

MEDICAL EDUCATION AND THE UNIVERSITY OF CALIFORNIA

Final Report of the Health Sciences Committee -- December 2004

I. INTRODUCTION

The California physician workforce is vital to the health and well being of the state's 35 million residents. While advances in medicine offer great promise, rapidly increasing health needs and the demands of medical practice have created new challenges that are putting California's doctors to the test. The population is aging and increasing in diversity. State and national expenditures on health care are skyrocketing, yet millions of Californians lack health insurance and even greater numbers lack adequate access to care. Chronic illnesses and adverse health conditions are leading to new models of care; innovations in science and technology offer new options for improving health outcomes; and continuing advances in science and clinical care appear limitless. Despite these gains, California's physicians face steep challenges as they work to address compelling state health needs. Among these:

- More than 1.5 million Californians, or 1 in 7 adults, have diabetes; nearly 3.9 million, or 1 in 8, adults and children in California are living with asthma; and 3.4 million Californians are living with disabilities that limit their activities of daily living.
- In 2001, the most common cause of death in California was heart disease (68,226 or 29% of all deaths), followed by cancer (53,923 or 23%), and stroke (18,088 or 8%).
- A reported 134,000 cumulative AIDS cases in 2003 ranks California second only to New York in the number of U.S. residents affected by this disease.
- Thirty percent of all California children are overweight and 40% are physically unfit.
- Twenty-three percent of adults are considered obese.
- An estimated 1.9 million students 12 years and older use illicit drugs.
- In 2003, nearly 23% of Californians between the ages of 19 and 65 lacked any form of health insurance.
- 18.5% of California children live below the federal poverty line (\$18,850 annual income for a family of four); 14% of children under age 18 have no health insurance.

To meet these and other health needs, the state's physician workforce must be adequate in size, diversity, and preparation for serving all Californians. In recent years, national organizations such as the American Medical Association (AMA), Council on Graduate Medical Education (COGME), American Association of Medical Colleges (AAMC), American College of Physicians (ACP), and the U.S. Bureau of Health Professions (BHPr) have predicted an impending shortage of U.S. physicians and issued recommendations for addressing future needs (Appendix A).¹⁻⁷ In California, two major studies issued in 2004 contain state-specific workforce findings, including the likelihood of severe regional shortages of physicians within a decade. Repeatedly, these studies recommend increasing medical student and resident enrollment as a necessary strategy for meeting U.S. needs.

This report provides an overview of California's current and projected supply of physicians; a review of the state's medical educational programs at the undergraduate (medical student) and graduate (medical resident) levels; an overview of the University of California's (UC's) role in medical education; and a set of

findings and recommendations that UC should consider in planning to address current and future workforce needs.

II. THE PHYSICIAN WORKFORCE

State of Medical Practice

Physicians play central roles in the practice and advancement of medical science. As clinicians, researchers, faculty, and policymakers, physicians are affected by state and national changes in the organization, delivery, and financing of health services. These changes include the use of sophisticated techniques, drugs, and new technologies for the diagnosis, treatment and prevention of disease; the ability to serve patients in remote locations through telemedicine; the trend away from solo and small-group practices to a variety of employment settings (e.g., managed care plans, hospitalist programs, and others); and an evolving shift from acute, problem-based care to health care delivery using integrative, interdisciplinary disease management models. New information technologies and models of care allow primary care and specialist physicians to improve health outcomes for patients and to improve the well being of families and communities. While these trends contribute to increased effectiveness, others pose formidable challenges. Rising costs of medical education influence the career choices of students and increasing costs of clinical practice affect decisions of graduates and practitioners. Questions regarding the health insurance status of patients routinely impact decisions – independent of health needs – about which patients will receive which services.

Current Physician Supply Estimates

In 2002, 105,000 California physicians were licensed to practice (active and retired), an increase of 55,000 physicians (91%) since 1980 – with the majority of these having attended medical school outside of the state. The number of medical residents in California showed more modest gains (2,500 additional resident physicians or 38%) since 1980. Despite a 91% increase in California's physician supply, the physician-to-population ratio increased by only 25% over the same period. This difference is attributable to the rapid population growth in the state, including a 47% increase between 1980 and 2000. The state's physician-to-population ratio is currently 265 per 100,000 people, which ranks California near the national average of 270 per 100,000 and in the middle one-third of all states. While the state's present overall supply of physicians is adequate, severe shortages exist in many areas. These shortages, together with the aging of the existing physician workforce, and the growth and aging of the California population, are expected to increase the severity of statewide shortages unless active steps are taken in the very near future.

Demographic and Academic Profile

Age. Nearly 70% of California physicians are men 45 years of age or older (Fig 1). The number of active California physicians age 65 years or older has been steadily increasing, from an estimated 3,000 in 1978 to close to nearly 10,000 in 2002. Currently, the median age of California doctors is 48, with significant differences between men and women (average age is 42 for women, 51 for men).^{5,6}

Gender. Among California physicians younger than age 35, 48% are women (see Fig 1). Women currently account for approximately 24% of the state's physician workforce.^{5,6} Greater representation of women in the profession is expected as the percentage of women enrolling in U.S.

allopathic medical schools continues to climb (from 24% in 1975 to 51% in 2004). Primary care specialties and OB/GYN currently have the highest percentage of women physicians, including 51% of all California pediatricians.⁶

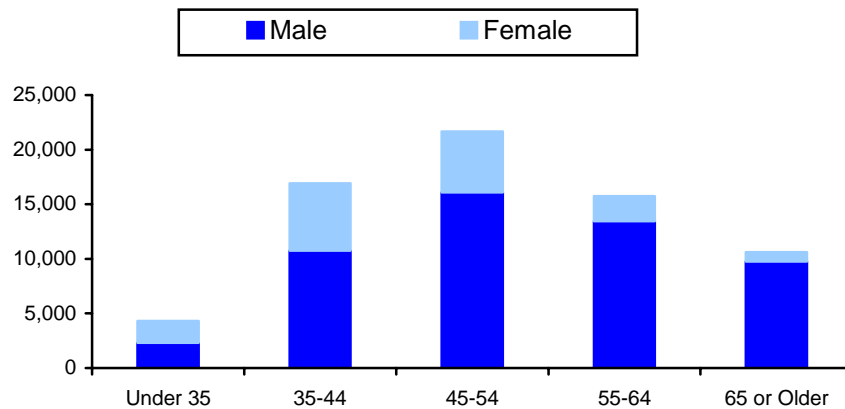


Figure 1. Active Patient Care Physicians in California by Age and Gender, 2002
 [Source: AMA Masterfile, Salsberg⁵]

Studies show an overall trend – more pronounced among women and younger physicians - of working fewer hours over their careers, and retiring at an earlier age.^{5,6,13,14}

Diversity. The state’s physician workforce does not reflect the diversity of the population it serves (Fig 2). The majority of California’s physicians are white (66%), followed by Asian/Pacific Islanders (22%), Hispanic/Latinos (4.4%) and African Americans (3%). Native Americans/Alaskan Natives and other races combined represent 3.9% of the doctors in the state (Appendix B).

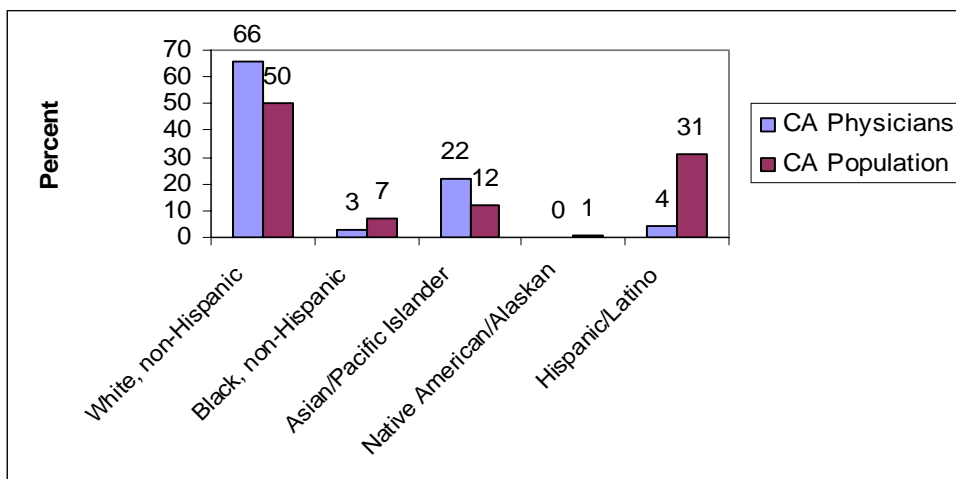


Figure 2. Race/Ethnicity of Active Patient Care Physician in California vs. Population
 [Source: AMA Masterfile, California Dept of Finance, Salsberg⁵]

Location of Medical Education and Training. Approximately 75% of the state’s active patient care physicians attended medical school outside of California.⁵ Among physicians moving into California are growing numbers of international medical graduates (IMGs).^{*} Of the 25% of active patient care physicians

who attended a California medical school, almost two thirds (62%) graduated from a UC school (Fig 3). All but a small number (<4%) of California physicians completed residency training in their principal specialty in the U.S.; 60% in California and 40% in other states or Canada.

* IMG is defined by the Educational Commission of Foreign Medical Graduates (ECFMG) as a physician who received his/her medical degree from a medical school located outside the United States and Canada. Non-U.S. citizens who graduated from medical schools in the United States and Canada are not considered IMGs.

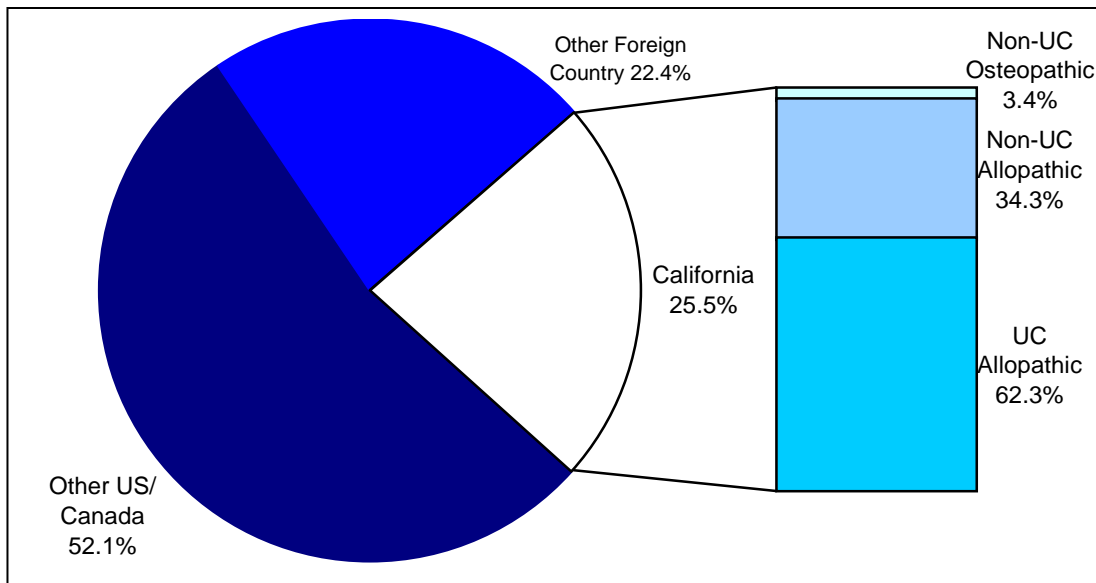


Figure 3. Location of Medical School Education of Active Patient Care Physicians in California, 2002

[Data do not reflect measure of those physicians who completed residency training in California.]

