PREPARING PHYSICIANS FOR RURAL PRACTICE:
THE WWAMI MODEL

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Despite a rapidly evolving health-care delivery system in the United States, there remains a significant shortage of physicians serving rural America. Ever since specialization began to emerge in the 1920s and was formalized by 1940 with the establishment of the first five specialty boards, increasing numbers of U.S. medical school graduates choose to pursue careers in specialty fields in the medical and surgical disciplines. By 1970, fewer than 20 percent of U.S. graduates were going into primary care—family medicine, general internal medicine, and pediatrics. This trend has continued so that, according to the Association of American Medical Colleges, only 14.5 percent of U.S. graduates entered primary care in 1992. Recently, fueled by the emergence of managed care and public policy efforts to reduce the cost of health care to the American public, primary care rose to 28 percent of U.S. medical school graduates in 1996 but is now again on the decline.

In 2001, the WWAMI program of the University of Washington School of Medicine celebrated its 30th anniversary. WWAMI, which stands for Washington, Wyoming, Alaska, Montana and Idaho, is a partnership established between these states and the University of Washington School of Medicine to provide access to publicly supported medical education for citizens of states where no medical school previously existed. With the addition of the State of Wyoming in 1997, the WWAMI region comprises approximately 27 percent of the total land mass of the United States. This area is home for approximately 3.3 percent of the total population of the United States (approximately 9.1 million people). Using the definition of the U.S. Census Bureau applied to non-Metropolitan Statistical Areas (non MSAs), 55 percent of people living in the WWAMI region live in rural communities. This compares to the overall U.S. average of 25 percent rural. The share of health care provided in these communities by primary care physicians is 85 percent.
When the WWAMI program was founded in 1971, the dilemma facing the states outside Washington was whether or not to build their own individual medical schools. The states chose at that time what appeared to be a more cost-effective and educationally superior approach. This approach was to develop a partnership between the University of Washington School of Medicine (UWSOM) and the states of Alaska, Montana and Idaho to develop a decentralized system of medical education. By every measure, this choice has been proven very effective.

In brief, the founding goals can be summarized with the following five points:

- Providing access to medical school seats for citizens of the WWAMI region;
- Increasing the number of primary care physicians and addressing the maldistribution of physicians in the WWAMI region;
- Broadening the educational experience through the use of community resources;
- Expanding undergraduate (medical school), residency, and continuing medical education in the WWAMI states; and
- Avoiding the need for capital-intensive expansion of buildings and faculty through partnerships between the University of Washington and existing state universities.

**Implementing a Decentralized Medical Education System**

Over the years, the WWAMI program has made a strong commitment to provide programmatic elements supporting physician education at all levels, from elementary school to establishment of community practice. In 1974, when the first programs were implemented, the WWAMI education program was divided into two major components. The first was the University Phase, which was carried out at state institutions of higher education within each of the participating states. The University Phase was established at the University of Idaho (Moscow), Montana State University (Bozeman), the University of Alaska (Fairbanks, later Anchorage), Washington State University (Pullman), and the University of Washington School of Medicine (Seattle).

The second major component, the Community Phase, allowed for the development of Community Clinical Units (CCUs), where the basic clerkships in the third year of medical school could be taught in community sites, many of which are in small towns, across the region. The admissions process was established through a decentralized model by which individual members of
the admissions committee were appointed from citizens in participating states, and their choices and recommendations were funneled up to an executive admissions committee. The executive admissions committee also included at least one representative from each of the AMI states (Alaska, Montana, Idaho) to serve and to make final admissions decisions. Likewise, in support of students graduating from the program and transitioning into community practice, there was an early attempt to create community Support Services in the form of continuing medical education, a medical consultation telephone service (MEDCON) for practicing physicians and outreach services from the Health Sciences Library.

Using the State of Montana as an example, the University Phase was established at Montana State University. A total of 20 students from Montana comprised the class. The class took all of the first-year basic sciences as well as the introduction to clinical medicine classes in Montana, utilizing the facility and faculty on the Bozeman campus. Initial efforts to develop CCUs in the State of Montana included a six-week rotation in Medicine either in Missoula or Billings, Pediatrics in Great Falls and Family Medicine in Whitefish (Map 1).
Regional Growth and Program Maturation: Introduction to the Educational Continuum

What has emerged over a 30-year period is a considerable increase in the number of programmatic elements that are now provided across the full continuum of educational services, from elementary school to continuing medical education for physicians. Attached (see pp. 78-81) is a diagram outlining this Educational Continuum and a glossary of terms with a brief explanation of each of the educational, community support and research elements. To briefly summarize the approach, considerable attention has been paid to developing a robust applicant pool, which is reflective of the health-care needs of the region. Specifically, represented on the left-hand side of the Educational Continuum diagram (see Attachment) are programs that primarily focus on the identification of interested and potential applicants who represent the diversity of the region (Native American, Alaskan Native, Hispanic/Mexican American and African American) as well as interested candidates from rural communities. The purpose of these programs is to develop preparatory skills and real-life health-care experiences among interested students.

