

UNIVERSITY OF MISSOURI



*Health Care
Task Force Report
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University of Missouri

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Introduction

Health policy experts across the country have long recognized that the United States will experience a shortage of health care workers starting in the latter part of this decade. Considerable shortages already exist in many specialties, and future shortages will likely affect a broad range of individuals, regardless of their socio-economic status.

The problem will be exacerbated by a number of developing trends, including significant retirements among active practitioners, changes in technology and practice, and the fact that most people are living longer and will need additional health care. While the health workforce shortage will affect most geographic areas, rural and inner city areas will likely be hit the worst (Pryce-Jones, 2006). This assessment is consistent with a recent report from the Association of American Medical Colleges that cites an aging population and greater longevity resulting in more health concerns (Questions and Answers About the AAMC's New Physician Workforce Position).

Demographic data indicate the population is aging across the country — perhaps more dramatically in Missouri than in other areas. Approximately 14 percent of Missourians are over the age of 65, and Missouri now ranks 14th in the nation in the number of people over 65. This percentage will increase as the baby boomers age — with the first group turning 60 in 2006. As the population

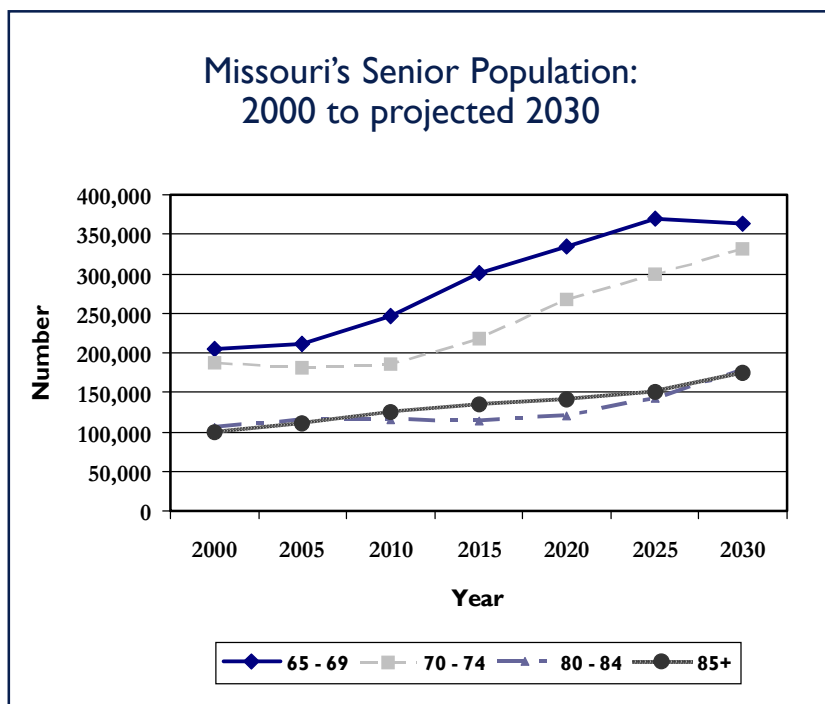
ages, the health care needs increase. Of course, this causes additional shortages among health care workers in Missouri (Overview of Missouri's Health Related Occupations, OSEDA, 2005).

Several other factors will affect the demand for and the supply of health care workers. The principal driving force is the population growth in the U.S., along with an aging group of baby boomers. This is followed by other important factors such as higher levels of chronic illness due to increased longevity; concerns for culturally-appropriate care in an increasingly-diverse population; increased consumer demand for more elaborate health care; and more technically-sophisticated care requiring specialized talents by health care workers (O'Neil, 2006).

Due to such conditions, workforce projections call for rather dramatic shortages among pharmacists, nurses and allied health care workers (rehabilitation therapists and imaging professionals). The projections in other areas such as medicine, dentistry, and optometry are more complicated and harder to predict because of

ambiguity about specialty areas and geographical distribution. Nonetheless, almost all projections call for shortages in rural and urban core areas. Missouri is vulnerable in both of these respects (Pryce-Jones, 2006).

The Association of Academic Health Centers recently prepared a comprehensive set of papers to



Source: USDC, Bureau of the Census, Population Division. Produced by: University of Missouri Extension, Office of Social and Economic Data Analysis (Nov. 2005).

address the health care workforce shortage and to evaluate the issues influencing the current workforce shortages in several areas. In “Are We Preparing the Health Professionals That We Will Need?” author C. Donald Combs answers his own question with a resounding “no.”

Combs suggests that there are three alternatives in addressing the emerging crisis: 1) do nothing and adapt to inferior health care and more health problems; 2) import health care professionals from other countries, without regard to the destabilizing effect on developing countries; or 3) increase the capacity of existing health care programs to address the country’s workforce needs (Combs, 2006).

According to Combs, it also will require health care educators to respond creatively in order to address the complicated issues and the diverse communities they must serve. Failure to do so may result in creating supplementary programs that can become more fragmented and expensive (Combs, 2006).

Currently the most significant issues facing the University of Missouri’s health care education programs are the cost of educating students in these specialized programs and the limited number of “seats” in existing programs, causing these programs to turn away many qualified applicants.

The health care programs at the University of Missouri could educate more students if their capacity increased, but to do so often requires both additional faculty and facilities. For the University of Missouri to address the health care worker shortfall, it needs to simultaneously

address the issues of access, affordability and program quality.

The issue of preparing qualified workers to tackle the health care needs of society clearly is a complicated proposition. Several issues emerge as University of Missouri health care programs examine the issues facing them today.

This task force report will address some of these issues by:

- I. Providing a summary of the existing programs on the University of Missouri campuses, including enrollment information on existing students and, when appropriate, for students in pre-professional programs;
- II. Identifying the potential needs and supply gaps that exist;
- III. Identifying disparity issues related to both service needs and educational applicants and how the University of Missouri responds;
- IV. Describing the innovative programs at the University of Missouri and how the University will lead the way with creative approaches to address these needs;
- V. Offering a summary of the health care workforce challenges and making recommendations for strategies to address the needs.

- **Approximately 14 percent of Missourians are over the age of 65.**
- **Missouri ranks 14th in the nation in the number of people over 65.**
- **This percentage will increase as the baby boomers age — with the first group turning 60 in 2006.**

I. Summary of existing programs

enrollment information • program descriptions

The University of Missouri offers health care education programs in dentistry, medicine, nursing, optometry, pharmacy, and a wide array of allied health fields in the areas of rehabilitative, diagnostic and imaging sciences. The University recognizes the importance of addressing the workforce needs in health care fields and is responding when fiscal and people resources are available.

As a four-campus system, the University of Missouri offers health care education across the full array of health care fields. The programs were developed to address the existing and emerging needs of Missouri and to train health care providers for the state and the region. The health care programs on the four campuses work collaboratively to provide quality education for a reasonable cost to Missouri citizens. Today's student population is different than the traditional college students of the past — many are employed full- or part-time and have family responsibilities — and their access to educational programs is geographically-based.

In two instances, the University offers similar health care programs on multiple campuses, with each campus concentrating on a unique niche for the area and population it serves. For example, the UMKC School of Medicine offers an innovative six-year program focused on the needs of metropolitan areas, while the MU School of Medicine focuses on research, medical specialties and rural health. The same is true in nursing, where the two metropolitan campuses designed programs to meet the nursing care needs within their regions. The MU School of Nursing focuses on specialties such as public health, mental health and gerontological nursing. Nursing faculty members at MU also have numerous collaborative research efforts with the Schools of Health Professions, Medicine, Veterinary Medicine, and the College of Engineering.

A key element in planning for the emerging shortage of health care workers is to assess the current educational programs and determine what additional resources are

needed to respond. This section outlines existing programs at the University of Missouri.

Dentistry: UMKC

The primary goal of the UMKC School of Dentistry is to prepare dentists, dental hygienists and dental specialists to deliver patient care with a scientific basis and a caring manner. The dental education program is a four-year program leading to a doctor of dental surgery (D.D.S.) degree.

UMKC currently enrolls 100 students per year in the dental program, the majority of whom are Missouri residents.

Enrollment 2005

• Doctor of dental surgery:	392
• Dental hygiene:	60
• Various specialty programs:	42
<i>endodontics, periodontics, pediatric dentistry, orthodontics, oral & maxillofacial radiology, oral & maxillofacial surgery, advanced education in general dentistry</i>	

Health Professions: MU

The School of Health Professions offers bachelor of health science degree programs in clinical laboratory science, communication science and disorders, diagnostic medical ultrasound, nuclear medicine, occupational therapy, pre-professional physical therapy, radiography and respiratory therapy. Graduate programs include master of health science programs in communication science and disorders (speech-language pathology

emphasis) and diagnostic medical ultrasound, master of occupational therapy, master of physical therapy (transitioning to a doctor of physical therapy in 2007), a doctorate in communication science and disorders, and a post-doctoral program in health psychology.