Source: AMA Masterfile, Salsberg⁵]

Practice Settings and Specialties

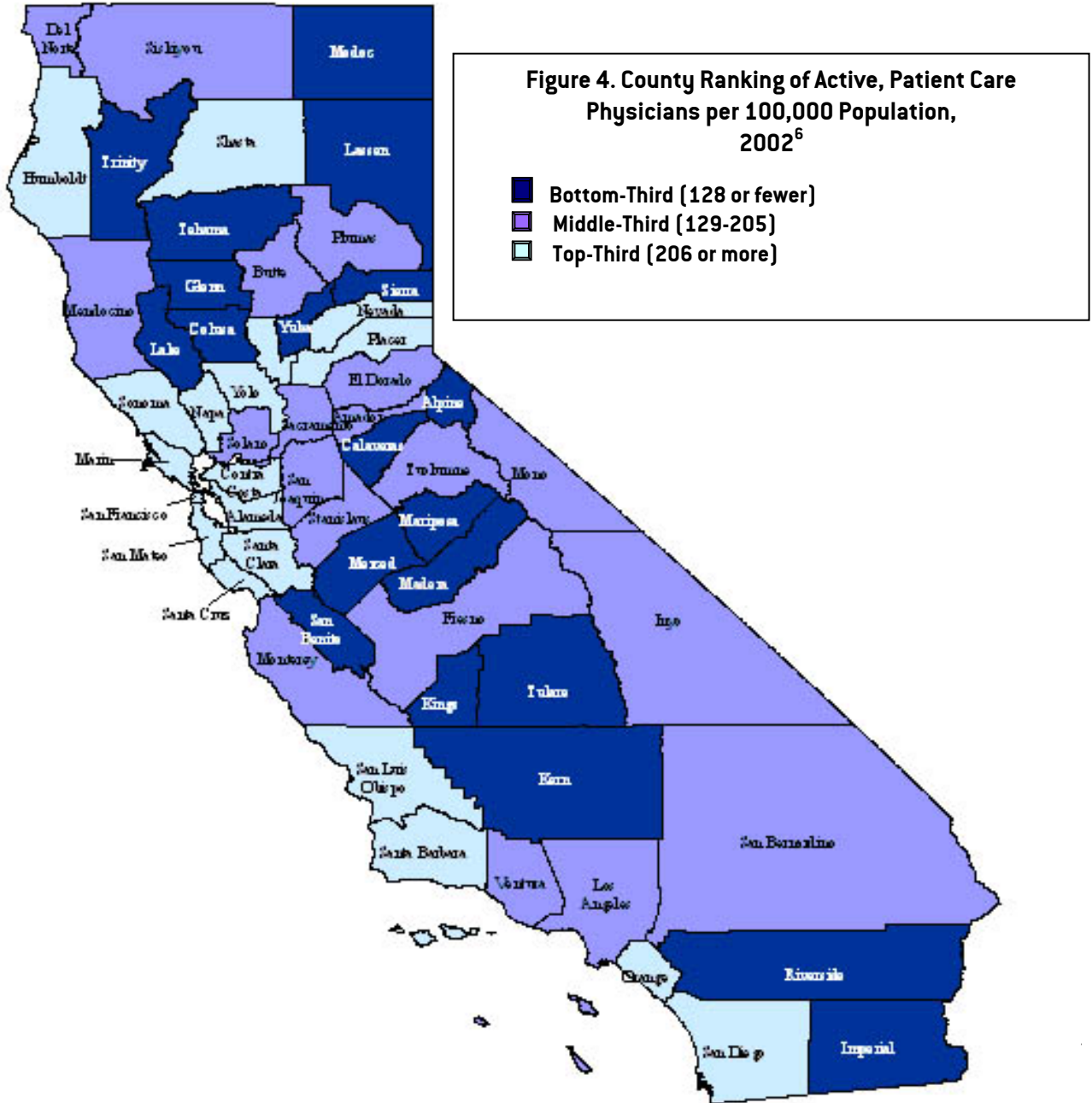
Of the 105,000 physicians licensed in California, approximately 70,000 are in active practice.⁵ Among those in active practice, 44% are part of a practice group, 38% are in solo practice, 11% are employed in hospital-based positions, and 9% work in outpatient clinics, government facilities, and academic institutions. The higher average age of solo practitioners by comparison with physicians in other settings reflects the steady move away from solo practice.

One third of active California physicians are primary care practitioners, with the largest numbers working in family medicine (10,000 or 14%), general internal medicine (10,000 or 14%), and general pediatrics (5500 or 8%) (Appendix C). Growth in the number of primary care physicians in California (from 13,000 in 1978 to 27,000 in 2002)⁶ is due in part to several factors, including the response to workforce projections identifying national shortages in primary care, increased patient enrollment in managed care plans, and increases in the employment of primary care physicians who are charged with managing all aspects of patient care, including referral to specialists. Over this same period, the number of specialists grew by 90% to more than 50,000. The average ratio of generalists to population in California is currently 77 per 100,000 residents, which is within the range of 60 to 80 previously recommended by CoGME. The average ratio of

specialists to population is estimated to be 114 per 100,000, which is below the national average of 121, and slightly above CoGME’s recommended range of 85 to 105.⁸ While these statistics provide a framework for comparison across states, it is important to note that CoGME is now reexamining their usefulness for purposes of physician workforce planning.

Geographic Distribution

California’s 58 counties show striking variation in the number of active patient care physicians per capita (Fig 4).



nonmetropolitan Inland Empire and Central and South Valley regions have the fewest patient care physicians per 100,000 residents (average 120). More than 48 California counties have at least one area that qualifies as a federally designated Health Professions Shortage Area (HPSA).

Workforce Trends and Projections

In 1980, the Graduate Medical Education National Advisory Committee (GMENAC) issued a report predicting an oversupply of physicians by 2000. In response, U.S. medical schools voluntarily capped medical student enrollment at current levels. Countering this effort, however, has been the continued enrollment growth in the nation's schools of osteopathy and residency training programs which account for overall growth in the numbers of U.S. physicians. This in turn prompted the AMA, COGME, and AAMC to recommend nationwide changes to limit the total number of U.S. physicians trained, to link medical school output more closely to GME training, and to ensure a more balanced generalist/specialist mix. Limits on federal funding for GME were imposed with the passage of the federal Balanced Budget Act in 1997.⁵

Twenty-five years after the GMENAC report, little evidence of a national oversupply of physicians has been found. This is true in part because the growth and aging of the U.S. population created increased demand for services, and because the national penetration of managed care (upon which many of these workforce projections were based) did not materialize.⁹⁻¹¹ Although national assessments concerning the size and specialty mix of the U.S. physician workforce have not been perfectly accurate with respect to supply and demand, it is clear that regular review and analysis of data regarding the supply and demand for services is necessary and useful for informing state and national planning. Within this context, and in the face of growing physician shortages – both regionally and in certain medical and surgical specialties – a number of national studies^{1-3,4,7} and two in-depth California studies^{5,6} have recently been conducted to assess future needs.

Consistently, these studies report:

- Growing demand for physician services, with U.S. demand expected to increase by 33% between 2000 and 2020.
- Population growth that continues to outpace growth in the physician workforce.
- Retirement rates for physicians that exceed the number entering the workforce each year – a trend that is expected to continue for the next 15 years.
- Poor geographic distribution and inadequate access to physicians in many of California's rural areas, inner cities, and poor communities.
- Projections for rapid population growth in many areas of California that are recognized as medically underserved and that are already designated as health professions shortage areas.
- Growing demand for increased diversity of the physician workforce.
- Increasing demand for cultural and linguistic competency among clinicians.
- Growing evidence of disproportionate disease burdens and disparities in health status that are race- or ethnicity-based.

In California alone, a statewide shortfall of between 5,000 and 17,000 physicians (5 to 16%) is projected by 2015. This projection is based on established health workforce forecasting models that consider various demand and supply scenarios and related variables such as the health insurance environment, population demographics, and economic influences.⁶

Factors Affecting Demand for Physician Services

Population Growth. The demand for physician services generally increases as the size of the population grows. California is the most populous state in the nation and the U.S. Census Bureau predicts an additional 22% increase between the years 2000 and 2015. This compares to an estimated 13% growth nationwide. In California, the fastest growth is expected to occur in the Inland Empire and Central and South Valley regions (Appendix E) where the physician supply is already low. Slower population growth is projected for Los Angeles, Orange County, and San Francisco Bay Area regions.

Ageing and Longevity. Utilization of health services increases steadily with age. Seniors account for higher numbers of patient care visits, higher total physician hours, and the greatest proportion of total health care expenditures of all age groups.⁷ California is home to the largest senior population in the U.S. Between 2000 and 2025, the state is predicted to see a 58% increase in 65- to 74-year olds, and a 49% increase in those 85 years and older.^{5,6} These changes will result in a significant increase in need and demand for physician services.

Ethnic Diversity. Demand for culturally and linguistically competent medical care will continue to increase as the population becomes more diverse. By 2015, nearly 37% of the California population will be of Hispanic/Latino origin and nearly 14% will be of Asian or Pacific Islander heritage (Appendix F). By 2025, the Hispanic/Latino population is expected to increase to 41%, at which time Latinos will be the largest group in the state. Because California's trend of increasing diversity is expected to continue, the need for physicians to serve these communities will intensify, particularly in areas already experiencing shortages of health professionals.

Health Care Access and Utilization. The socioeconomic status of a group or community typically correlates with both its utilization of health services and the number of physicians who serve that population. Individuals who are employed and insured use medical services more frequently and more regularly than people who lack health insurance. As medical knowledge grows and the patient population becomes more knowledgeable through increased access to abundant written and web-based resources and direct-to-consumer advertising, demand for health services increases.

Health Status and Disease Prevalence. The greater the incidence and prevalence of disease and conditions that pose health risks, the greater the need for physicians who are skilled and knowledgeable about practice models offering integrated, interdisciplinary care and lifelong disease management. In California, rates of chronic illness (asthma, diabetes, arthritis, and chronic obstructive pulmonary disease [COPD]), and conditions posing health risks (obesity, substance abuse, and smoking) continue to climb.¹² Breast cancer rates continue to climb. Although rates of lung cancer have fallen over the last 5 years, lung cancer mortality rates in California exceed those related to prostate, breast, and colorectal cancer combined. These and other health conditions will increase demand for health services in numerous specialties and settings.

Factors Affecting Supply of Physician Services

Age of the Workforce. The number of active California physicians 65 years or older tripled and those aged 56 to 65 years doubled over the past 20 years.^{5,6} Growth in the number of physicians younger than age 40 was considerably slower. The total number of California medical school graduates increased only slightly with the opening of a new California osteopathic medical school (granting the DO rather than the MD degree). Given an average age of entry into the workforce between 29 and 32 years and an average retirement age of 65, the rapid aging of the current workforce poses significant challenges at a time of greatly increased demand for services.⁷

Career Focus. Physicians are engaged in a wide array of professional activities, including patient care, biomedical research, health policy, medical education, and administration. Location and allocation of work hours unrelated to clinical care directly affect the supply of physicians providing clinical services. As non-clinical activities by some physicians increase as a result of expanding career options, a corresponding decrease occurs in direct patient care.