The overall medical school program (center of the Educational Continuum diagram) also has promoted development of individual programs that encourage early awareness and interest in rural and medically underserved medicine, community-based learning and further development of the University Phase faculty and programs.

Following medical school, a network of Family Practice and Primary Care Internal Medicine Residencies affiliated with the UW has been developed for the five-state region. With the inclusion of Wyoming in 1996, there are 21 primary care residencies affiliated with WWAMI over the five-state region; 18 focus on family medicine and three on internal medicine. Many of these residencies have developed a specific programmatic focus on meeting the rural and medically underserved needs of communities across the region, such as the rural track program in Billings (Montana), Spokane (Washington), Boise (Idaho) and Anchorage (Alaska).

Finally, the Community Practice phase (right hand side of the diagram) contains programs developed to enhance and strengthen community health-care providers and their communities (Programs for Healthy Communities/Community Health Services Development Program) as well as specific programs to enhance recruitment and retention of health professionals in underserved communities through the Area Health Education Center system.
Looking at Map 2 as an example of programmatic development, a proliferation of programs is evident compared to humble beginnings in 1975. We have now created a truly decentralized, community-based approach to medical education across the region. Beyond Montana, the regional map (Map 3) demonstrates program distribution across the five-state region. To accomplish this successfully, a considerable number of partnerships have been established, including a variety of members that are critical to establishing enduring community links.

**WWAMI—Constant Innovation in Medical Education**

In 1996, two additional innovative programs were established. The WRITE Program (WWAMI Rural Integrated Training Experience Program) provides a six-month block for interested students to work within a rural community, meeting a large portion of the requirements of their six basic clerkships during the third year of medical school. There are now 10 WRITE Programs over the five states. In Montana, Libby serves as the WRITE site.
A second innovation, founded in Idaho, eastern Washington and Alaska is the Third Year Track System. This program allows students to complete all third-year requirements within one geographic area. The Track System has better accommodated the needs of “geographically bound” students who need to spend a greater portion of their medical school time closer to family in their home states. Like WRITE, Tracks also allows for greater continuity of patient care for students during medical school, a central theme for teaching primary care.
WWAMI—INTERSTATE PARTNERSHIPS

Successful implementation of the WWAMI program has depended on the enduring partnerships created within and between states. The programs initially require a tremendous amount of effort to bring together all the right people and organizations that need to be involved, and then a continued amount of attention and communication to assure that the various needs and interests of the partnership groups are met in an ongoing fashion. In Montana, this list includes: physicians of Montana and the Montana Medical Association, specialty societies in Montana, the Montana Area Health Education Center in Bozeman, private businesses in Montana, the Montana Hospital Association, the Rural Health Research Center (UWSOM), the Department of Medical Education (UWSOM), the Montana State Department of Health and Human Services, the Montana State Office of Rural Health and the Office of the Commissioner of Higher Education. The annual report to the Montana State Legislature and the Commissioner of Higher Education’s Office provides for an annual dialogue on the current status, progress and outcomes from WWAMI.

THE MISSION OF THE UNIVERSITY OF WASHINGTON

The WWAMI program has allowed the University of Washington to successfully execute a substantial portion of its stated mission. The mission is rather simple, and contains just two items:

- To address the health-care needs of the region with special reference to primary care.
- To achieve leadership and excellence in biomedical research.

The University of Washington has frequently been referred to as a bimodal medical school—one that excels in both primary care and biomedical research. This has only been made possible through the enduring community-based partnerships that have been established through the WWAMI program.

Over the course of the past decade, the University of Washington School of Medicine has enjoyed success in meeting its mission. U.S. News and World Report has listed UWSOM as the number one primary care school of the 125 medical schools in the United States each year since 1994. The percentage of graduates entering primary care has consistently been at or near 50 percent.
However, consistent with national trends, this percentage has dropped over the past two years. During the past decade, nearly 20 percent of the school’s graduates have taken up practice in areas classified by the federal government as Health Professional Shortage Areas (HPSA). This percentage is far above the national average for U.S. medical school graduates, which is less than 10 percent.