Enrollment 2005

• Bachelor of health science:	258
• Pre-professional students:	403
• Master of health science:	95
• Doctorate:	3

The fall 2005 enrollment of 759 students included 403 pre-professional students who have yet to be admitted to a program and 353 professional students. The school graduates 140 students annually, with 86 percent of those graduates remaining in Missouri to practice.

Medicine: MU

The MU School of Medicine provides postgraduate physician training in virtually all specialties and subspecialties. The school is a pioneer in the problem-based learning style of medical education that emphasizes

problem solving, self-directed learning and early clinical experience. This curriculum combines small

groups of students with faculty mentors. While remarkably successful, the curriculum requires significantly

Enrollment 2005

• Doctor of medicine:	364
• Residents and fellows:	365
• Doctorate in basic sciences:	85
• Master's degree, health management & informatics:	125

more faculty resources than traditional lecture-based medical curricula.

The school provides training to more than 900 medical students, physicians completing residencies and fellowships, and students pursuing master's and doctoral degrees in the basic sciences, health management and informatics. The school also serves hundreds of undergraduate students each year by offering such fundamental courses as anatomy and biochemistry.

Eighty-five percent or more of physician graduates receive their first or second choice of specialty and residency programs, with 70 percent or more being matched with the program they want most.

Currently the school has an enrollment of 364 medical students: 94 first year, 87 second year, 93 third year and 90 fourth year. Forty-nine percent of students are female and 17 percent are racial and ethnic minorities.

Medicine: UMKC

The UMKC School of Medicine opened in 1971 in response to projected physician shortages in Missouri and provides an innovative program that allows students to complete a medical degree in six years rather than eight. Over the past 35 years, the school has fulfilled this mission by

Enrollment 2005

• Baccalaureate-M.D. six-year program:	630
• Residents and fellows:	485

graduating 2,500 physicians. Approximately 45 percent of the graduates serve Missouri residents by practicing in the state. Twenty percent of the graduate respondents to a recent survey about practice characteristics indicated that they practice in underserved areas. Each year the school admits more than 100 students into its six-year baccalaureate/M.D. program, which provides a medical education to 85 to 90 Missouri students. In partnership

with five Kansas City hospitals, the school also sponsors residency and fellowship programs, offering a total of 485 slots in 39 specialties and subspecialties.

Nursing: MU

The MU Sinclair School of Nursing offers three options to obtain a bachelor of science in nursing (BSN) degree to prepare professional nurses. The pre-licensure option is a four-year degree program that prepares students for licensure as a registered nurse (RN). The RN/BSN option is designed for nurses who have earned an associate or diploma degree and wish to complete the BSN degree. To allow practicing nurses to continue their education and remain in their communities, the RN/BSN option is offered online. The accelerated BSN option is a 15-month program started in 2003 in response to the nursing shortage. The program prepares students with degrees in another fields for licensure as RNs.

Enrollment 2005

• Pre-nursing/BS:	430
• Nursing majors/BS:	220
• Pre-nursing/RN/BSN:	80
• Nursing/RN/BSN:	75
• Accelerated:	40
• Master's degree:	160
• Post Master's degree:	24
• Doctorate:	38

Students in the master's program may choose to focus on nursing education, leadership in health care systems, school health nursing, or to prepare for an advanced practice role and certification as a clinical nurse specialist or nurse practitioner in public health, mental health, family, pediatric, maternal-child, or gerontological

nursing. Students who have completed a master's degree may complete a post-master's program in another area of study. All of the master's options are offered online, with on-campus visits required for some areas of study. The Ph.D. program prepares students to assume leadership roles by advancing the discipline of nursing through interdisciplinary research and the development of social and health policy.

The school advises 1,067 students, including pre-nursing students and RN/BSN pre-nursing students.

Nursing: UMKC

The UMKC School of Nursing offers a pre-licensure bachelor of science in nursing; an undergraduate completion program for registered nurses; a master's of science in nursing with a variety of concentration options, including adult, family, neonatal, women's health and pediatric nurse practitioner, nurse midwifery, nurse educator and nurse executive; and a Ph.D. program. The school's location and partnerships garner a wide range of clinical experiences, research and specialty opportunities. To meet the needs of today's adult students, the school offers the neonatal nurse practitioner and the RN/BSN programs online, provides distance education sites for the family nurse practitioner and nurse educator programs in St. Joseph and Joplin (cooperative program with MSSU), and provides variable course scheduling options.

Enrollment 2005

• Pre-nursing/BS:	151
• Nursing majors/BS:	213
• RN/BSN:	50
• Master's degree:	220
• Post Master's degree:	2
• Doctorate:	15

The school began the pre-licensure BSN program in fall 2001 and graduated its first class in May 2005. The school has a commitment to the Kansas City and professional communities to increase the number of RNs from minority and underserved populations. Approximately 25 percent of students are minorities, and 15 percent of the total students in the BSN program are graduates from urban core high schools. The school graduates approximately 80 BSN, 30 RN/BSN and 50 graduate students each year. More than 85 percent of the school's graduates stay in Missouri and are employed in nursing positions approximate to their educational preparation.

Nursing: UMSL

The UMSL College of Nursing offers a full range of programs. The traditional undergraduate program admits students as freshmen and awards the bachelor of science in nursing (BSN) degree. Two other baccalaureate programs also are offered. One allows the RN, a graduate of either a diploma or community college program, to complete the BSN degree at the end of two years. This program is offered to students on campus, in

Enrollment 2005

• Pre-licensure/BS:	422
• Traditional/BS:	237
• Accelerated/BS:	32
• On-campus/RN/BSN:	40
• Online/RN/BSN:	36
• Practitioner/MS: <i>Adult, Family, Pediatric, Women's Health, Neonatal</i>	19
• Adult Clinical Nurse Spec:	6
• Nurse Leader & Education Program:	38
• Post Master's degree:	1
• On-Campus/Doctorate:	28

outreach communities in the eastern portion of the state, and also is available to students online, with only one required visit to campus.

The college's graduate programs are designed to prepare faculty, administrators or Advanced Practice Nurses for health facilities in the St. Louis area and the eastern portion of the state. The master of science in nursing (MSN) program, which may be pursued either full- or part-time, offers four options: educator, administrator, clinical specialist and nurse practitioner. The Ph.D. curriculum allows the student to direct their research in the following three areas of nursing: health promotion and protection, health restoration and support, and health care systems.

Optometry: UMSL

The mission of the College of Optometry at UMSL is to promote and provide improved eye and vision care for people throughout the country by preparing the next generation of optometrists and vision researchers, with an emphasis on meeting the eye and vision care needs of a diverse

metro-politan commu-nity.

The college adminis-ters the

only educational program in Missouri leading to the Doctor of Optometry (O.D.) degree, and is just one of 17 programs to do so in the U.S. Two on-site and three affiliated accredited post-graduate residencies also are sponsored by the college. Master's and doctoral education is available through the program in vision science. Having a reputation for its comprehensive and rigorous clinical education, nearly 100 percent of the graduates in optometry are placed in professional practice or other suitable positions upon graduation. Although not

Enrollment 2005

• Optometry:	164
• Vision science:	4

required for licensure, a high percentage of graduates pursue post-graduate residency education and compete very well for a limited number of available residency positions.

Each year up to 44 students are admitted into the professional (O.D.) degree program. Enrollment for the 2005–2006 academic year is 164, of which 57 percent are female and 6 percent are underrepresented minorities. Approximately 50 percent of the practicing optometrists in Missouri are graduates of UMSL.

School of Pharmacy started a satellite Pharm.D. program in cooperation with the MU School of Health Professions, with the goal of creating room for approximately 150 additional students in mid-Missouri. More details are provided later in this report.

Pharmacy: UMKC

The UMKC School of Pharmacy offers four degree programs, including a B.S. in pharmaceutical sciences, a Pharm.D., an M.S. and a Ph.D. There are currently 35 students

enrolled in

the B.S.

program and

424 students

enrolled in

the Pharm.D.

program. Five

students are

enrolled in

the M.S.

program, and

there are 37 students in the Ph.D. program. One hundred thirty-five pre-professional students are enrolled in the College of Arts and Sciences at UMKC. Since historical data indicate there are approximately six times more annual applicants than the UMKC pre-professional pool, the current applicant/admit ratio may become even greater than the current level of 5/1.

There continues to be a great demand for seats in the Pharm.D. program, and applications of qualified students far exceed the number of spaces available. For example, for the 2006–2007 academic year, the school received approximately 600 applications for a class of 118 students. To respond to this need, the UMKC

Enrollment 2005

• Bachelor of science:	35
• Master's degree:	5
• Pharm.D.:	424
• Ph.D.:	37

II. Identifying potential needs & supply gaps

addressing current supply & future demand in health care fields

America and Missouri are facing a health care crisis. This year, the first baby boomers turn 60, with 8,000 Americans reaching that age every day. While the total population in Missouri is projected to grow by 9 percent, the number of persons aged 65 and older is predicted to increase 44 percent by 2020. The incidence of chronic illness and conditions such as diabetes and obesity have strained an already fragile system (Missouri Hospital Association Workforce Report, 2005).