Work Hours. Regulations limiting resident work hours to 80 or fewer per week and weekly days off further reduce the hours spent providing clinical care. As a result, one study predicts as much as a 10% reduction in total physician work hours (with the same sized physician workforce) in the future.⁵ Studies also show that women physicians – independent of maternity leave – work fewer hours over their careers than their male counterparts. Research also shows an overall trend within the workforce, particularly among younger physicians, of working fewer hours and retiring at an earlier age.^{5,6,13,14}

Geographic Location. Clinicians, researchers, and faculty physicians are often concentrated in urban and metropolitan areas. These areas offer practice opportunities where sophisticated technology and state-of-the-art clinical resources are available and where interaction with other health professionals is possible. California's medical schools and major teaching hospitals are located in areas with physician to population ratios that are among the highest in the state. Workforce studies show that an estimated 70% of physicians who complete their residency training in California remain in the state and become part of its workforce.¹⁵ Higher income potential in urban centers is attractive to both debt-burdened graduates and more experienced physicians making practice decisions. Without effective intervention, health professions shortage areas are likely to persist or even worsen for rural and poor communities throughout the state.

Technologic and Medical Advances. The effects of medical innovations on physician supply are variable and difficult to predict. Medical innovations, technologic development, and reorganization of medical practices hold the potential for increasing the productivity of clinicians. Standard forecasting models cite the potential for as much as a 5% increase in productivity, which – if achieved – would effectively increase physician supply.⁵ Offsetting this increase, however, are the physician hours directed to increasingly complex applications of new diagnostic and treatment methods and to caring for patients who are living longer as a result of these advances.

High Cost of Health Insurance. The high costs of health insurance continue to have adverse effects on the state's practice environment. As premiums for health benefits rise, growing numbers of Californians are joining the ranks of the uninsured. An estimated 12 million Californians lack health insurance,¹⁶ a number that will grow as employers shift the costs of health coverage to employees. Health insurance is a major determinant of access to care for all Californians and is a major factor considered by many physicians when

making choices about where and how to practice. While proposed solutions to improve insurance coverage are yet to be realized, it is important to note that demand for services is likely to increase significantly if and when such changes are made.

High Cost of Malpractice Insurance. Increasing malpractice premiums and threats of legal action by patients who are unsatisfied with their health care continue to have an adverse effect on the practice environment. The costs and extent of coverage of malpractice insurance are of growing concern to physicians throughout the state, particularly for those physicians in high-risk specialties, such as obstetrics.

Educational Opportunity. California has a medical education and training system that is small for its geographic size and population. It lags significantly behind most other states with respect to the number of medical students per 100,000 population. In 2002, California had 15 medical school slots for every 100,000 individuals compared to a U.S. average of 27 slots (Fig 5).⁵

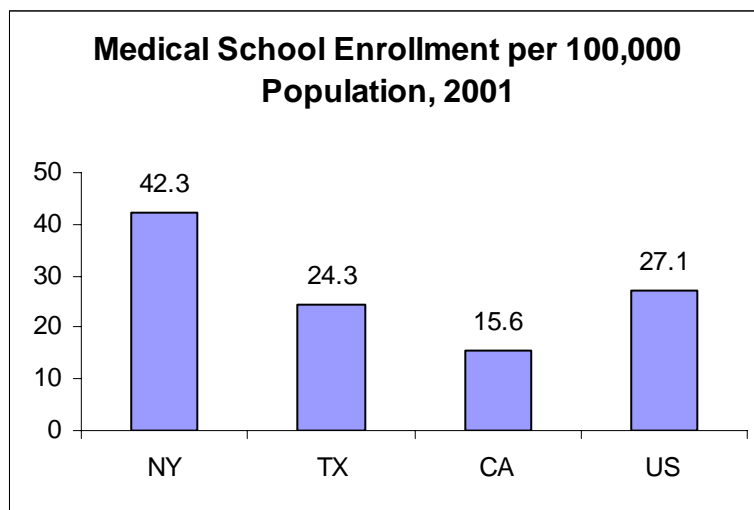


Figure 5. Comparison of Medical Students Enrolled per 100,000 Population
(Center for Health Workforce Studies, University of Albany, 2003; Data Source: AMA;AACOM)

In the same year, California trained 24 residents/fellows per population compared to a U.S. average of 34. The number of medical education and training opportunities in the state directly affects the pool of graduates entering the workforce. The relative absence of growth in medical student and resident education in California over the past two decades significantly limits the state's ability to accommodate California students wishing to attend medical school and directly impacts its physician supply.

Doctors of Osteopathy. Doctors of Osteopathic Medicine (DO) are trained and licensed to practice medicine in California. Like their colleagues in allopathic medicine who hold a Doctor of Medicine (MD) degree, doctors of osteopathy enter residency training and pursue practice in a selected medical or surgical specialty. DOs are trained to place special emphasis on preventive medicine and holistic patient care in addition to learning skills involving musculoskeletal manipulation. An estimated 65% of these physicians enter general or family medicine, general internal medicine, or general pediatrics, thereby contributing to the state's supply of primary care providers.

Physician Assistants and Nurse Practitioners. In 2003, an estimated 4,800 physician assistants (PA) and 11,000 nurse practitioners (NP) were licensed in California, double the number in 1996.⁶ These non-physician clinicians play important roles in the overall health system in California (G). PAs and NPs provide primary and specialty care in a variety of settings and increasingly provide primary care in rural counties where physician resources are scarce and health needs are great.⁶

III. MEDICAL EDUCATION AND TRAINING: AN OVERVIEW

Becoming a board-certified physician generally requires 3 or 4 years of undergraduate study, 4 years of undergraduate medical education, and from 3 to 8 years of postgraduate training, depending on the specialty and board certification requirements. In addition to clinical practice, physicians also enter the workforce as researchers, faculty, administrators, policy experts, and public health officials.

Undergraduate Medical (Student) Education

Currently, 126 accredited allopathic medical schools in the U.S. enroll an estimated 17,000 first-year medical students in 4-year undergraduate medical education programs leading to the Doctor of Medicine (MD) degree.¹⁷ Nationally, 20 colleges of osteopathic medicine enroll approximately 2,500 students in 4-year programs leading to the Doctor of Osteopathy (DO) degree.

Academic and Clinical Preparation. Entering medical students generally hold at least a bachelor's degree and have completed required premedical courses in physics, biology, mathematics, English, and inorganic and organic chemistry. The undergraduate medical student curriculum shows evidence of fundamental change at most U.S. schools over the last decade. Academic preparation focuses on an integrative approach to health care throughout life. Through active, problem-based learning in small group settings, students complete coursework that integrates the study of anatomy, embryology, physiology, biochemistry, pharmacology, psychology, microbiology, pathology, medical ethics, and cultural competence as a foundation for effective patient care. Students gain clinical experience focusing on the prevention, diagnosis, management, and treatment of illness through hospital and clinic rotations in internal medicine, family practice, obstetrics and gynecology, neurology, pediatrics, psychiatry, surgery, and other specialties. Collaborative study with students in other health professions and orientation to new medical models of care (e.g., greater provision of care in ambulatory/outpatient settings) prepare future physicians to work as part of an integrated health care team.

Medical School Application and Enrollment Trends. Following 6 years of decline, the number of applicants to U.S. medical schools for 2003-2004 increased by 3.5% (33,625 to 34,785) over the previous year.¹⁸ For the first time, the majority of applicants were women – reflecting a 7% increase to a total of 17,672. In 2004-2005, the total number of applicants increased by an additional 2.7% over 2003 to a total of 34,791. More importantly, however, the diversity of U.S. medical school classes improved as the number of African American and Hispanic applicants who gained admission in 2004-2005 rose by 2.5% and 8%, respectively (Appendix H).

As the diversity of the U.S. population increases, the demand for diversity and cultural competency within the health workforce will also increase. Notwithstanding the efforts of programs intended to strengthen the pipeline and increase the pool of students who are underrepresented in medicine, progress has been

limited and difficult to sustain. As the number of applicants grows and medical student fees increase, medical schools will require new strategies for recruiting and training students from diverse backgrounds.

Graduate Medical (Resident) Education

Graduates of accredited U.S. medical schools and colleges of osteopathy, and IMGs with certification from the Educational Commission for Foreign Medical Graduates (ECFMG) typically enter graduate medical education (GME) as the next component of their clinical training. Graduate medical education (or residency training) is required for medical licensure and for board certification in a given medical specialty (e.g., pediatrics, internal medicine, or family medicine) or surgical specialty (e.g., general surgery or neurosurgery).^{19,20} Residency training occurs primarily in teaching hospitals and other ambulatory and community-based health facilities and requires from 3 to 7 years for completion, depending on the specialty and program selected. During this time, residents work under the supervision of faculty physicians, gaining clinical skills and assuming increasing levels of responsibility for patient care. Through such training, young physicians are prepared for independent practice.

Known to be academically rigorous and physically demanding, U.S. residency programs accredited by the national Accreditation Council for Graduate Medical Education (ACGME) are required to meet new requirements (instituted in 2003) concerning maximum work/duty hours and scheduled time off. These standards apply to all accredited medical and surgical training programs and were adopted on a nationwide basis to address patient safety concerns, reduce fatigue, and improve working conditions for resident physicians. While the success of these standards in reducing medical errors and improving working conditions has yet to be measured fully, it is clear that reducing work hours has required many hospitals to hire additional personnel to meet patient care needs. In some teaching hospitals, nurse practitioners and ancillary staff have been hired to fill the gap.

Residency Program Application and Enrollment Trends. Each year, an estimated 17,000 graduates from U.S. allopathic medical schools and an additional 15,000 graduates of osteopathic, Canadian, and foreign medical schools, apply for approximately 23,000 first-year residency positions through the National Residency Matching Program (NRMP).²¹ In 2004, NRMP data show U.S. medical school seniors accounted for 64% of all positions filled, with the highest percentages of U.S. graduates currently in residency programs in dermatology; radiation oncology; and general, orthopedic, and plastic surgery. While the percentages in these specialties are high, it is important to note that total enrollments are relatively small. By contrast, in 2004 the lowest percentages of U.S. seniors were in primary care programs that are typically large in size, including internal medicine, family practice, pediatrics, and psychiatry.²¹ In the same year, 104 (10%) more DOs, and 203 (9%) more IMGs matched in U.S. residency programs than in 2003, with highest percentages of these physicians selecting programs in internal medicine, family practice, and pediatrics.^{19,20,22} With the addition of these first-year residents (PGY1), a total of 100,877 U.S. physicians were enrolled in 7,988 accredited programs in 2004-2005. Among these, nearly 30% are presently IMGs.^{23,24}

Licensure and Board Certification. All states and the District of Columbia require medical licensure to practice medicine. Not all states recognize licensure in other states. Obtaining a license to practice medicine requires that physicians graduate from an accredited medical school, complete from 1 to 3 years of GME, and pass the three steps of the U.S. Medical Licensure Examination (USMLE). Licensure renewal occurs every 2 to 5 years and requires proof of continuing medical education.

Physicians seeking board certification in a specialty field must complete a minimum of 3 to 7 years of residency training followed by specialty-specific examinations, both oral and written, after completion of their training. There are currently 24 specialty boards in the U.S., many of which offer certificates of added qualification (CAQ) in recognized subspecialties.

IV. MEDICAL EDUCATION AND RESIDENCY TRAINING IN CALIFORNIA

Medical Student Education

Ten schools in California offer undergraduate medical education (Table 1).

