* 2000 Nov/Dec;9:1036-1040.
[68] US Census Bureau. Income stable, poverty up, numbers of Americans with and without health insurance rise – Census Bureau Reports. Available online at: http://www.census.gov/Press_Release/www/releases/archives/income_wealth/002484.html. Last visited on May 30, 2005.
[69] Resneck J, Pletcher MJ, Lozano N. Medicare, Medicaid, and access to dermatologists: The effect of patient insurance on appointment access and wait times. *J Am Acad Dermatol.* 2004 January;50(1):85-92.
[70] Descriptive and correlational designs. http://clcpages.clcillinois.edu/home/soc455/psycweb/research/descriptive.htm. Last visited on April 24, 2005.
[71] Gayle V. The research value of longitudinal data. http://www.ccsr.ac.uk/methods/festival/programme/Thu/am/C/documents/Gayle_000.ppt. Last visited on April 24, 2005.

[72] Woolf LM. Theoretical perspectives relevant to developmental psychology. http://www.webster.edu/~woolflm/designs.html. Last visited on April 24, 2005.
[73] Woolsen RF. Study designs in medical research. http://www.gcrc.musc.edu/seminars/presentations/20041020-woolson.ppt. Last visited on April 24, 2005.
[74] Grimes DA and Schultz KF. Descriptive studies: what they can and cannot do. The Lancet 2002;359:145-149.
[75] Ramsay D, Grunberg A, Sanchez M, Rosenthal L. Dermatology manpoer projections. *Arch Dermatol.* 1984;120:1298-1300.
[76] National Resident Matching Program 2004 Match Data. Available online at: http://www.nrmp.org/res_match/data_tables.html. Last accessed on May 21, 2005.