While finding an adequate supply of health care workers to meet tomorrow's need is not uniformly bleak across all health care areas, there is widespread agreement that many shortages will exist.

Embedded in this broader discussion are the issues of overall supply, shortages in specialty areas, and concerns about geographical distribution to achieve the full range of health care services. Further complicating this conversation are the myriad of different methodologies that are used to determine shortages and the conflicting workforce projections (Pryce-Jones, 2006).

In this section, the health care programs at the University of Missouri offer a summary of the future demand in their respective fields, as well as an assessment of the potential supply of eligible professionals. This provides a local assessment of the emerging trends in Missouri and the surrounding states.

Dentistry

The number of practicing dentists in the state declined between 1990–2000. The rate of decline appears to have tapered off between 2000 and 2002, and 2004 licensure data suggest a modest reversal in this trend. The average

age of dentists practicing in Missouri is higher than the average age of practicing dentists in the U.S.

Missouri licensure data from 2005 indicate a total of 2,776 dentists in active practice, with nearly 74 percent of those practitioners over 45 years of age.

The U.S. Census Bureau Series predicts Missouri's population to be 6,137,000 in 2020. In order to meet the goal of one dentist for every 2,000 citizens, the state will need 3,068 dentists in active practice in 2020.

There are substantial differences in provider supply between regions of the state. The eastern and mid-Missouri regions have adequate numbers of

dentists, but much of the remainder of the state remains under-supplied. The UMKC School of Dentistry is having some success recruiting more students from rural areas of the state, but where these new graduates will eventually practice is difficult to predict.

Missouri is not alone in examining strategies for dental health care workforce recruitment and retention. Increasing sizes of existing education programs, loan repayment for practice in Health Professional Shortage Areas (HPSAs), community-based clinics in underserved areas, alternative licensure pathways for international dental graduates, and new primary care training programs (Advanced Education in General Dentistry) have been most commonly identified as promising for increasing the supply of dentists. UMKC is involved in all of these types of activities.

The economic impact of a shortage of oral health care providers in Missouri can be measured in several ways. Oral health is essential for the overall health and well-being of the people of Missouri. Poor oral health, which

While the total population in Missouri is projected to grow by 9 percent, the number of persons aged 65 and older is predicted to increase 44 percent by 2020.

would result from an inadequate supply of providers, can compromise individuals profoundly. Children miss school as a result of toothache and other oral infections, compromising their education and future workforce contributions. Adults can lose time from work while seeking oral health care, leading to lack of productivity. Sequential extractions as emergency treatment for oral infection can result in compromised “smiles,” leading to people having difficulty in finding jobs.

The fact that many people do not have access to oral health care also leads to emergency situations, in which patients are frequently treated in hospitals at considerable expense.

Health Professions

Through the imaging and diagnostic sciences, allied health professionals are on the frontline of disease detection and care. The allied health professionals working in the rehabilitative sciences help patients recover from illness and injury to regain physical movement and stability and return to the workforce. Rehabilitative professionals also can work with older citizens to help improve balance and coordination to help prevent devastating falls. The result of their work is a healthier population that contributes longer to Missouri’s economic well-being.

The workforce shortage in the allied health professions has been labeled the “sleeper crisis” because these shortages are often only examined in the context of one professional group at a time rather than a crisis for the entire professional community. Examining the shortages in these professions individually, however, reveals some startling and alarming consequences for care delivery organizations. For example, if a rural hospital has a radiological services department staffed with four professionals and loses two of those professionals, it is experiencing a 50 percent reduction in its staff. That significant shortage will have a major impact on the ability of the hospital to provide necessary care to its patients. A review of the Missouri Economic Research

and Information Center (MERIC) data indicates a significant number of openings for all of the allied health professions. Based on capacity alone, MU and other public and private schools throughout the state should be able to meet the workforce demand. However, capacity does not equal graduates. Attrition and lost workers are the greater issues.

The MU School of Health Professions recruits heavily from within the state and graduates 140 allied health professionals annually. One hundred-twenty of those graduates remain in Missouri providing care for our citizens. Many of the private institutions’ recruitment efforts are directed toward out-of-state and international students — and often these students leave Missouri after they graduate. While MU’s health professions are smaller in total size than some others in the state, the focus is on high ability students and high matriculation and graduation rates.

Nationally, a shortage of at least 1.6 million to as many as 2.5 million allied health workers, the backbone of the nation’s health care system, is predicted by 2020. The U.S. Department of Labor reports allied health professionals represent 60 percent of the American health care workforce. Half of the fastest growing occupations in 2004 were in the allied health professions. In Missouri, health occupations are projected to increase 22.3 percent, or about 47,110 jobs, between 2002–2012, approximately double the overall projected increase in state employment.

Double-digit growth is expected in at least six of the allied health professions by 2012. They are:

- Audiologists: 19 percent
- Occupational therapists: 30 percent
- Physical therapists: 28 percent
- Radiation therapists: 30 percent
- Respiratory therapists: 32 percent
- Speech language pathologists: 25 percent

Medicine

Multiple factors contribute to the nation's physician shortage, including an increasing demand for physician services, an aging baby boomer population, changing practice patterns and geographic disparities. In particular, the aging of the population places an increase in need for physicians due to heart disease, cancer, and other conditions more prevalent in the elderly. Even at the current time, the number of graduates from M.D.-granting medical schools in the U.S. cannot keep up with the demand for physicians to fill residency training slots.

According to the *Health Care State Rankings 2006*, in 2004, 1.7 percent of U.S. physicians were practicing in Missouri. The state ranked 31st, reporting a rate of 261 physicians per 100,000 population compared to the national rate of 297. Missouri's doctors tend to be younger on average, with one-fourth of them 35 years of age or younger. Similar to the nation, a third of Missouri physicians were in primary care. The Missouri Department of Health and Senior Services estimates that 108 out of 114 Missouri counties are designated as underserved in terms of physicians.

Based on 2006 projections of physician demand across Missouri completed by MU, the most critical areas of need include: primary care physicians in rural areas (family practice, internal medicine, general surgery, OB/GYN, and pediatrics); physiatrists (physical medicine and rehabilitation and spinal cord injury); psychiatrists (general, psychoanalysis); dermatologists; radiation oncologists; and anesthesiologists.

Over the past decade, the MU School of Medicine and the UMKC School of Medicine have trained more than 2,000 physicians in 60 medical specialties. More than 55 percent of these physicians completed their residency in Missouri, and nearly half have since established practice in Missouri.

The Association of American Medical Colleges (AAMC) Center for Workforce Studies has noted that at the current rates of physician training, the ratio of physi-

cians to population will peak in the next 10–15 years, at the same time that the baby boom generation begins to turn 70. With the length of training required for physicians, even if medical schools increase enrollment now, it would take 10–15 years to see increases in the numbers of practicing physicians. The AAMC has called for medical schools to increase enrollments by 30 percent by 2015, either through increased class size or through opening new medical schools in order to begin training physicians to meet this expected demand.

Both the MU and UMKC Schools of Medicine are responding to the AAMC recommendation. The MU medical school plans to increase its class size for physicians by 30 percent. The plans call for state funds to support the proposed MU Health Sciences Research and Education Center and the school's annual request for an approximately \$7.5 million increase in state appropriations for medical education. The MU School of Medicine also plans to increase the number of physicians in rural areas by strengthening its existing programs in rural health and family and community medicine, both of which are ranked among the top 10 in the nation.

The UMKC School of Medicine is evaluating the capacity to increase class size in response to the AAMC recommendation. The major current limitation is in basic sciences in science teaching laboratories and the number of seats in the lecture halls.

In addition to training physicians, medical schools serve the public. Medical schools, combined with their hospital affiliates, comprise the Academic Medical Center (AMC). AMCs and their physicians provide safety net care to underserved populations and provide highly specialized services such as trauma centers, burn centers and organ transplantation. Both University of Missouri academic medical centers provide these services.

Nursing

According to the latest projections by the Health Resources and Services Administration (HRSA), the nursing workforce will need more than 800,000 regis-

tered nurses by the year 2020 unless drastic steps are taken to reverse this shortfall. The Bureau of Labor Statistics (BLS) reported that registered nursing remains among the top occupations in terms of job growth, and analysts project that two-fifths of all new jobs in the health sector over the next 10 years will be for RNs.