California Medical School	Number of First-Year Positions	Total Positions
UC Medical Schools		
UC Davis	93	372
UC Irvine	92	368
UC Los Angeles**	169	676
UC San Diego	122	488
UC San Francisco*	153	624
UC Subtotal	629	2,540
Private Medical Schools		
Loma Linda University	165	648
Stanford University	87	465
USC	160	659
Private Subtotal	412	1,772
Osteopathic Schools		
Western University	176	700
Touro University	125	475
Osteopathic Subtotal	301	1,175
GRAND TOTAL	1,342	5,487

Table 1. California Medical Student Enrollments

* Includes 12 students in the UC Berkeley-UCSF Joint Medical Program

** Includes 24 students per year in the UCLA-Drew program, 24 per year in the UCLA-UCR program

Eight of these ten are allopathic medical schools (granting the MD degree), including five UC medical schools and four smaller UC medical education programs located in Berkeley, Fresno, Riverside, and at the Charles R. Drew University of Medicine and Science in Los Angeles. In addition, three private medical schools exist at Stanford University, the University of Southern California, and Loma Linda University.

Collectively, these eight allopathic schools enroll approximately 4,300 students across their four-year educational programs. Two osteopathic medical schools (granting the DO degree) are offered by Touro University and Western University of Health Sciences, which together enroll 1,175 students.

Competition for admission to medical school is intense, with far more qualified applicants than can be accommodated. California's ten schools admit an average of 1,340 first-year students and maintain a statewide total enrollment of nearly 5,500 students across the four-year curriculum. These totals have changed only slightly in the last 20 years, with virtually all of this increase attributable to the doubling of enrollment in osteopathic programs that occurred with the opening of Touro University College of Osteopathic Medicine (from 162 in 1998 to 301 in 2002).⁵ By contrast, UC medical schools have actually experienced a slight decrease in enrollment over the past 25 years.

Reflecting nationwide trends, the number of applicants to all California medical schools rebounded after a 6-year decline to reach a total of 34,786 in 2003 (Appendix I, Display 1). Within the UC system, there was a 3% increase in applicants from 2002 to 2003 (from 7,670 to 7,838), the majority of which were California residents, with women and men equally represented (Appendix I, Display 2). The majority of both applicants and enrolled students were non-Hispanic whites and Asian Americans (Appendix I, Display 3). In 2004, the number of applicants to all California medical schools reached approximately 26,000, of which 1,033 students enrolled. UC schools enrolled a total of 637 students, including the 8 students enrolled in UC Irvine's PRIME-LC (Program in Medical Education for the Latino Community – see page 15 for additional information). This very small (<2%) growth marks the first increase in UC medical school enrollment in more than 25 years. Of the first-year (2004) class at UC medical schools, 108 of 637 are underrepresented minority students (0.32% Native American/Alaskan Native, 4.46% African American, and 10.51% Latino).

Increasing numbers of applicants and steady-state capacity in California schools means that, on average, fewer than 5% of applicants to any given school are ultimately enrolled. California now leads the nation in the number of students that must pursue medical education outside of the state, with significantly more California students enrolling in non-California schools than matriculate in state. According to the AAMC, nearly 4,000 California students applied to medical school in 2003. Of those, more students matriculated out of state (1,110) than enrolled in California (816); more than half of all California applicants were not accepted or did not enroll.

Residency Training

According to the ACGME, 67 institutions in California currently sponsor more than 700 accredited specialty and subspecialty residency programs. Through its more than 300 specialty-specific residency programs, UC trains nearly half of the state's medical residents. These resident physicians work and learn in an extensive clinical network, which includes the University's five state-of-the-art academic medical centers and more than 100 affiliated clinical sites throughout the state – including Veterans Affairs, county, and community hospitals, and a large number of outpatient clinics and ambulatory care sites. Collectively, the UC system is also a major provider of health care for Californians, providing more than 120,000 inpatient visits and 3.3 million outpatient visits annually. Within this delivery system, UC medical residents work and learn as they provide patient care and assist in the education and training of UC medical students.

The University's five academic medical centers enroll approximately 1,000 new first-year residents annually. In 2003-2004, the state-supported enrollment in UC residency programs was 3,829, with actual

enrollment (state and non-state supported positions) being slightly higher. On average, approximately half of all UC residents are enrolled in primary care training programs (internal medicine, family practice, pediatrics, and obstetrics and gynecology) (Appendix J).

Like the California physician workforce in general, residents enrolled in UC and non-UC training programs do not reflect the diversity of the state's population. California's resident physicians are predominantly white (61%) or of Asian/Pacific Islander heritage (25%). A disproportionately low number of resident physicians are Hispanic, African American, or Native American. In the surgical specialties and most subspecialties, the majority of residents are white males. By contrast, primary care specialties, such as pediatrics and family practice, enroll higher numbers of women and of physicians who are underrepresented in medicine.

Upon completion of residency training, an estimated 70% of UC residents remain in California to practice.^{5,15} In-state retention rates are affected by factors such as job availability, cost of living, and plans for fellowship or other training.²⁵ California resident exit surveys conducted since the year 2000 show retention rates that vary by specialty, ranging from approximately 90% in psychiatry and internal medicine to approximately 40% in orthopedic surgery.¹⁵

National data show that approximately 25% (or one in four) of all U.S. medical residents are IMGs. By contrast, UC medical residency programs train predominantly U.S. medical school graduates, with an estimated 5% IMGs enrolled annually on average. This difference is attributed to the limited number of California training programs (when compared to the national average) and the competitiveness of UC training programs, which consistently attract large numbers of highly qualified U.S. medical school graduates.

Strengths of UC Medical Schools

Excellence and Innovation in Education. Ranked among the top medical schools and teaching hospitals in the nation, UC medical centers educate and train approximately two thirds of California's medical students and approximately half of the state's resident physicians. UC medical schools' nationally recognized 1,071-member ladder-rank faculty and more than 10,000 volunteer faculty design and deliver an updated, interdisciplinary curriculum that prepares medical students and residents as future physicians. Cultural competence, geriatrics, informatics, ethics, evidence-based medicine, behavioral health, and nutrition are among new areas of emphasis at UC campuses. Top-ranked programs in nursing, dentistry, public health, and other health professions offer added resources and training opportunities at several UC campuses. In addition, UC medical students and residents may participate in a variety of high-quality, advanced-degree programs (e.g., MD/PhD, MD/JD, MD/MPH, MD/MBA) and interdisciplinary research opportunities in such fields as AIDS, cancer, autoimmune disease, behavioral health, aging, and Alzheimer's disease (Appendix K).

Academic Preparation and Student Outreach. UC is committed to increasing the diversity of its medical school classes and to providing medical education opportunities to graduates who will serve California's increasingly diverse population. Since 2000, first-year class enrollments of underrepresented minority (URM) students in UC schools (combined) averaged 117 of 630 total (18%). To assist in the recruitment and preparation of students who are underrepresented in medicine and who have experience with or interest in serving underserved populations and communities, UC medical schools offer more than 100 summer outreach, academic enrichment, mentoring, and advising programs for elementary, high school, and college students throughout the state. Educational programs, such as postbaccalaureate programs,

offer students who have previously applied to medical school but have not yet gained admission focused programs to improve their overall competitiveness by strengthening their science preparation as well as their test-taking and interviewing skills.²⁶

Population-Centered Programs. The Program in Medical Education for the Latino Community (PRIME-LC), launched at the UC Irvine College of Medicine in July 2004, is an innovative example of a new UC program medical student education program that is focused on the health needs of California's growing underserved Latino population. This program offers a specialized five-year curriculum to prepare students as future leaders and clinicians who will serve the state's medically underserved Latino community. PRIME-LC recruits and enrolls students who possess a record of achievement and demonstrated commitment to caring for Latino patients and communities. Planning is underway at several UC medical schools to develop programs modeled on PRIME-LC that may ultimately focus on rural health, telemedicine, homelessness, and other state health needs.

Leadership in Research and Development. UC Schools of Medicine lead the nation in NIH grant funding for medical and bioscience research. Together, these institutions receive on average more than \$2 billion to support the investigations and infrastructure essential to UC research. The work and contributions of UC researchers have led to advances in the understanding and treatment of disease, development of new technologies and industries, and worldwide recognition, including awards from the National Academy of Sciences, National Institutes of Health, and the Norwegian Nobel Committee.

Comprehensive Training and Health Care Delivery. UC's medical centers, hospitals, and clinics – and the faculty, students, and staff who learn and work in them – collectively represent the fifth largest health delivery system in California. One of the largest MediCal providers in the state, UC facilities and programs are integral elements of the state's health "safety net" for under- and uninsured patients (Appendix L). Throughout California, the UC system meets the needs of insured, under-insured, and uninsured Californians through networks of outpatient clinics; emergency medical, burn, and cancer centers; hospitals with Level I trauma units; acute and critical care inpatient services; units; labor, delivery, and neonatal care units; organ transplant programs; and a variety of other state-of-the-art primary and specialty care services.

Challenges for UC Medical Schools

Limits on Educational and Training Opportunities. Because state-funded enrollment has not kept pace with population growth (and not increased in nearly 30 years), UC medical schools have been unable to accommodate the growing number of qualified California students who wish to attend medical school. As the number of applicants to each campus (approximately 5,000 annually) exceeds the capacity of UC schools (100-150 positions per entering class), greater numbers of Californians are enrolling in medical schools in other states and countries. As a result, California not only sends more medical students out-of-state than it trains in state, but also exports more medical students than any other state in the nation. As the population grows and evidence of physician shortages increases, the University's ability to offer educational opportunities to students and to assist in meeting California's health workforce needs will lag even further.

Balancing Budget Cuts and Responding to Changes in Medical Education. By the 2004-2005 fiscal year, the University will have sustained nearly \$520 million in base budget reductions; another \$420 million in

cuts will have been offset with student fee increases, and an additional \$550 million gap reflects the absence of funding for cost-of-living adjustments, non-salary price increases, employee health benefit increases, and other expenses. UC medical schools have taken their share of these cuts, including an unprecedented permanent 25% reduction in state support for medical student and resident instruction in 2004-2005 alone. As UC schools absorb these cuts, they face increasing demands for faculty productivity in clinical settings; diminishing time for teaching; and near-term shortages of faculty. Schools are increasingly relying on non-FTE supported and volunteer clinical faculty to fulfill teaching responsibilities. Many teaching, research, and clinical facilities are aging or no longer meet current standards ranging from seismic safety to design and suitability for current programmatic purposes. While commitment to quality remains the highest priority, the University's ability to maintain both quality and access to education will be seriously challenged if further budget cuts occur. Added to these challenges are rapid escalations in the volume and complexity of medical information and technology and growing demands of the public and various accreditation, regulatory, and governmental bodies.^{27,28}

Recruitment and Retention of Faculty. Factors that compromise successful recruitment and retention of medical school faculty include higher salaries offered by other employers; increasing educational indebtedness at the time residency training is completed; demands required for an academic career; institutional pressure to generate income; and changing demands involving teaching, research, and patient care. California's high cost of living, particularly in Los Angeles, San Francisco, San Diego, Davis, and Irvine, adds to these challenges when faculty are recruited by other institutions offering higher salaries, better start-up packages, and lower costs of living.

Insufficient Student and Faculty Diversity. Rising UC medical student fees, limited financial aid opportunities, high costs of living, insufficient school scholarships and endowments and intense competition from other medical schools (both in and outside of California) compromise efforts to attract and enroll students from a variety of ethnic and socioeconomic backgrounds. The lack of diversity of the UC medical school faculty limits the opportunities for students of diverse backgrounds to identify role models and is perceived negatively by some applicants when deciding where to enroll. Rising fees are creating real and perceived barriers to medical education for students from financially and educationally disadvantaged backgrounds. When compared with the state's population, the lack of diversity among medical students and the faculty is a major challenge in developing successful strategies for addressing disparities in health status and the needs of medically underserved communities (Appendix M). As UC schools work to address state health needs, the demand for increased diversity among faculty, students, and residents will increase and the need for improved cultural and linguistic competency will grow.