The American Association of Colleges of Nursing (AACN) reported a 14 percent increase in enrollment in entry-level baccalaureate nursing programs in 2004 over the previous year. Yet this increase is still not sufficient to meet the demands for nurses. While a number of factors have been identified as contributing to the nursing shortage, a major factor is due to the fact that nursing programs across the country are struggling to expand enrollments due to the inability to increase capacity. The AACN reports that more than 30,000 qualified applicants were turned away from nursing schools last year due primarily to a shortage of nurse faculty.

Closer to home, a recent report from the Missouri Hospital Association (MHA) indicated an emerging need for nurses in Missouri. The vacancy rates for RNs in Missouri is currently almost 10 percent. A projected need of 19 percent is expected by 2010, with an annual projected vacancy of 2,000 jobs per year.

In addition to the need for nurses in hospital settings, nurses are used in a number of other areas such as public health settings, schools, social agencies, and even businesses. This suggests the need for nurses might be even higher than the numbers reported for hospitals in the MHA study.

According to the MHA's 2005 Workforce Report, current nurse vacancies could result in higher nurse-to-patient ratios and lower staffing levels. In 2004, based on results from five studies, the U.S. Department of Health and Human Services' Agency for Healthcare Research and Quality found a correlation between lower nurse staffing levels and one or more types of adverse patient outcomes. To alleviate the current shortage and maintain adequate staffing levels, hospitals in Missouri utilize

agency and temporary staff, including registered nurses, at a cost of more than \$81 million in 2004.

Health care quality and patient outcomes also may be affected by the shortage of nurses with a baccalaureate degree or higher. *The Journal of the American Medical Association* published a study from the University of Pennsylvania identifying a distinct link between better patient outcomes and higher levels of nursing education. Those treated at hospitals with a 10 percent increase of BSN prepared nurses decreased their risk of death and failure to rescue by 5 percent.

Given the demands of today's health care system, the greatest need in the nursing workforce is for nurses prepared at the baccalaureate and higher degree levels. The HRSA recommends baccalaureate degree preparation for at least two-thirds of the nursing workforce, as the evidence clearly shows that higher levels of nursing education are linked with lower patient mortality rates, fewer errors and greater job satisfaction among RNs (AACN 2005).

Based on projections from MERIC, an increase of 19 percent in jobs is expected in nursing-related careers in Missouri, adding almost 2,200 positions per year, or 13,200 openings by the year 2012. According to the State Board of Nursing in Missouri, in 2005 there were 1,148 graduates receiving BSN degrees from schools of nursing like those at the University of Missouri. Using the 2005 graduates as a future estimate and the HRSA recommendation that two-thirds should be baccalaureate prepared, this indicates a need for 8,712 BSN nurses in Missouri by the year 2012. The nursing programs in the state will graduate approximately 6,900 BSN graduates during that period. This leaves a shortage of approximately 2,000 BSN-prepared nurses to fill the nursing openings in the state.

The nursing shortage is not limited to BSN-prepared nurses alone. In Missouri, only six counties (Platte, Clay, Cole, Jackson, St. Charles and St. Louis) are not designated by the state as Primary Care Health Professional Shortage Areas, according to the Missouri Department

of Health (Bureau of Primary Care, 2005). Based on the overwhelming lack of primary care providers in Missouri, MSN nurse practitioners are needed to function as a member of the health care team. Since the exact numbers of providers needed are not known, the Bureau of Primary Care in the Missouri Department of Health is initiating a study to determine the number of physicians and nurse practitioners needed to meet the state's health care demands.

Optometry

Optometry is the nation's third largest independent health care profession. According to the American Optometric Association, more than half of the people in the U.S. wear glasses or contact lenses. Data from MERIC suggest that the demand for new optometrists is comparable with that of other primary care providers such as pediatricians and internists, with an average of 20 optometrists needed annually through 2012.

Currently, optometric care is available in nearly every county in Missouri. The community optometrist is often the most accessible primary health care practitioner in many small communities. In order to maintain that accessibility, retirements of practitioners within many of these communities will require new graduates to take their places. The increased prevalence of vision abnormalities and decreased mobility with age is expected to increase the need for easily accessible optometric services in many areas.

The U.S. Bureau of Labor reports that "employment of optometrists is expected to grow faster than average for all occupations through 2014, in response to the vision care needs of a growing and aging population." Additionally, MERIC reports that projected employment for optometrists is above average overall in Missouri.

Doctors of optometry are among the most widely-distributed primary health care providers throughout the region. Thus, by one estimate, optometric care is available in 103 of Missouri's 115 counties and the City of St. Louis. Three decades ago, prior to the establishment of

the UMSL College of Optometry, this was not the case. Historical and professional factors result in a natural propensity for optometrists to be well-distributed through rural, medium-sized and urban communities. The need for all states in the Midwest is stated as above average, except for Kansas, which is average.

Pharmacy

The demand for pharmacists is consistent with the aging of the American population. It is well-documented that elderly patients use more prescription medications, are at greater risk for adverse effects, and have a greater liability for drug interactions than younger patients. Pharmaceutical care addresses all of these issues and, despite the innovative use of technology in filling approximately four billion prescriptions annually, the number of pharmacists still does not satisfy the demand for pharmaceutical care.

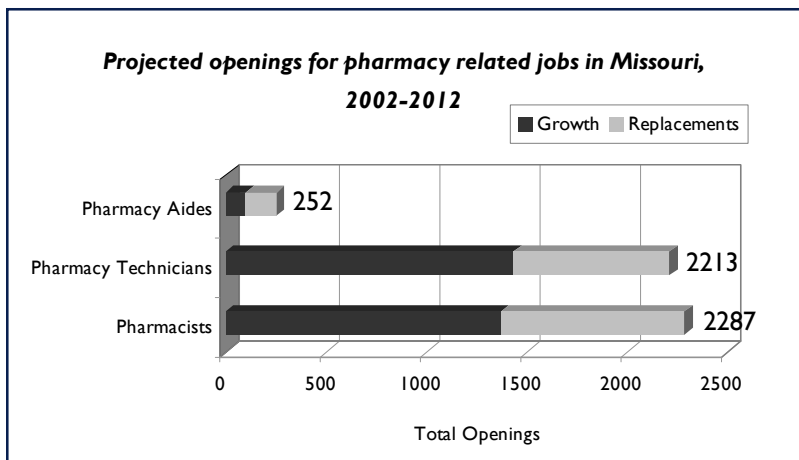
A significant shortage of pharmacists has been documented since the late 1990s. Current national data indicate that there are more than 8,000 unfilled pharmacy positions, a shortage that is expected to deepen in conjunction with the new Medicare prescription drug benefit program that began in January 2006. Published long-range predictions forecast a national shortage of 157,000 pharmacists by the year 2020 (Knapp, 2002).

Statewide data for Missouri from the Pharmacy Manpower Institute currently rates the shortage at 4.17 on a scale of 1–5, where 3.0 represents an adequate supply of pharmacists and 5.0 represents a severe shortage.

Examining the MERIC projections, there are 2,287 projected openings for pharmacy in 2012. Current plans for the School of Pharmacy call for an increase in class size to 123 students per year in fall 2007, a figure which includes students in the satellite Pharm.D. program in Columbia. However, it takes six years for a student to matriculate, so the impact of the increased enrollment programs is always significantly downstream.

Since the MERIC data calls for 228.7 pharmacists per

year, an estimate can be made of the projected shortfall. Data from both UMKC and the St. Louis College of Pharmacy (a private school) indicate a total of 581 graduates stayed in the state from 2002–2006, as compared to a MERIC estimate of the 1,144 pharmacists needed. Thus, the MERIC projections indicate the state has fallen behind by approximately 563 practitioners to date.



Source: *State of the Pharmacy-Related Workforce in Missouri, MERIC, January 2006.*

Current projections for UMKC and the private school of pharmacy based in St. Louis indicate they will educate approximately 1,500 pharmacy graduates from 2007–2012. However, data from the past three years demonstrate that 70–71 percent of UMKC graduates and 39–48 percent of the St. Louis College of Pharmacy graduates remain to practice in Missouri. Pro-rating these estimates based on actual residency data provides an additional total of approximately 970 practitioners between 2006–2012. The total number of pharmacists produced that will remain in Missouri to practice is 1,551 — compared to the MERIC projected shortage of 2,287 during the 2002–2012 time period. These data indicate both a shortfall of more than 700 pharmacists and the need for additional mechanisms to address the pharmacy shortage.

III. Disparity issues: Providing education & care to underserved populations & regions

access & opportunity in education & care

One of the major issues today is that of providing health care services to traditionally underserved populations. Even if an adequate number of physicians, dentists, pharmacists and other health care workers could be prepared, there would likely still be significant disparities in rural areas, in sections of large metropolitan areas, and in vicinities where lower socio-economic citizens reside. The challenge of providing services as well as offering educational opportunities to underrepresented groups continue to be two of the primary concerns facing health care educators today and in the coming decades.

The challenge of providing services as well as offering educational opportunities to underrepresented groups continue to be two of the major issues facing health care educators today and in the coming decades.

To address the disparities in both educational opportunities and in access to services, the University of Missouri health care education programs have adopted a number of strategies. These include enhanced student recruitment efforts, partnerships with local hospitals and clinics, pre-admission programs to attract academically-prepared underrepresented minorities, recruitment and service efforts in rural areas, and developing clinics in underserved areas that provide patient care and training opportunities for existing students.

These efforts can bridge the disparity gap by providing low-cost care to patients and by training health care workers who can establish rapport with underserved and low-income clients who have limited access to adequate care. Further, these outreach efforts can promote better preventive health measures, increased access to dental and medical services, and better screening and diagnosis opportunities for clients.

This section outlines some of the activities currently

available through the health care schools and colleges at the University of Missouri.

Dentistry

The UMKC School of Dentistry's most recent strategy has been to engage in a partnership with the state in a PRIMO program, identifying students from underserved areas who then receive loan repayment to go back to their areas. In addition, it is adding rotations to the more than 20 community-based dental health clinics around the state, exposing dental and dental hygiene students to practice in rural and underserved communities. This, in combination with loan repayment, has resulted in placement of a number of graduates into rural and underserved areas.

Health Professions

The MU School of Health Professions has developed a comprehensive recruitment plan for increasing awareness and highlighting the opportunities in the allied health professions. Unfortunately, resources have not been identified to implement its plan. Previously the school participated in the Health Careers Opportunities Program but the elimination of Title VII funding ended that recruitment opportunity for disadvantaged and underrepresented minorities. Potential and current students also suffer from a lack of available financial aid opportunities; for instance, the PRIMO program does not apply to any of the school's disciplines.

As is the case with other health care programs in Missouri and around the nation, the current student

population of the School of Health Professions is not diverse; 88 percent of the students enrolled in the school's nine allied health degree programs are white. Two efforts are currently underway to address this issue:

- A unique program is being explored in Kansas City, partnering with Children's Mercy Hospital and Lincoln Preparatory School, to meet the needs of minority students and enhance interest in the allied health professions. The goal is to increase awareness among students about health professions careers, increase minority enrollment in health professions schools and subsequent admissions into allied health professional programs, and increase diversity in the health professions workforce.
- A "Mizzou To You" type program, modeled after the MU College of Agriculture, Food and Natural Resources statewide tour, is directed at increasing awareness of the health professions and increasing enrollment of students from outstate Missouri.

The school also is a key provider of services that help improve health and enhance quality of life for Missourians. The Missouri Mobile Health program offers state-of-the-art osteoporosis, lung health and carotid artery screenings to uninsured and underinsured residents in northeast Missouri. Columbia area residents take advantage of the Robert G. Combs Language Preschool, where children with speech and language delays work side-by-side with children with normal speech development. The Health Connection offers older residents a unique fitness program tailored to their needs.

Graduates of the School of Health Professions have a significant impact on the health of the state. When they graduate, 86 percent of the school's students remain in Missouri to practice — about half go to urban areas and half go to rural settings. The increasing number of graduates and excellent salaries these positions command contribute significantly to the state's economy.

Medicine

The MU School of Medicine develops its talent early with a pre-admissions program that is unique among the nation's medical schools. The MU Rural Track Program draws aspiring students from five undergraduate feeder schools in smaller towns that are more likely than urban campuses to attract students from rural areas.

The school has created a longitudinal, four-part program to increase the supply of appropriately trained physicians for rural Missouri. The goal of this program is to recruit appropriate students, provide role models with a conceptual orientation, and train students in rural settings so they later practice medicine in rural Missouri. The program is described in more detail in this report's section on *Innovative Approaches*.

In addition, the Conley Scholars Program pre-admits high-achieving, highly-qualified students as high school seniors into medical school four years after high school graduation. Currently, there are 65 Conley Scholars.

The MU Center for Health Policy has formed a partnership with Washington University in St. Louis to create a health disparities center in order to confront statewide health care discrepancies in rural and urban areas.

In terms of patient care, MU's School of Medicine and University hospital system treated 125,658 Missouri patients and provided more than \$43 million in uncompensated care to Missouri Medicaid patients in Fiscal Year 2005. The University's comprehensive and far-reaching network of hospitals, clinics and telehealth sites serves patients from every county in Missouri, regardless of their economic status.

At UMKC, the School of Medicine has a long history of recruitment of a diverse student body. Through multiple programs lead by the Associate Dean for Diversity, the number of students recruited from underrepresented minority groups has increased. In two of the last four years, underrepresented minority students represented 12 percent of the entering class, which represents the percentage found in the population of Missouri. The

school reached gender equity more than 20 years ago.

Additional efforts at UMKC to increase enrollment and graduation of underrepresented minority students include pipeline projects for high school students, the Summer Scholars and the Saturday Academy. The Summer Scholars program has been in place for 26 years and provides minority high school students experience with a career in health care. The Saturday Academy is a rigorous academic preparation course for middle school minority youth interested in attending medical school. A number of the participating students have subsequently entered and graduated from the school and are practicing physicians today.

Special curriculum efforts also have been made to enhance cultural competency (gender, race, ethnic background, age, etc.). Students encounter a broad and diverse population of patients from both rural and urban environments during the program. In addition, the school's faculty members are actively engaged in research in health care disparities.

Nursing

Each school of nursing at the University of Missouri has a unique approach to providing educational opportunities to individuals from underserved and underrepresented populations. Each school is committed to promoting a culturally-diverse environment. This commitment is reflected in the schools' missions, philosophies, goals and objectives, and is evident in the curriculum and in faculty development opportunities. The urban locations for both the UMKC and UMSL schools afford those programs unique opportunities.

Examples of recent activities at the MU School of Nursing include:

- School of Nursing academic advisers participate in ethnic diversity workshops and have enrolled in coursework to assist them in addressing multicultural and diversity issues.
- Graduate nursing faculty members regularly

participate in the Express Program, where they provide mentoring for minority students involved in research activities.

- Nursing advisers also are involved in events coordinated by the campus admissions office, such as Clue-In to Mizzou, targeted at recruitment of minority high school students from Kansas City, St. Louis and mid-Missouri areas. Advisers also participate in minority recruitment events sponsored by academic schools and colleges on campus.

Examples of activities at the UMKC School of Nursing include:

- The School of Nursing shares a staff position with the School of Medicine who is responsible for recruitment of ethnic minority students as well as students from urban core high schools.
- Summer enrichment programs and yearlong college preparation programs are provided to at-risk high school students interested in pursuing degrees in a health profession.
- Yearlong development activities are provided to faculty, students and staff to expand knowledge and values related to diversity and cultural competency.
- Both BSN and MSN students spend at least 50 percent of their clinical education in settings where the underserved are the primary patient population.

Optometry

The Association of Schools and Colleges of Optometry (ASCO) reports that there continues to be a significant need for underrepresented minorities in optometry. The UMSL College of Optometry has a comprehensive student recruitment plan intended to increase awareness for opportunities for serving the eye and vision care needs of patients throughout the region, including rural

and urban locations in Missouri. Each year, staff and faculty from the college visit at least 30 colleges and universities in the Midwest to meet with undergraduate students who have expressed an interest in the health professions. The recruitment plan includes visits to urban and rural institutions, some having a high percentage of enrollment of underrepresented minorities. Several of these initiatives include:

- Working cooperatively with the Bridge Program coordinated within the UMSL College of Education. Students who successfully complete the program and have an interest in the health professions are more likely to be highly-qualified applicants to the College of Optometry. Targeted for urban youth, the program seeks to: increase the number of students who complete high school and go to college; increase the number of students who are prepared and motivated to pursue careers in math and science fields; and support mathematics, science and English instruction in participating schools.
- Developing a joint recruitment initiative within the two largest urban communities in Missouri, in cooperation with the UMKC School of Dentistry. The goal is to work together to recruit and retain more individuals from underrepresented and disadvantaged populations into dentistry or optometry, two of the top three independent licensed professions.

The college has been providing comprehensive eye care to metropolitan St. Louis residents for nearly 25 years. By working cooperatively with other health professionals through community health care agencies and entities, the college is helping to address the eye and vision care needs of the St. Louis community. These activities provide high-quality primary eye and vision care in an urban area where patients have few choices to pursue their eye care needs. Hundreds of vision screenings, most within elementary schools, are furnished at no cost to the children. All college-operated clinics accept

Medicare, Medicaid, Lions Clubs' vouchers, Red Cross vouchers, and privately-funded indigent eye care.

Pharmacy

Pharmacists are recognized as being the most accessible health care professionals, so the projected shortage is of great concern. In many rural or inner city areas, pharmacists can address basic questions raised by clients and offer suitable over-the-counter alternatives when appropriate. They also serve as a point of first contact for many low-income or rural residents and can make referrals to the appropriate physician or health care professional. There are eight counties in Missouri that would not have a pharmacist if it were not for UMKC, and an additional 18 counties that have more than half of their pharmacists from the UMKC program.