V. SUMMARY OF FINDINGS

1. *California is expected to have a statewide shortage of physicians by 2015.*

Recent physician workforce studies predict that California will face a shortage of up to 17,000 physicians by the year 2015. Factors contributing to this shortage includes: the growth and aging of the California population; increasing rates of chronic illness and conditions (e.g., diabetes, asthma, arthritis, COPD, and HIV/AIDS); aging of the physician workforce and accelerating rates of retirement among physicians that exceed the number of new doctors entering practice; growing challenges of the practice environment that have prompted some clinicians to reduce or modify patient care activities; and a comparative lack of growth in medical education and residency training opportunities within the University of California for more than 20 years.

2. *Many California counties and communities face physician shortages that are likely to grow.*

California has historically relied upon “in-migration” of physicians trained outside of the state to meet its workforce needs. This mechanism has proved inadequate, however, for addressing the state’s geographic maldistribution of doctors, particularly in areas designated as health professions shortage areas. Demographic projections for the state indicate that many of these same regions are likely to experience significant population growth over the next decade. Without intervention, severe physician shortages are likely in the Inland Empire and in Central and South Valley communities. These areas, where per capita income is low and advanced technology is often less available, have limited access to quality health care. Continued growth in these regions, without an increase in physician supply, will significantly increase the number of Californians who lack adequate access to physician services.

3. *Demand for increased diversity and cultural and linguistic competency will steadily increase.*

California is home to the largest and most diverse population in the nation. Its physician workforce does not reflect the diversity of the population it serves. Hispanic/Latino, African-American, South East Asian, and Native American physicians, in particular, are significantly underrepresented among active physicians in the state. Increasing the diversity and improving the cultural and linguistic competency of the state’s physician workforce are necessary strategies for improving access and health outcomes for all Californians.²⁹

4. *UC medical schools face major challenges in training future physicians to meet state needs.*

Although UC schools train two thirds of all California medical students, more California undergraduate students must pursue their education and training outside of the state than ever before. UC medical schools have experienced major permanent cuts in state support, and faculty face unprecedented challenges in developing new teaching styles and expanded curricula, keeping pace with growing medical information and innovations in technology, and managing growing public and regulatory expectations about patient care. UC faculty are recognized for their contributions to the advancement of medical science, supported by more than \$2 billion in NIH research. Demands to generate clinical income, however, increasingly limit the time available for teaching and research. UC faculty, students and staff provide outstanding primary, secondary, and tertiary care throughout the state, and serve as part of the state’s

safety net for low income, under- and uninsured Californians; budget realities, however, have directly impacted many programs.

5. *Changes in the organization and financing of health services require changes in education and training.*

Accredited U.S. medical schools have undergone fundamental changes over the past decade to better prepare future physicians to meet changing patient needs and to practice more effectively within the nation's changing health care system. Case-based learning, small group instruction, ongoing curricular change (e.g., genetics, cultural competence), and use of technology and informatics are among the educational resources that prepare students to provide medical care in a variety of settings using various integrative, interdisciplinary disease management models. As the body of science and medical knowledge expands, and as public expectations increase, physicians are expected to devote time and effort to continuing medical education and professional development and to be committed to lifelong learning.

6. *Nurse practitioners, physician assistants, and other health professionals are essential partners for meeting state needs.*

Nurse practitioners, physician assistants, and other licensed and unlicensed health personnel are essential to the state's overall health system. Their expertise, which covers a wide range of clinical disciplines, narrows the gap in health care access that exists for many communities throughout the state. Licensed non-physician practitioners, in particular, often deliver primary and specialty care in rural areas where physician resources are scarce.

7. *Health professions workforce assessments are essential tools for state and regional planning.*

Developing and reviewing a comprehensive profile of the California's physician workforce, including an assessment of the supply and demand for physician services within the context of changing demographics needs, provides useful information for determining how many physicians California will need in the future. While a number of past projections regarding the physician workforce have not proven entirely accurate, improved forecasting models are being developed. These advances, together with workforce studies examining nursing, pharmacy, public health, and other health professions, are useful in planning and guiding educational and public policies that aim to improve supply and distribution of health professionals throughout the state.

VI. RECOMMENDATIONS

1. *Increase medical student enrollment and existing UC medical schools.*

- Increase total UC medical student enrollment by 10% [approximately 65 new first-year medical students systemwide]. Increases should begin as soon as possible. Campus-specific increases should reflect consideration of local priorities and/or practical concerns (e.g., space, current class size, etc.). If increases are in place by 2008, this would result in a 10% increase in UC medical school graduates by 2012.

2. Increase UC medical resident enrollment by targeting growth in sites and specialties of compelling state need.

- When current limits on federal Medicare support for graduate medical education are lifted, increase UC medical resident (postgraduate) enrollment by 15-20% (approximately 150-200 new first-year residents systemwide). This growth should be phased in over several years and should occur in programs, clinical specialties, and locations of documented need or priority. If all increases were in place for medical residents beginning their training in July 2008, the average number of UC graduates entering practice would increase by 15-20% (or approximately 150 to 200 new graduates per year) by the year 2011-2012.

3. Initiate planning immediately for comprehensive new medical education programs by 2020.

- Because space and resource constraints on existing UC medical school campuses limit the growth, UC should begin immediately to assess the feasibility and initiate planning to develop and open one or more new comprehensive medical student education programs by 2020, provided that the proposed growth in existing programs is achieved and adequately funded. Appropriate sites for such programs should include regions that are medically underserved and/or projected to experience significant physician shortages in the future (e.g., in the Inland Empire and the Central and South Valley regions). Planning should anticipate a need for as many as 200 additional UC medical school graduates, in one or more locations, phased in over time. UC should consider a variety of options and methods for achieving this goal including: fully developing existing UC facilities and training sites; adopting or designing nontraditional educational programs that involve new and existing sites; and building new educational facilities near existing clinical training and practice venues. All new programs should meet UC standards for quality in medical education, research, and patient care.

4. Participate actively in efforts to improve the distribution of California physicians and to meet the needs of medically underserved groups and communities throughout the state.

- Develop new and expand existing residency training sites in medically underserved communities such as in the Inland Empire and South and Central Valley regions, where access to health services is poor and severe shortages of physicians are predicted.
- Expand the use of telemedicine and other programs to enhance quality and availability of health services to remote areas such as in the Inland Empire, South and Central Valley, and rural Northern California. Expand training opportunities for physicians and other health care workers using new and emerging technologies.
- Actively support state, regional and federal initiatives that provide incentives to recruit and retain physicians in medically underserved areas of the state, including loan repayment and job placement programs, reimbursement advantages, and access to start-up funds.
- Actively support state and federal initiatives to improve reimbursement for indigent care.
- Develop and support medical education programs with specialized curricula that prepare future UC graduates as leaders and clinicians committed to serving underserved populations.

5. Increase diversity and cultural and linguistic competency within the physician workforce.

- Intensify efforts to recruit students from rural or other underserved communities who are likely to serve those areas after completing their training. Premedical advising and postbaccalaureate programs are among the established strategies that have proven effective.
- Expand and develop early academic, enrichment, and scholarship programs to support educationally and/or financially disadvantaged students who are interested in pursuing careers in medicine, biomedical science research, and other health sciences.
- Continue existing and develop new mentoring opportunities in rural and community clinics to encourage youth in those areas to consider medicine as a career path.

6. Develop and implement strategies to improve the recruitment and retention of faculty.

- Provide faculty development opportunities to maximize acceptance, understanding, and proficiency in using new curricula and updated teaching methods.
- Encourage, develop, and support interdisciplinary collaboration in teaching, research, and clinical care.
- Adopt incentives to recruit junior faculty and to support and encourage productivity among all faculty.
- Encourage recruitment and retention of medical school faculty who are underrepresented in medicine and competent in caring for underserved populations.

7. Develop new facilities, infrastructure, and faculty resources to accommodate changes in education and practice, and develop new strategies for meeting and funding capital, infrastructure, and technology needs.

- Reconfigure and refurbish existing or build new UC facilities as medical education and clinical practice move away from lecture-based to small-group instruction, and from inpatient academic health centers to outpatient/ambulatory care settings.
- Develop and provide faculty development programs to improve the preparation of the faculty and to ensure quality instruction of medical students and residents in small group, case-based learning formats.
- Support investment in technologic tools that shape academic and clinical instruction, improve patient care, and increase productivity and efficiency in teaching, research, and patient care.

8. Prepare UC graduates to collaborate with all health professionals in addressing state needs.

- Ensure that medical students and residents are prepared and encouraged to collaborate with nurses, nurse practitioners, physician assistants, and other health professionals in a variety of training and practice settings.
- Explore a variety of staffing options involving physicians and non-physician clinicians in newly developed training sites.

9. Regularly monitor and assess population health needs and health workforce data.

- Lead and contribute to statewide efforts to track and regularly review and data regarding the projected supply and demand for physician and other health services at regular intervals. This review should include consideration of both regional and specialty-specific needs.
- Establish effective procedures at all UC medical schools to maintain an information database of student, graduate, and faculty populations to inform educational and workforce planning.
- Utilize information from such assessments to inform program and planning decisions involving medical student and resident education.

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Appendix A: National and State Recommendations for Responding to a Projected Physician Workforce Shortage

ACCREDITATION COUNCIL FOR GRADUATE MEDICAL EDUCATION (ACGME): Citing a study of the physician workforce in the U.S., the ACGME states that the total number of U.S. physicians will grow from 781,000 physicians in 2002 to 972,000 in 2020. This same study predicts that 1.06 million physicians will be needed by 2020.

To offset an anticipated shortfall of physicians by 2020, the ACGME has recommended an increase of 3,000 U.S. medical graduates by 2015, “a corresponding expansion in residency positions, and a change in the distribution of residency slots.”

AMERICAN MEDICAL ASSOCIATION (AMA): The AMA announced in 2003 that, in recognition of the predicted shortage of physicians cited by ACGME and the Council of Graduate Medical Education (CoGME), it planned to:

- * Work to minimize visa delays for international medical graduates
- * Supported continued funding of the Public Health Service Act, Title VII, Section 747, to increase the number of primary care physicians working with medically underserved populations
- * Work to ease medical student debt
- * Encourage and conduct national and regional research on physician supply in all specialties and to develop strategies to mitigate geographic maldistribution
- * Develop recommendations for adequate reimbursement of primary care physicians and improved recruitment into primary care
- * Publicize the need to enhance underrepresented minority representation in medical schools and in the physician workforce
- * Develop a national consensus on physician workforce policy, in conjunction with state and specialty societies

COUNCIL ON GRADUATE MEDICAL EDUCATION (CoGME): In its report, *Physician Workforce Policy Guidelines for the U.S. for 2000-2020*, the Council on Graduate Medical Education (CoGME) concludes that the nation is likely to face a significant shortage of physicians over the next 15 years and recommends an increase in the number of new physicians being educated and trained in the United States. This marks a significant change from earlier CoGME reports and as the first to call for an increase in U.S. medical school capacity. CoGME is no longer recommending that 50% of new physicians be in generalist specialties, but rather that the distribution by specialty should be determined by marketplace demand. The report strongly endorses the need for additional data collection and research to guide decisions on the size and mix of the physician workforce.

The Council endorses several key recommendations in order to address the likely shortage, including:

- * Increase the number of new physicians entering the system from 24,000 to 27,000 per year with no specific target for generalists and non-generalists.
- * Expand U.S. medical school enrollment by 3,000 (15 percent) per year by 2015.
- * Expand funding under Medicare for additional GME slots to accommodate the increase in U.S. medical graduates.
- * Promote efforts to improve productivity, such as information systems and systems redesign.
- * Continue to study, track, and regularly assess the nation’s physician workforce needs.
- * Expand support for programs that address the geographic and specialty mal-distribution, address needs in under-served areas, and promote increased physician diversity.

AMERICAN COLLEGE OF PHYSICIANS (ACP): The American College of Physicians (ACP) responded to the CoGME report *Physician Workforce Policy Guidelines for the U.S. for 2000-2020*, excerpted as follows:

- * Increase the number of physicians entering residency training to help meet future workforce demand.
- * Because distribution between generalists and non-generalists will require ongoing assessments of need, avoid establishing rigid national targets.
- * Do not overlook the abilities of existing training programs in alleviating the physician shortage.

- * Enhance efforts to recruit students from under-represented populations and from under-served areas to increase the future supply of physicians most likely to serve under-served populations.
- * Remove the existing cap on the number of residents and fellowships eligible for Medicare reimbursement.
- * Expand the J-1 visa waiver and Conrad 30 programs to help alleviate the workforce shortage in the most critically underserved areas.
- * Regularly and consistently monitor and assess physician supply, demand, need, and distribution trends in the United States.
- * Encourage physicians to invest in new technologies to improve quality and enhance productivity.
- * Develop systems of performance measurement that reward physicians for productivity enhancements and the provision of high quality health care.
- * Expand the National Health Service Corps (NHSC) and other programs under Title VII of the Public Health Service Act, including The Minority and Disadvantaged Health Professions training programs, The Indian Health Service (IHS) Loan Repayment Program, and United States Armed Forces Health Professions Loan Repayment and Scholarship Programs.
- * Use low-interest loans with service obligations to encourage medical graduates to pursue careers in primary care and serve in health professional shortage areas.
- * Allow deferment, or tax-deductibility, of interest and principal payments on medical student loans until after completion of residency training.
- * Develop innovative solutions involving alternative financing of medical education to avoid incurrence of large educational debts.

NATIONAL CENTER FOR HEALTH WORKFORCE ANALYSIS, BUREAU OF HEALTH PROFESSIONS, HEALTH RESOURCES AND SERVICES ADMINISTRATION (HRSA), U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (HRSA): In its report, *Changing Demographics: Implications for Physicians, Nurses, and Other Health Workers*, HRSA addressed the impact of changing demographics on the future health workforce. Some of the major findings follow:

- * The aging of the population and the subsequent increase in the size of the elderly population is perhaps the most important demographic trend that will affect the future health workforce. The aging of the population will increase the total amount of health care services demanded, will change the mix of services demanded, and will have profound economic implications that could affect future coverage policies and the provider reimbursement system.
- * If health care consumption patterns and physician productivity remained constant over time, the aging population would increase the demand for physicians per thousand population from 2.8 in 2000 to 3.1 in 2020.
- * The aging of the health workforce raises concerns that many health professionals will retire about the same time that demand for their services is increasing. Furthermore, the declining proportion of the population age 18 to 30 raises concerns regarding the ability to attract a sufficient number of new health workers.
- * Demand for health care services by minorities is increasing as minorities grow as a percentage of the population. Between 2000 and 2020, the percentage of total patient care hours physicians spend with minority patients will rise from approximately 31 percent to 40 percent.
- * Minority physicians have a greater propensity than do non-minority physicians to practice in urban communities designated as physician shortage areas. An increase in minority representation in the physician workforce could improve access to care for the population in some underserved areas.
- * Although an increasing proportion of the U.S. population resides in urban areas, a substantial proportion of the population will continue to reside in rural areas. Many of these rural areas are currently designated as physician shortage areas.
- * Pockets of urban areas will continue to have a high concentration of minorities. Many of these areas are currently designated as physician shortage areas. Efforts to increase the supply of health professionals in these areas must deal with economic, cultural and language considerations.

CENTER FOR HEALTH WORKFORCE STUDIES, UNIVERSITY AT ALBANY, STATE UNIVERSITY OF NEW YORK: In their report, *California Physician Workforce: Supply and Demand through 2015*, Forte, Salsberg, and colleagues conclude that the state is likely to face an overall shortage of up to 17,000 physicians by 2015. They state that some communities can expect to experience more serious shortages than other areas. They recommend a number of strategies to address these shortages and maldistribution of physicians, including:

- * Increase medical school capacity, given projected growth in the population and the low ratio of medical school enrollment to population.
- * Increase GME capacity and therefore attract physicians from around the country to California's high quality training programs.
- * Encourage physicians to migrate to California to practice through programs that market medical practice to physicians practicing in other states.
- * Provide incentives to keep physicians in practice, addressing physicians' concerns (medical liability, barriers to part-time practice, etc) and encouraging physicians to practice more hours as well as delay retirement.
- * Address the maldistribution of physicians in the state through programs that encourage physicians to locate in a particular region to train and practice.
- * Expand the supply and use of non-physician clinicians, including nurse practitioners, physicians assistants, and midwives.
- * Invest in new technologies and increase use of protocols and utilization review to improve efficiency and effectiveness.
- * Promote diversity of the physician workforce through such programs as educational enrichment and support for economically disadvantaged and underrepresented minorities.
- * Track the need for and supply of physicians and their services to better guide workforce policies and planning

THE NICHOLAS C. PETRIS CENTER ON HEALTH CARE MARKETS & CONSUMER WELFARE, UNIVERSITY OF CALIFORNIA, BERKELEY SCHOOL OF PUBLIC HEALTH: In their report, *Is There a Doctor in the House? An Examination of the Physician Workforce in California over the Past 25 Years*, Coffman et al state new and important findings about the physician workforce in California, which include:

- * California's physician-to-population ratio is slightly larger than the average in the rest of the country, but has moved downward towards the national average over the last decade.
- * California could face a shortage of physicians in the future unless retirements are offset by an increase in the number of young physicians.
- * Statewide ratios of active patient care physicians to population have increased since 1978 for generalists, hospital-based specialists, and medical specialists. The ratios of obstetrician/gynecologists and psychiatrists have remained stable. The ratio of surgical specialists to population has decreased over the past 25 years, because the population has grown more rapidly than the number of surgeons.
- * California's physicians are not adequately distributed across the state. For 25 years, some counties have consistently had abundant supplies of physicians, whereas others have had persistent shortages.
- * Although the state's physicians are slowly becoming more racially/ethnically diverse, Blacks and Hispanics remain underrepresented among California's physicians.
- * The number of nurse practitioners and physician assistants in California has increased rapidly in recent years. These professionals are important resources in physician shortage areas.

Recommendations of these authors include the following:

- * Improve distribution of physicians in the state by modestly increasing medical school and residency enrollment for the primary purpose of preparing physicians to meet the needs of underserved populations and communities.
- * Continue to support policies and programs aimed at increasing access to medical care in communities with an inadequate number of physicians. California could recruit more medical students and medical residents from underserved areas, provide more training in these areas, and expand loan repayment programs for physicians who practice in these areas.

- * Fund outreach and scholarship programs designed to increase the racial/ethnic diversity of the state's physician medical students and residents.
- * Ensure that physicians educated in California have the linguistic and cultural competencies required to meet the health care needs of the state's racially/ethnically diverse population.
- * Support alternatives to traditional doctor-patient visits, such as expanding the use of physician assistants and nurse practitioners, information technologies (Internet, electronic mail), and telemedicine.
- * Monitor physician supply and the demand for medical care in the state.

Appendix B: Percentage of Asian/Pacific Islander Physicians vs California Population

Race/Ethnicity	California Physicians	California Population
Indian	5.0%	0.9%
Bangladeshi	0.1%	0.0%
Cambodian	0.0%	0.2%
Chinese	7.1%	2.7%
Taiwanese	1.0%	0.2%
Filipino	3.3%	2.7%
Hmong	0.1%	0.2%
Indonesian	0.0%	0.0%
Japanese	1.4%	0.9%
Korean	2.3%	1.0%
Laotian	0.0%	0.2%
Malaysian	0.0%	0.0%
Pakistani	0.3%	0.1%
Sri Lankan	0.2%	0.0%
Thai	0.2%	0.1%
Vietnamese	2.0%	1.3%
Other	0.1%	0.0%
Not specified	0.2%	0.1%
Two or more	0.5%	0.2%

Source: The Center for Health Workforce Studies, University at Albany, SUNY; Census 2000

Appendix C: Principal Specialties of Active Patient Care Physicians in California, 2002

<i>Specialty</i>	# Active Patient Care Physicians	% Active Patient Care Physicians
Family/General Practice	9,864	14.3
Internal Medicine (General)	10,020	14.5
Pediatrics (General)	5,479	7.9
Primary Care	25,363	36.8
Obstetrics & Gynecology	3,978	5.8%
Gynecology	226	0.3%
Ob/Gyn	4,204	6.1
Cardiology	1,886	2.7
Endocrinology & Metabolism	340	0.5
Gastroenterology	993	1.4
Geriatrics	163	0.2
Infectious Disease	349	0.5
Medical Oncology	451	0.7
Nephrology	568	0.8
Pulmonary Disease	810	1.2
Rheumatology	346	0.5
Other Internal Medicine	437	0.6
IM Specialties	6,353	9.2
Surgery (General)	2,325	3.4
Neurosurgery	459	0.7
Ophthalmology	2,040	3.0
Orthopedics	2,351	3.4
Otolaryngology	974	1.4
Plastic Surgery	877	1.3
Thoracic Surgery	506	0.7
Urology	935	1.4
Surgery Specialties	8,788	12.7
Anesthesiology	4,083	5.9
Pathology	1,353	2.0
Radiology	3,292	4.8
Facility Based	8,728	12.6
Psychiatry – Adult	4,360	6.3
Psychiatry – Child/Adolescent	602	0.9
Psychiatry	4,962	7.2
Allergy & Immunology	421	0.6
Dermatology	1,340	1.9
Emergency Medicine	2,853	4.1
Neurology	1,100	1.6
Pediatrics Subspecialties	965	1.4
Physical/Rehab Medicine	547	0.8
Prev Med/Occ Med/Public Hlth	520	0.8
Other	536	0.8
Other Specialties	8,282	12.0
TOTAL	69,005	100

Appendix D: California Counties with the 10 Highest Ratios of Patient Care Physicians per 100,000 Persons

Year/Rank	1978	1980	1985	1990	1995	2000	2002
1st	San Francisco	San Francisco	San Francisco	San Francisco	San Francisco	Marin	Marin
2nd	Marin	Marin	Marin	Marin	Marin	San Francisco	San Francisco
3rd	Napa	Napa	Napa	Napa	Napa	Napa	Napa
4th	Santa Barbara	Santa Barbara	Santa Barbara	San Mateo	San Mateo	San Mateo	San Mateo
5th	Alameda	Alameda	Alameda	Santa Barbara	Yolo	Yolo	Yolo
6th	San Diego	Los Angeles	San Mateo	Orange	Santa Barbara	Santa Barbara	Santa Barbara
7th	Santa Clara	San Diego	San Diego	Alameda	Orange	San Diego	Shasta
8th	Los Angeles	Santa Clara	Los Angeles	Inyo	Santa Clara	Orange	Placer
9th	San Mateo	San Mateo	Santa Clara	Santa Clara	Placer	Placer	San Luis Obispo
10th	Yolo	Orange	Orange	San Diego	Sonoma	San Luis Obispo	Orange
Ratio of Physicians to Population in Top 10 Counties							
	< 169	< 173	< 200	< 206	< 212	< 224	< 233