The UMKC School of Pharmacy is keenly aware of the importance of improving the diversity of its admitted student body. The competition for qualified minority candidates is great, and the school takes every opportunity to increase the awareness of its program among those groups. A new scholarship fund was created in 2005 as a means to provide financial support to qualified applicants.

In addition to traditional recruitment methods, the School of Pharmacy also uses service as a means to introduce students to underserved minorities. Each pharmacy student must complete 60 hours of community service through Academic Service Learning (ASL) as a requirement for graduation. Students are placed in urban core service organizations in an effort to learn about the social and health care needs of the community. In 2005–2006, pharmacy students provided more than 4,800 service hours in ASL to service organizations, resulting in a cost savings of just under \$76,000 to those organizations. Additionally, students are charged with helping others gain a better understanding of pharmacy as a profession and career choice.

Under the supervision of a faculty member, students manage the Medication Assistance Program-Pharmacy

(MAP), which has provided more than \$1 million in free medication to medically-indigent residents of Jackson County, Mo.

Students have been recognized nationally for their community service programs geared at improving the health of their communities. In 2005, students volunteered more than 900 hours to assist more than 3,000 patients and provide more than \$13,000 in health care services. Programs include Project Outreach, a drug abuse awareness program for 4th and 5th graders; Operation Immunization, which improves vaccination rates for Missouri citizens; Operation Diabetes, which provides free diabetes screening and education; Project Heartburn, which offers free screening, education and treatment options; and ROOt for Health, a childhood obesity prevention initiative that received a national award from the American Pharmaceutical Association in 2006.

The school also considers the health care needs of the community when determining clinical placements of faculty, with the goal of identifying and resolving drug-related problems leading to an improved quality of life for those served. Faculty placements include but are not limited to: indigent care clinics, mental health facilities and the Veterans Affairs Medical Center.

IV. Innovative approaches for the future

educating & training a future workforce of health care professionals

The University of Missouri health care programs are charged with developing innovative ways to address the emerging

need for health care workers; preparing future faculty members; serving under-represented clients and regions;

developing groundbreaking medical techniques; and conducting research. Such challenges must be balanced with a health care environment that needs more trained professionals immediately in order to address the aging population, as well as the changes in medical technology and health care practices. With limited resources and limited state support to fund capital projects, the health care schools are using a number of strategies to tackle these challenges.

In addition to the existing programs described in earlier sections of the report, several of the health care education programs strive to find creative solutions to the workforce shortage. Most of these initiatives are based on existing funds or through an external grant that funds the new project.

Designing innovative solutions will require curricular planning; continuous dialogue with practitioners; integrated teams of health care workers operating together to address common problems; an increased use of technology and informatics; quality improvement strategies tailored to address health care curriculum so that it can meet today's needs; and a willingness to be accountable to the public (Combs, 2006). In addition, public health experts can help evaluate the emerging

public health needs and foster cooperation among the various health care education programs to address them.

With limited resources and limited state support to fund capital projects, the health care schools are using a number of strategies to tackle these challenges.

In many cases, opportunities for innovative methods to address worker shortages would come from additional resources that cover the increased costs of new programs. These new initiatives also are dependent on the willingness of other agencies or colleges to develop cooperative partnerships. Often these alliances require careful attention and care to keep the initiatives going. The sections below describe current innova-

tive UM programs as well as initiatives currently in the planning stages.

Dentistry

In response to an impending shortage of providers in the state, in 2002 the school increased its class size and its efforts to recruit qualified Missouri residents into dental school. By adding an additional 100 students to the school and retaining a constant percentage of graduates, the goal of 3,068 practicing dentists in 2020 should be within reach. At this point there is some concern about the state's ability to retain Missouri graduates, but there is a strong effort to address the state's needs in providing more dentists.

The dean of the UMKC School of Dentistry convened representatives from dentistry and dental hygiene, educators, and legislators from Kansas and Missouri in the late 1990s to address the supply of dentists and dental hygienists for the region. A number of initiatives grew from the work of the BiState Task Force. UMKC discontinued a program that attracted highly-qualified high school students from across the country into a six-year B.A./D.D.S. program. By redirecting resources to increase the size of the four-year program, the school was able to increase its class size from 80 to 100 students

per year. More importantly, discontinuing the B.A./D.D.S. program allowed the school to rededicate its recruitment to qualified Missourians. The majority of students are now Missouri residents.

UMKC also initiated an advanced education program in endodontics and increased the class size of the dental hygiene program. Other institutions in Missouri stepped forward to develop new dental hygiene programs throughout the state.

Health Professions

The MU School of Health Professions has made addressing the allied health workforce shortage and developing creative collaborations to enhance educational opportunities for students a top priority.

The School of Health Professions established a satellite respiratory care program at St. John's Mercy Medical Center in St. Louis. Under this arrangement, St. John's supports two additional St. Louis-based faculty members to allow the acceptance of additional students.

The school recently reactivated its degree program in clinical laboratory sciences/medical technology through unique partnerships with the University of Nebraska at Omaha Medical Center and Boyce and Bynum Clinical Pathology Laboratories in Columbia, Mo.

In addition, the school has played a major role in coordinating the creation and hosting of the UMKC pharmacy satellite program on the MU campus. Distance education applications play an important role in supporting these efforts.

In November 2005, the school hosted the FuturePoint Summit to find solutions for allied health care workforce challenges. The summit drew on the work of more than 80 allied health professionals representing academia, industry, policymakers and practitioners from across the U.S. The FuturePoint national coalition, co-chaired by Dean Richard Oliver, will target specific strategic and tactical initiatives to address immediate needs and create long-term solutions to the workforce crisis. Such public-

private partnerships will be increasingly important as the school explores ways to address growing allied health practitioner and faculty shortages.

To meet the service needs of rural and underserved areas of the state, the school utilizes telehealth technology to serve patients. In-person treatment also is offered by faculty and staff from the health psychology department who travel to outstate areas. The school is expanding its clinical partnerships in Columbia through the interdisciplinary practice of the Thompson Center for Autism and Neurodevelopment Disorders. A pediatric occupational therapy clinic is currently operating in Lewis Hall and the school plans to start an adult occupational therapy clinic in the fall. Outstate clinical partnerships also are being planned, with the first site scheduled for Cooper County.

The Adult Day Connection, formerly the Eldercare Center, has served more than 326 families since opening in 1989. As the only state-licensed adult day health care center in Columbia, it offers savings to both the state and family. With Medicaid reimbursement, a family saves \$51.32 per day. With long-term care rates averaging nearly three times that amount, savings are even greater. Additional benefits include the family member being able to stay in the home longer and the ability of caregivers to continue working outside the home. Through a partnership with The Intersection, an independent, non-profit organization with a mission of promoting the development of a healthy community, a second site opened in Columbia in June 2006.

Programs modeled after the MU-UMKC pharmacy partnership to incorporate pre-professional coursework and expand the school's professional programs are being explored with UMSL. Additional educational partnerships similar to the one at St. John's Mercy Medical Center in St. Louis also are being explored for the Kansas City area.

Lastly, a multi-disciplinary master's degree in public health is being developed in cooperation with the other health care education programs on campus. By pooling

the resources of several colleges, the program will be able to address public health issues critical to Missouri and the nation.

Medicine

To help address the shortage of medical providers in rural areas, the MU School of Medicine, in conjunction with the University of Missouri Area Health Education Center (MU-AHEC Office), has implemented a strategy to encourage MU medical students to pursue a career in rural medicine. As part of this strategy, medical students may receive part of their training at community-based clinical education sites under the guidance of community-based faculty. Through this exposure, the program aims to increase the number of physicians who choose to practice in rural Missouri.

Through the use of interactive televideo, the students at the community sites access many of the same lectures and seminar series as their MU-based colleagues. Computer networks connect students to MU's library resources, national databases and electronic communication systems.

The MU School of Medicine is addressing the state's shortage of rural physicians with nearly \$1 million in grant support from the Missouri Foundation for Health. Currently, the rural track program has training sites in Rolla, St. Joseph and Poplar Bluff, chosen because they are located near rural communities but are still large enough to support regional hospitals and multi-specialty practitioners. With the grant funds, the school will develop new rural teaching sites in more counties in rural Missouri. Junior-high and high-school programs administered by the regional AHEC offices in Springfield and Poplar Bluff also will be enhanced in conjunction with the new and expanded teaching sites. The programs are designed to educate students about health care career opportunities.

The MU School of Medicine also has formed collaborative centers for health disparities and health policies. Center leaders are Robert Wood Johnson Health Policy

Fellowship graduates who trained with members of Congress in Washington, D.C. They are working in partnership with other schools on campus, Washington University in St. Louis, the Missouri Foundation for Health, state agencies and others to identify health disparities in urban and rural settings and to develop corrective policy measures.

The MU School of Medicine is working with Cerner Corporation, the world's leader in health care information technology based in Kansas City, to transform medical education and patient care through the use of information technology. The partnership's education and research components are estimated to cost \$10 million, and a research component is still under development. Cerner has pledged to invest \$1 billion in such research and development projects over the next five years.

In addition, MU's Missouri Telehealth Network (MTN), launched in 1995 with more than \$9 million in private and government funds, is one of the nation's first and largest telehealth networks. MTN brings specialty medical care to more than 90 sites in more than 30 counties throughout Missouri, especially rural areas, and is developing connections with most of the state's hospitals and community health centers. MTN recently earned the American Telemedicine Association President's Award for the Advancement of Telehealth. The network's clinical specialties include child and adolescent medicine, burn care, physical medicine and rehabilitation, dermatology, general internal medicine, endocrinology, neurology, psychiatry, geriatric medicine and teleradiology. MTN projects include counties designated as Primary Care Health Professional Shortage Areas, all of which lack the specialty resources provided by MTN. The network may serve as a future benchmark for delivering health care services to underserved regions and populations.

At UMKC, the School of Medicine is nationally-known for its innovative and unique medical education program. Students are admitted directly out of high school, and complete both their undergraduate and medical degrees in six years, rather than the traditional eight

years. The goal of this integrated program of humanities, basic sciences and clinical medicine is training altruistic, well-rounded physicians. Despite the accelerated pace of the program, students master basic sciences and do well on national licensing examinations. In 2005, 95 percent of students passed Step I of their board examinations on the first attempt, higher than the national average pass rate.

The UMKC School of Medicine does not own or operate any hospitals, but partners with strong community teaching hospitals for clinical training. This approach provides partnerships with high-quality and high volume hospitals that serve a diverse population. The cost of education per student is one of the lowest in the country. Affiliated hospitals include a safety-net hospital (Truman Medical Centers), a private tertiary care hospital (St. Luke's Hospital of Kansas City), a regional children's hospital (Children's Mercy Hospital), a state psychiatric hospital (Western Missouri Mental Health Center), and a veterans affairs hospital (Kansas City Veterans Affairs Medical Center). Approximately 500 full-time faculty physicians are located at these facilities.

The UMKC Schools of Medicine and Nursing are partners in the development of patient simulation laboratories. New computerized mannequins and models allow for safer training of physicians and nurses, both as individuals and in teams prior to direct patient contact. The schools currently own several of these highly-specialized mannequins, and the new learning laboratories will be located in the new Health Sciences Building, scheduled to open in 2007. It is anticipated that hospital affiliates also will be interested in use of these facilities for their employees, and thus these facilities may become a regional community resource in the ongoing training of nurses and physicians.

One program currently in planning is designed to address one of the most pressing shortages in anesthesia services. These services are critically underserved throughout Missouri and the rest of the nation. The school was recently awarded planning funds for a two-year master's degree program for anesthesiologist

assistants (AAs), which would provide an accelerated pathway to increasing high-quality anesthesia services. These providers are important members of anesthesia care teams and function as specialty physician assistants under the direction of licensed anesthesiologists. There are currently four AA training programs in the U.S. Since the surrounding states do not yet allow AAs to practice, it is anticipated that the graduates of this program would stay in Missouri.

Nursing

Each School of Nursing has developed and is continuing to plan creative ways to assure nursing education is on target for preparing students for the future. In addition, the three schools participate in collaborative efforts to maximize opportunities while minimizing resources where possible.

All three University of Missouri Schools of Nursing work to prepare nursing faculty through a cooperative Ph.D. program that involves sharing courses and participating on dissertation committees for students at the other campuses. The collaborative Ph.D. program model is being used to design the Doctor of Nursing Program (DNP).

All three schools also cooperate in providing educational programs by sharing courses in the Pediatric Nurse Practitioner program and Cooperative Instructional Development (CID) courses developed to support all three campuses.

The schools are working to continue to identify outstanding students in the traditional or accelerated baccalaureate program to move to the BSN/Ph.D. track. Such an effort will facilitate the preparation of additional faculty and resources. For example, MU increased the number of BSN students by adding 40 students to the accelerated program that allows students with backgrounds outside of nursing to complete a BSN with a special series of courses. The vast majority of the costs for the program were obtained from UM Health Care.

MU's innovative efforts are seen in TigerPlace, a retirement community founded in 2004 that serves as an interdisciplinary model for aging in place. As a model of geriatric education, research, care delivery and environmental design for the 21st century, TigerPlace also serves as a center for students, scholars and policymakers to research the aging in place model in eldercare. As care needs increase, residents contract for more care in the same setting, eliminating the need to move to a more restrictive living environment such as a nursing home.

UMKC provides Pathways to Nursing, a yearlong program through a grant funded by the Menorah Legacy Foundation, in collaboration with West Central Missouri Area Health Education Center, Upward Bound and Group E-Mentoring. The program provides both didactic and clinical experiences to (a) encourage high school students primarily from minority and underrepresented populations to pursue a career in nursing; and (b) prepare a qualified and culturally diverse pool of applicants for nursing programs.

The UMKC School of Nursing social work effort is an unique program to support underrepresented students enrolled in the nursing program. Personal (financial, health, housing, family) issues are the most common reasons for attrition, and so the school has implemented an innovative approach of employing a staff social worker to help students address these issues and to support their continued progress in the nursing program.

In order to maximize student diversity, the UMKC School of Nursing has implemented an initiative, "Increasing Minority Nurse Researchers," through a grant proposal submitted to the Division of Nursing in HRSA. There is a critical dearth of nurse researchers and faculty from underrepresented minority groups, and the goal of this study is to increase the number of nurses from underrepresented minority groups who complete their Ph.D. in nursing at UMKC.

The UMKC School of Nursing is a partner with Truman Medical Center and Children's Mercy Hospital in a grant

proposal to investigate a new model for clinical education that would increase capacity in the school's undergraduate program.

UMSL is participating in the Missouri Hospital Association Expansion Initiative, with a goal of increasing the number of undergraduate students by 30 each year. The school also is participating in a MBH grant, with a goal of graduating an additional 11 undergraduate students in 2006.

The UMSL nursing school also is working with the MU School of Health Professions to offer the Imaging and Respiratory Therapy programs in St. Louis. In addition, UMSL is working with the SSM Health Care in St. Louis to offer an additional externship experience for 30–40 students in summer 2006.

Optometry

Many at-risk school-age children do not receive appropriate eye and vision care. In order to address this gap, the college recently implemented the Mobile Examination Center (MEC), which provides comprehensive eye and vision care on-site at schools, residential facilities and other areas where the need to do so has been identified. This project is helping to improve vision for children, and children who see clearly are better prepared to learn. The fullest reach of these initiatives is primarily limited by the available resources.

The UMSL School of Optometry has several new initiatives underway that will foster comprehensive eye care, promote early screening, and attract more minority students to the field. Some examples include:

- Expansion of existing collaborative partnerships with neighborhood health clinics in order to decrease barriers to high-quality comprehensive eye and vision care.
- Solidifying relationships with other health professionals, including those within UM, through the establishment of multi-disciplinary

health centers strategically located in order to address health care disparities.

- Expansion of efforts to recruit minorities into optometry. The Bridge Program and the joint recruitment efforts with UMKC's School of Dentistry are two examples described in more detail on page 20.

Pharmacy

The unique nature of the UMKC School of Pharmacy involves the education of “drug experts,” pharmacists who are trained to practice clinically and provide the highest level of pharmaceutical care.

The pharmacy graduate receives over 100 semester hours of coursework specifically targeted at understanding drug therapy, including a year of clinical clerkships in various practice settings associated with direct patient care. Working under the tutelage of highly-trained faculty clinicians, graduates become capable of recommending appropriate drug products, detecting potential drug interactions with both prescription and non-prescription products, and designing therapeutic regimens to provide optimal outcomes.

The clinical component currently utilizes more than 100 sites and more than 300 volunteer faculty across Missouri, which allows the school to reach out to most areas of the state. Students who have the opportunity to train at these outstate sites often develop relationships that lead them back to those sites after graduation.

The school also is actively working to expand its program offerings to other areas of the state to address the shortage of pharmacists in Missouri. The recently implemented satellite program in Columbia will increase the school's capacity and graduate an additional 35 percent per year. The program also will allow students to receive experience in rural settings and in nuclear medicine, areas that are not readily available on the Kansas City campus.

The unique and novel satellite program is very cost-effective, utilizing the basic science courses from the Columbia campus in addition to course work and clinical experiences specifically designed by the UMKC School of Pharmacy. Students formally admitted to the pharmacy program complete their education through online, residential and clinical practice courses, all offered on the Columbia campus and in community clinics.