California Counties with the 10 Lowest Ratios of Patient Care Physicians per 100,000 Persons

Year/Rank	1978	1980	1985	1990	1995	2000	2002
58th	Alpine	Sierra	Modoc	Alpine	Alpine	Alpine	Alpine
57th	Solano	Modoc	Glenn	Glenn	Glenn	Glenn	Sierra
56th	Modoc	Glenn	Yuba	Modoc	Modoc	Sierra	Glenn
55th	Glenn	Del Norte	Tehama	Yuba	Yuba	Yuba	Yuba
54th	Del Norte	San Benito	Madera	Colusa	Lassen	Mariposa	Mariposa
53rd	Mono	Yuba	Imperial	Imperial	Colusa	Modoc	Colusa
52nd	San Benito	Madera	Lassen	Madera	San Benito	Colusa	Modoc
51st	Lake	Calaveras	Colusa	Calaveras	Imperial	Trinity	Imperial
50th	Madera	Tehama	Del Norte	Del Norte	Madera	Imperial	San Benito
49th	Yuba	Imperial	Alpine	Trinity	Calaveras	San Benito	Calaveras
Ratio of Physicians to Population in Bottom 10 Counties							
	> 61	> 80	> 92	> 90	> 75	> 75	> 78

Appendix E: Project Population Growth by Region, 2000-2015

Region	2000	2015	Percent Growth
Bay Area	7,199,291	8,308,080	15.4%
Central Coast	1,874,448	2,370,148	26.4%
Central Valley/Sierra	1,149,033	1,591,237	38.5%
Inland Empire	3,298,337	4,859,820	47.3%
Los Angeles	8,838,861	10,978,502	11.6%
North Valley/Sierra	2,085,706	2,736,248	31.2%
Northern California	904,963	1,149,853	27.1%
Orange County	2,833,190	3,277,959	15.7%
San Diego	3,097,190	3,900,304	25.9%
South Valley/Sierra	2,372,133	3,198,748	34.9%
TOTAL	34,653,395	42,370,899	22.3%

Appendix F: Projected Population Growth by Race/Ethnicity and Region, 2000-2015

	1990	2000	2015
White (Non-Hispanic)	57.2%	50.3%	42.4%
African American/Black (Non-Hispanic)	7.0%	6.7%	6.5%
Asia/Pacific Islander (Non-Hispanic)	9.2%	11.5%	13.7%
Native American/Alaskan Native (Non-Hispanic)	0.6%	0.6%	0.6%
Hispanic/Latino	26.0%	30.8%	36.9%

Region	All	White	Hispanic	Asian	Black	Native
Bay Area	15.4%	-3.7%	40.4%	44.8%	14.6%	9.7%
Central Coast	17.7%	7.6%	59.0%	45.6%	22.3%	16.5%
Central Valley	38.5%	23.5%	63.2%	67.4%	49.0%	34.8%
Inland Empire	47.3%	16.5%	92.2%	105.3%	53.6%	35.9%
Los Angeles	11.6%	-14.6%	30.3%	23.9%	-5.7%	3.3%
North Valley	27.1%	19.5%	58.0%	73.6%	43.8%	36.0%
No. California	31.2%	20.0%	75.0%	78.5%	39.5%	31.4%
Orange Cty	15.7%	-7.3%	40.5%	54.9%	21.3%	23.4%
San Diego	25.9%	7.5%	56.9%	54.0%	21.8%	12.6%
South Valley	34.9%	12.0%	58.9%	66.5%	41.8%	32.2%

Appendix G: Physician Assistants and Nurse Practitioners

Working as members of the health care team, **physician assistants** (PA) are health care professionals formally trained and licensed to practice medicine independently in collaboration with a licensed physician. They provide diagnostic, therapeutic, and preventive healthcare services, as delegated by a physician, and conduct physical examinations, diagnose and treat illnesses, order and interpret tests, counsel on preventive health care, and assist in surgery. In 47 states, PAs are able to write prescriptions. Within the physician-PA relationship, physician assistants exercise autonomy in medical decision-making and provide a broad range of diagnostic and therapeutic services. A PA's practice may also include education, research, and administrative services.

PAs are trained in intensive education programs accredited by the Accreditation Review Commission on Education for the Physician Assistant (ARC-PA). Of the more than 130 accredited training programs in the US, ten are in California:

Charles R. Drew University of Medicine & Science	San Joaquin Valley College
Keck School of Medicine, USC	Stanford University School of Medicine
Loma Linda University	Touro University at Mare Island
Riverside County Regional Medical Center	University of California, Davis
Samuel Merritt College	Western University of Health Sciences

Because of their close collaboration with physicians and other members of the health care team (nurses, pharmacists, and allied health professionals), PAs are educated in the medical model designed to complement physician and nursing training. Upon graduation, physician assistants take a national certification examination developed by the National Commission on Certification of PAs in conjunction with the National Board of Medical Examiners. To maintain their national certification, PAs must log 100 hours of continuing medical education every two years and sit for a recertification every six years. Graduation from an accredited physician assistant program and passage of the national certifying examination are required for state licensure.

Nurse practitioners (NP), in collaboration with physicians and other health professionals, provide primary and specialty health care. NPs practice preventive care, treat non-life-threatening acute illness, manage chronic conditions, and counsel patients on medical and psychosocial problems. Specific duties vary depending on the practitioner's area of focus and expertise (e.g., adult, pediatric, family, gerontologic, neuropsychiatric, neonatal, oncology). Likewise, practice settings can vary based on specialty choice, ranging from inpatient to outpatient hospital-based/affiliated care to community-based clinics, homeless shelters, schools, and home health agencies. While NPs often practice without the direction supervision of a physician, their close association with physicians, pharmacists, public health officers, and other health professionals within the health care team ensures the delivery of quality care to the community served.

Master's NP programs usually require two years of full-time study, and Post-Master's options usually require one to two years. All graduates of Master's and Post-Master's programs are eligible for national certification through various organizations, including the American Nurses Credentialing Center (ANCC) and the National Certification of Pediatric Nurse Practitioners and Nurses (NCBPNP). There are approximately 150 NP training programs in the United States. Those in California include:

Azusa Pacific University	Samuel Merritt College
Biola University	San Diego State University
California State University (10 campuses)	San Jose State University
Dominican University of California	University of California, Los Angeles
Holy Names College	University of California San Francisco
Humboldt State University	University of San Diego
Loma Linda University	University of Phoenix
Mount St. Mary's College	University of San Diego
National University	Western University of Health Sciences
Point Loma Nazarene University	

Appendix H: Applicants and First-Year Enrollees to U.S. Medical Schools, 2004

Year	Total	% change from prior
1994	45,360	6.0%
1995	46,586	2.7%
1996	46,965	0.8%
1997	43,016	-8.4%
1998	40,996	-4.7%
1999	38,443	-6.2%
2000	37,088	-3.5%
2001	34,860	-6.0%
2002	33,625	-3.5%
2003	34,791	+3.5%
2004	35,727	+2.7%

		Applicants	Accepted Applicants	Matriculants
Hispanic	Mexican American	810	403	377
	Puerto Rican	505	290	282
	Cuban	144	84	80
	Other Hispanic	890	383	359
	Multiple Hispanic	196	81	76
Non-Hispanic	Black	2,803	1,160	1,086
	Asian	6,732	3,231	3,093
	Native American (incl AK)	106	53	48
	Native Hawaiian/Pacific Islander	39	11	11
	White	21,023	10,959	10,338
	Other	113	44	38
	Unknown	234	151	134
	Multiple Race	1,107	532	497
Non - U.S.	Foreign	1,025	270	219
Total		35,727	17,652	16,638

Appendix I: Applicants and Matriculants to California Medical Schools, 2003

Display 1. Applicants by State of Legal Residence, 1992-2003

Applicants by State		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Change 2002-2003
West	State of Legal Residence*													
	Alaska	54	63	72	51	62	59	60	48	59	76	75	69	-8.0%
	Arizona	389	471	506	574	623	568	559	566	539	500	491	480	-2.2%
	California	4,651	5,442	5,924	6,066	5,847	5,163	4,749	4,454	4,446	4,093	3,858	3,978	3.1%
	Colorado	544	602	695	802	814	755	698	688	649	591	575	663	15.3%
	Hawaii	171	189	206	222	234	239	215	184	206	180	171	178	4.1%
	Idaho	92	128	128	110	123	125	106	115	126	122	122	113	-7.4%
	Montana	93	83	99	118	141	114	117	120	118	109	105	101	-3.8%
	Nevada	142	146	182	215	210	178	151	179	181	160	159	170	6.9%
	New Mexico	232	267	321	364	372	334	337	333	336	270	255	248	-2.7%
	Oregon	328	388	395	423	390	397	339	319	296	297	304	342	12.5%
	Utah	308	380	445	472	434	448	488	442	486	428	426	426	0.0%
	Washington	514	637	752	799	782	775	716	688	641	621	622	700	12.5%
	Wyoming	31	35	61	71	63	69	63	62	65	67	61	59	-3.3%
	All	7,549	8,831	9,786	10,287	10,095	9,224	8,598	8,198	8,148	7,514	7,224	7,527	4.2%
All Applicants	37,402	42,806	45,360	46,586	46,965	43,016	40,996	38,443	37,089	34,860	33,625	34,786	3.5%	

Source: AAMC: Data Warehouse: Applicant Matriculant File as of 11/6/2003. *State of Legal Residence not necessarily based on citizenship.

Display 2. Applicants and Matriculants by School and Gender, 2003

Applications by School 2003	Applications	Applications				Matriculants	Matriculants			
		by instate status		by Gender			by instate status		by Gender	
		In State	Out of State	Women	Men		In State	Out of State	Women	Men
		%	%	%	%		%	%	%	%
CA Drew/UCLA Joint Program	1,618	76.2	23.8	55.8	44.2	24	95.8	4.2	62.5	37.5
Loma Linda	3,012	50.8	49.2	49.0	51.0	165	49.1	50.9	53.3	46.7
Southern Cal-Keck	4,590	63.0	37.0	50.1	49.9	160	81.9	18.1	48.8	51.3
Stanford	5,435	37.2	62.8	47.6	52.4	87	43.7	56.3	52.9	47.1
UC Berkeley/SF Joint Prog	25	84.0	16.0	72.0	28.0	12	83.3	16.7	66.7	33.3
UC Davis	3,556	83.0	17.0	52.1	47.9	93	100.0	0.0	52.7	47.3
UC Irvine	3,365	88.1	11.9	51.6	48.4	92	98.9	1.1	44.6	55.4
UC San Diego	4,297	69.7	30.3	50.2	49.8	121	91.7	8.3	54.5	45.5
UC San Francisco	4,634	53.2	46.8	51.8	48.2	141	81.6	18.4	58.9	41.1
UCLA-Geffen	5,097	59.6	40.4	49.7	50.3	144	85.4	14.6	47.2	52.8
TOTAL	35,629					1,513				

*Source: American Association of Medical Colleges (AAMC) [<http://www.aamc.org/data/facts/start.htm>]

Display 3. Race/Ethnicity of UC Applicants, 2003

Race and Hispanic Origin of Applicants, 2003		*Non-Hispanic	Mex Am	PR	Cuban	Other	Multiple	Total
All Applicants	American Indian or Alaska Native	16	6	1	.	.	.	23
	American Indian or Alaska Native, Black or African American	8	1	.	.	1	1	11
	American Indian or Alaska Native, White	44	4	.	.	2	.	50
	Asian	2,216	4	.	.	20	.	2,240
	Asian, White	172	1	1	.	5	.	179
	Black or African American	433	1	1	.	5	.	440
	Black or African American, White	23	.	1	.	2	.	26
	Native Hawaiian or Other Pacific Islander	11	.	.	.	3	.	14
	White	3,633	84	9	18	76	12	3,832
	White, Other	94	12	1	1	20	2	130
	Other	255	137	13	6	97	22	530
	Unknown	17	22	.	.	4	1	44
	Non U.S. Citizen/Permanent Resident	192	192
	Multiple Race, N<300	99	3	2	2	18	3	127
Total	7,213	275	29	27	253	41	7,838	

Source: AAMC Data Warehouse: Applicant Matriculant File as of 11/6/03.