The UMKC School of Pharmacy continually works on innovations for training and practice settings. Other innovative programs include:

- Extension of the doctor of pharmacy program to other sites around the state; development of specialty clinical rotations in key areas such as oncology and nuclear pharmacy; and initiation of a health care team model in conjunction with the satellite program. This latter effort would pair pharmacy students with other health care team members in patient care settings, allowing for the development of strong inter-professional communication skills.
- Development of interdisciplinary health care team experiences with other health care schools is being planned. These experiences will provide graduates with better patient care skills through integrated approaches to optimal care.

V. Executive summary

Health care worker shortage

Health policy experts across the country recognize that the United States will experience a shortage of health care workers starting in the latter part of this decade. Considerable shortages already exist in many specialties, and future shortages will likely affect a broad range of individuals, regardless of their socio-economic status. The problem will be exacerbated by a number of developing trends, including significant retirements among active practitioners, changes in technology and practice, and the fact that most people are living longer and will need additional health care. While the health workforce shortage will affect most geographic areas, the rural and inner city areas will likely be hit the worst (Pryce-Jones, 2006).

Aging population

Demographic data indicate the population is aging across the country — perhaps more dramatically in Missouri than in other areas. Approximately 14 percent of Missourians are over the age of 65, and Missouri now ranks 14th in the nation in the number of people over 65. As the population ages, the health care needs increase. Of course, this causes additional shortages among health care workers in Missouri (Overview of Missouri's Health Related Occupations, OSEDA, 2005).

Existing UM health care education programs

The University of Missouri recognizes the importance of addressing the workforce needs in health care fields and is responding when fiscal and human resources are available. The University offers health care education programs in dentistry, medicine, nursing, optometry, pharmacy, and a wide array of allied health fields in the areas of rehabilitative, diagnostic and imaging sciences.

Addressing current supply & future demand

For the University of Missouri to address the health care worker shortfall, it needs to simultaneously address the issues of access, affordability and program quality. Currently the most significant issues facing the University of Missouri's health care education programs are the limited number of “seats” and the cost of educating students in these specialized programs, which causes the programs to turn away many qualified applicants.

Access to health care & education

Providing access to health care and offering educational opportunities to traditionally underserved populations are two additional concerns for health care educators. To address both these issues, the University of Missouri programs have adopted a number of strategies including enhanced student recruitment efforts, partnerships with local hospitals and clinics, pre-admission programs to attract academically prepared yet underrepresented minorities, recruitment and service efforts in rural areas, and developing clinics in underserved areas that provide patient care and training opportunities for existing students.

Innovative approaches

The University of Missouri health care programs are charged with designing innovative programs; developing groundbreaking techniques and conducting basic and applied research; and serving underrepresented patient populations. These responsibilities must be balanced with a health care environment that needs more trained professionals immediately to address the aging population, as well as the changes in medical technology and health care practices. With limited resources and limited state support to fund capital projects, the health care schools are using a number of strategies to tackle these challenges.

In many cases, opportunities for innovative methods to address worker shortages would come from increased resources to cover the costs of new initiatives. These new initiatives also are dependent on the willingness of other agencies or colleges to develop cooperative partnerships.

Responding to the state's health care needs

The health care programs at the University of Missouri could educate more students if their capacity increased, but to do so often requires both additional faculty and facilities. The University of Missouri is perfectly positioned to respond to these needs building on its vast resources and economic development potential. To address these emerging needs will require a broad based coalition of business leaders and entrepreneurs, health care educators and practitioners, and adequate financial resources.

This task force report outlines numerous illustrations of how these issues can be addressed, given the proper partnerships and financial resources.

Using resources in efficient & creative ways

The challenge facing the University of Missouri is to provide leadership and innovation in health care education, research and training. To meet this challenge it must use existing resources and faculty talents in efficient and creative ways to increase funding for research; to initiate partnerships with private companies and public agencies; and to identify novel ways to address today's health care needs.

To respond to these emerging trends to meet the health care needs in the next decade, the University of Missouri has developed a proposal across the full array of health care areas. The details of these proposals are articulated in Appendix A in the form of a legislative appropriations request. This initiative is a top priority of the University of Missouri and the result of coordinated planning by the nine UM health care schools. More

detailed information on this proposal can be obtained by contacting UM Government Relations, 309 University Hall, Columbia, Mo. 65211.

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Appendix A: Funding for health care professional education background information

Funding requests & background information by school

UMC School of Medicine = \$7,893,750 (FY08)

- The school ranks in the bottom 7 out of 74 public medical schools in state support.
- \$7.367 million for salary support for existing and new faculty in order to reduce the pressure to carry out activities that “pay for themselves” such as seeing patients and allowing more time for student training.
- \$526,750 for recruitment and retention of rural medical students:
 - Estimated annual cost of medical education per student is \$200,000; state appropriated funds provide about \$32,700 annually per student.

UMC School of Nursing = \$2,055,723 (FY08)

- Nurse vacancy rates are commonly above 10 percent in health care facilities, with a 19 percent estimated shortage by 2010 if not addressed.
- Funding will be used to increase the number of undergraduate and graduate students by 100 per year:
 - Includes hiring of additional faculty and staff;
 - Enables continuance of an accelerated program to educate 40 students per year;
 - Increases the BSN completion program by 20 students per year;
 - Increases the number of graduate students by 40 per year.

UMC School of Health Professions = \$2,100,000 (FY08)

- Allied health professionals account for 50 percent of the U.S. health workforce.
- Faculty shortages in allied health are the highest among all health professions, ranging from 9.3 percent to 15.4 percent.
- Funding will be used to increase undergraduate and graduate student capacity by 20 percent:
 - Create an interdisciplinary Ph.D. program in Health and Rehabilitation Sciences;
 - Strengthen existing critical need programs in rehabilitative and imaging sciences
 - Increase teaching faculty and pursue academic partnerships with Missouri hospitals and other employers;
 - Establish the Allied Health Scholars program to provide up to three years’ scholarship funding to 15 new students in exchange for three years of employment service within the state.

UMKC School of Medicine = \$1,315,625 (FY08)

- UMKC School of Medicine is a 6-year combined baccalaureate/M.D. degree.
- It received the highest accreditation possible from the LCME (accreditation body); however, it was cited for a lack of basic science faculty.
- \$750,000 to hire additional basic medical science faculty.
- \$65,625 to establish a Clinical Simulation Center to address the changing requirements of medical diagnosis and treatment by providing the latest in human patient simulation equipment.
- \$500,000 to provide additional scholarships for need-based and minority students.

UMKC School of Nursing = \$1,742,078 (FY08)

- The hospital nurse vacancy rate for the Kansas City region is 10.7 percent.
- Funding will be used to address nursing shortages in Missouri:
 - Supports the implementation of an accelerated BSN program, graduating an additional 40 students each year;
 - Expands the Nurse Educator and doctoral programs to produce an additional 50 nursing faculty per year, who will be prepared to teach in nursing programs.

UMKC School of Dentistry = \$690,000 (FY08)

- UMKC provides the only dental school in Missouri or Kansas (public or private).
- The school has already increased its student enrollment by 25 students per year and will need funding to support this increase.
- 106 out of 114 counties in Missouri are considered dental shortage areas.
- \$440,000 to hire additional faculty.
- \$250,000 to provide additional scholarships to students, specifically those from rural and minority communities.

UMKC School of Pharmacy = \$1,486,780 (FY08)

- Missouri has a 4.2 out of 5 pharmacist demand rating, with 5 being high demand, indicating a critical shortage before 2012 based on the MERIC projections.
- The school has already increased its student enrollment by 28 students per year through a cooperative agreement with UMC.
- \$1.163 million to hire 10 full-time faculty.
- \$89,600 to hire 2 full-time support staff.
- \$60,000 in recurring funds for scholarship support to encourage graduates to practice in rural areas.
- \$173,740 in recurring funds for distance education technology, accreditation research and office infrastructure equipment for further program development.

UMSL College of Optometry = \$1,157,236 (FY08)

- UMSL provides the only such program in the state, but student fees for attendance continue to be the highest among the 17 U.S.-located schools and colleges of optometry, both public and private; the College's fees were an average of 46 percent higher than the average.
- A substantial number of Missouri residents are choosing to attend schools out of state, with fees lower than that of their in-state school.
- \$1.157 million for scholarships to reduce educational costs to students, in order to position the student fees at the mean of all university-located schools and colleges of optometry.

UMSL School of Nursing = \$1,558,807 (FY08)

- The hospital nurse vacancy rate for the St. Louis region alone is 11 percent.
- \$1,235,710 to increase faculty and staff. The additional faculty will enable an enrollment of 75 additional students per year, in order to deal with the statewide nursing shortage.
- \$89,097 in scholarships to increase access for students.
- \$234,000 in one-time expenses for building space renovation.



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