* Non Hispanic includes those self-designated as not Hispanic and those who did not self-designate by ethnicity.

Appendix J: UC State-Supported GME Enrollment, 2003-2004

UC Based ACGME 1st Board Programs						
CATEGORY I	UC-Davis	UC-Irvine	UCLA	UC-San Diego	UCSF	TOTAL
Anesthesiology	34	24	59	30	74	221
Dermatology	6	9	8	7	13	43
Emergency Medicine	28	18	37	18	N/A	101
Emergency Medicine/Pediatrics	N/A	N/A	2	N/A	N/A	2
Family Practice	27	32	40	20	40	159
Internal Medicine	87	86	100	81	162	516
Internal Medicine/Pediatrics	N/A	N/A	N/A	16	N/A	16
Medical Genetics	N/A	1	N/A	1	N/A	2
Neurological Surgery	5	N/A	17	7	11	40
Neurology	9	9	25	10	17	70
Nuclear Medicine	2	N/A	4	1	2	9
Obstetrics & Gynecology	20	24	31	20	32	127
Ophthalmology	9	9	23	8	12	61
Orthopedic surgery	20	20	32	13	30	115
Otolaryngology	8	8	30	8	12	66
Pathology Anat & Clinical	9	17	25	18	27	96
Pediatrics	31	48	71	42	85	277
Physical Medicine & Rehabilitation	10	15	N/A	N/A	N/A	25
Plastic Surgery	3	5	8	2	6	24
Preventive Medicine	N/A	N/A	2	8	8	18
Psychiatry	21	30	70	33	60	214
Psychiatry/Family Practice	6	N/A	N/A	9	N/A	15
Radiation Oncology	N/A	5	7	N/A	12	24
Radiology Diagnostic	25	20	42	26	42	155
Surgery	46	30	51	40	76	243
Urology	8	6	12	6	12	44
CATEGORY I SUBTOTAL	414	416	696	424	733	2683

UC Based ACGME 2nd Board Programs						
CATEGORY II	UC-Davis	UC-Irvine	UCLA	UC-San Diego	UCSF	TOTAL
Allergy Immunology	N/A	2	1	N/A	N/A	3
Anesthesiology Pain Management	N/A	2	2	N/A	1	5
Dermatology/Dermatopathology	N/A	1	N/A	N/A	N/A	1
Family Practice Sports Medicine	N/A	N/A	4	N/A	N/A	4
IM Cardiovascular Disease	N/A	10	12	N/A	12	34
IM Clinical Lab Immunology	N/A	1	N/A	N/A	N/A	1
IM Endo/Diabetes/Metabolism	N/A	2	4	N/A	4	10
IM Gastroenterology	N/A	7	11	N/A	6	24
IM Geriatrics	N/A	2	4	N/A	3	9
IM Hematology/Oncology	N/A	6	7	N/A	11	24
IM Infectious Disease	N/A	4	4	N/A	7	15
IM Nephrology	N/A	4	4	N/A	7	15
IM Pulmonary Dis & Crit Care Med	N/A	8	7	N/A	12	27
IM Rheumatology	N/A	2	2	N/A	2	6
Neurology Child	N/A	3	N/A	N/A	N/A	3
Ob/Gyn ABMS Fellowships	N/A	N/A	4	N/A	2	6
Orthopedic Hand Surgery	N/A	N/A	1	N/A	N/A	1
Path ABMS Fellowships	N/A	N/A	N/A	N/A	2	2
Path Cytopathology	N/A	N/A	1	N/A	N/A	1
Path Hematology	N/A	N/A	3	N/A	N/A	3

Path Neuropathology	N/A	N/A	1	N/A	N/A	1
Peds Adolescent Medicine	N/A	N/A	1	N/A	N/A	1
Peds Cardiology	N/A	N/A	6	N/A	2	8
Peds Critical Care	N/A	N/A	2	N/A	N/A	2
Peds Endocrinology	N/A	N/A	4	N/A	N/A	4
Peds Gastroenterology	N/A	N/A	1	N/A	N/A	1
Peds Hematology/Oncology	N/A	N/A	2	N/A	N/A	2
Peds Infectious Disease	N/A	N/A	2	N/A	N/A	2
Peds Neonatal Perinate Medicine	N/A	6	3	N/A	2	11
Peds Nephrology	N/A	N/A	3	N/A	N/A	3
Peds Neurology	N/A	N/A	1	N/A	N/A	1
Peds Pulmonary	N/A	2	N/A	N/A	N/A	2
Phys Med Rehab: Spinal Cord Injury Med	N/A	1	N/A	N/A	N/A	1
Psychiatry Child	N/A	4	12	N/A	4	20
Psychiatry Geriatric	N/A	N/A	4	N/A	N/A	4
Radiology - Neuroradiology	N/A	N/A	3	N/A	N/A	3
Radiology Vascular/Interventional	N/A	1	2	N/A	N/A	3
Surgery Critical Care	N/A	1	N/A	N/A	N/A	1
Surgery Plastics	N/A	N/A	1	N/A	N/A	1
Surgery Thoracic	N/A	N/A	2	N/A	N/A	2
Surgery Vascular	N/A	N/A	1	N/A	N/A	1
CATEGORY II SUBTOTAL	0	69	122	0	77	268
UC Affiliated 1st Board Programs						
CATEGORY IIIA	UC-Davis	UC-Irvine	UCLA	UC-San Diego	UCSF	TOTAL
Anesthesia	N/A	N/A	3	N/A	N/A	3
Emergency Medicine	N/A	N/A	39	N/A	16	55
Family Practice	85	75	95	N/A	86	341
Internal Medicine	N/A	N/A	226	N/A	36	262
Neurology	N/A	N/A	1	N/A	N/A	1
Obstetrics/Gynecology	N/A	N/A	38	N/A	9	47
Pediatrics	N/A	N/A	65	N/A	19	84
Psychiatry	N/A	N/A	N/A	N/A	11	11
Surgery General	N/A	N/A	10	N/A	13	23
CATEGORY IIIA SUBTOTAL	85	75	477	0	190	827
GRAND TOTAL, STATE SUPPORTED						
HISTORICAL BUDGETED ENROLLMENT	516	581	1330	402	1000	3829
REMAINING FTE FOR 2nd BOARD PROGRAMS AND/OR GROWTH						
	17	19	35	0^A	0	71

A = By agreement between the Dean of the School of Medicine and the Vice President for Health Affairs, the UCSD campus is authorized to increase its campus-based Category I enrollment by up to 60 new positions effective July 1, 2003. Until an increase in State support for increased enrollments is provided, any new growth must be funded by campus resources (see *Interim UC Guidelines* issued by the Office of Health Affairs on October 15, 2002.)

Appendix K: Record of UC Faculty Achievements

Current UC faculty have earned academic distinction and awards from the National Academy of Sciences (254), Institute of Medicine (106), Academy of Arts and Sciences (389), and the Norwegian Nobel Committee (28). These accomplishments are characteristic of a long history of distinction:

Diagnosis/Detection Innovations

- A UC physician invented a tissue typing technique in 1964. This is the standard test for all patients before receiving a tissue or organ transplant.
- A UC scientist developed a blood test to detect the genetic defect that causes the Tay-Sachs disease. The test led to prenatal tests and parental screening.
- UC epidemiologists determined that the *Chlamydia trachomatis* organism causes pneumonia and lung damage in newborns. Pregnant women can now be tested and treated for the organism.
- Positron Emission Tomography (PET) scan, which visualizes metabolic changes in the brain and body, was invented by UC scientist in 1974.
- UC scientists isolated the gene for insulin in 1977, which led to the mass production of genetically engineered insulin to treat diabetes.
- UC scientists developed prenatal tests for sickle cell anemia and thalassemia blood-related disorders.
- The gene markers for Down's syndrome and Huntington's disease were discovered by UC scientists in 1987 and 1989, respectively.
- UC physicians reported the nation's first cases of acquired immunodeficiency syndrome (AIDS) in 1981. UC scientists were among the first groups to isolate the human immunodeficiency virus (HIV) in 1983.
- The prostate cancer metastases tracking system was developed in 2002 by UCLA researchers. The discovery could lead to safer and more effective gene-based treatments.

Prevention Innovations

- UCSF scientists discovered Vitamins E, K, and a potent form of vitamin D in 1922, 1935, and 1967 respectively.
- The first hepatitis B vaccine was developed by UCSF scientists in 1981.
- Folic acid/vitamin B12 combination was shown by UCSF researchers to be a cost-effective way to treat and prevent heart disease.

Treatment Innovations

- UC scientists created a device that removes blood clots from arteries and veins, which is an alternative to costly open-heart surgery for patients.
- UC researchers developed a procedure to maintain organs for transplant for up to 72 hours.
- Herceptin, developed at UCLA, was the first cancer drug to treat a specific genetic alteration.
- Doctors at UCI performed the world's first infant heart-lung bypass.
- UC scientists patented an artificial lung surfactant, which improved treatment for premature infants.
- UCLA scientists pioneered Retroperfusion, a technique that uses a pump to oxygenate blood and restore damaged heart muscle immediately after a heart attack.
- UCSF urologists developed the first bladder pacemaker to restore urinary control.
- UCLA researchers developed The Nicotine Patch that helps to wean smokers off of cigarettes.
- An inner ear implant device was developed by UC researchers.
- Researchers at UCI developed a Non-Contact Ultrasonic Burn Care Device that replaces conventional physical examination of the burn site with a more precise and less painful computer-based examination.
- UCLA researchers developed a brain tumor vaccine that completely eliminates brain tumors in laboratory rats.
- UCSF is one of only two academic institutions in the US that derived human embryonic stem cells that qualified for inclusion on the National Institutes of Health Stem Cell Registry.

Appendix L: Safety Net Health Care Provision by UC Health Facilities

Academic Medical Center/Metropolitan Area	Inpatient Care Delivered within Health Services Area	
	Medi-Cal Population	Indigent/Uninsured of Total Population
UC Davis/Sacramento County	28%	55%
UC Irvine/Orange County	25%	41%
UC San Diego/San Diego County	12%	45%

Appendix M: All Ladder Rank Faculty in Medicine (October 2003)

Ethnicity/Race	Number	Percent of Total
All Combined	1,071	
American Indian	0	0
African American	17	1.6 %
Hispanic/Latino	30	2.8 %
Asian	124	11.6 %
White/Other	900	84.0 %

Source: Academic Advancement, University of California Office of the President, June 2004