In research, UWSOM has ranked in the top five of all medical schools in the United States in funding from the National Institutes of Health (NIH), ranking third in 2001 with $315 million, behind Harvard and the University of Pennsylvania. Five of eight basic science departments and five of 12 clinical departments rank in the top 10 research departments among U.S. medical schools. The Fred Hutchinson Cancer Research Center (FHCRC) and the UW School of Medicine (all researchers at FHCRC are members of the UW faculty) combine to form the largest cancer research program in the United States. The School of Medicine currently lists 39 members in the prestigious Institute of Medicine, 21 members of the National Academy of Science and 3 Nobel Laureates.

Educational Programming to Support Our Regional Mission

Programmatic efforts to encourage students to choose careers that meet the primary care, medically underserved and rural area needs of the WWAMI region do not begin on the first day of medical school and end when the student graduates. Rather, as shown on the Educational Continuum diagram, programs must be designed to support a successful outcome to meet the school’s mission at every step along the way.

Approach Prior to Starting Medical School

WWAMI believes that identifying and nurturing a strong and diverse applicant pool of qualified students is essential to the success of the medical education program. To this end, the UW School of Medicine has developed the U-DOC High School Program designed to foster, affirm and encourage the interest of high school students living in medically underserved areas through summer programs at the affiliated state universities. Diversity in the applicant pool is enriched by outreach programs, such as the Minority Medical Education Program. This program brings 75 mostly undergraduate students
to the UW campus for science courses, mentorship and experiences that bring greater meaning to medicine for the participants. The Native American Center for Excellence provides similar experiences for Native American students and also creates a focus for support and programmatic enrichment for students enrolled at the University of Washington.

These efforts at outreach support the decentralized system of admission to WWAMI mentioned above. This system further assures that qualified applicants who are selected will best meet the individual state’s needs for the next generation of physicians. The admissions process places equal emphasis on past academic performance and aptitude with non-academic factors such as community service, care of the underserved and personal commitment to a balanced professional future.

**Programs During Medical School**

During medical school, UW students are given many opportunities to learn in community-based settings. These include:

- Pre-clinical education based in affiliated state universities (1st year)
- Rural/Underserved Opportunities Program (R/UOP) (between the 1st and 2nd year)
- R/UOP Research (years 1 and 2)
- Community-based required clerkships (3rd year)
- WWAMI Rural Integrated Training Experience (WRITE) (3rd year)
- Regionally based clinical electives (4th year)

As mentioned earlier, a brief synopsis of each of these programs is provided in the glossary attached to the Educational Continuum diagram. Each class of 178 students has 68 students who begin their medical school experience in one of the six affiliated state universities. In Montana, 20 students begin their medical school studies at Montana State University. Considerable effort is expended to assure that course material and introductory clinical experience at each of six first-year sites are consistent in content and maintain across all locations the high quality provided by the University of Washington School of Medicine.

More than half of the first-year class selects the R/UOP option. The experience consists of four weeks in a rural or medically underserved
community working side by side with a community physician who is a member of the School's clinical faculty. Like all programs and experiences, R/UOP can be elected by any student to be done in any of the five states. Map 2 shows R/UOP sites as darker dots.

R/UOP's impact can best be characterized by the following two quotations, one from a participating student, the other from one of the clinical faculty:

What I remember most about R/UOP were my conversations with my sponsoring physician in the evenings after making rounds at the hospital. Sometimes he would explain a medical condition or a physical finding to me. Sometimes we discussed the state of health care in America or the nursing homes in town or hospital politics. Often he would tell me about his experience as one of the first doctors to be trained at the University of Washington's new Family Practice Residency Program. I was inspired by the glimpse he gave me of the doctor I can become. ……R/UOP Student

The enthusiasm of the student is a real benefit to the practice. It keeps us sharp and is perceived by patients as an honor to be selected by the UW School of Medicine. We are looking forward to next year. ……R/UOP Physician

During R/UOP, students may also elect to spend an additional eight weeks completing a student/preceptor-designed research project (R/UOP Research). These projects are sponsored and mentored by experienced UW researchers. The program allows the student to complete the School’s independent study/thesis, required of all students prior to graduation, while still having time to experience R/UOP.

Required third-year clerkships in family medicine, medicine, obstetrics and gynecology, surgery, psychiatry and pediatrics can be satisfied by the student in any of approximately 50 regional community-based sites (on Map 2, sites in Billings, Havre, Great Falls, Missoula and Whitefish) or within the UW Academic Medical Center in Seattle. To assure academic integrity across the vast regional “classroom,” considerable effort is directed at common curriculum, common exams, quarterly meetings of the faculty and an extensive student/preceptor evaluation system.
The WRITE program, mentioned earlier, allows a student to complete his or her third-year requirements while spending six months of the third year in one rural community. The program allows a more extensive experience in rural health while providing an unparalleled opportunity for continuity of care with patients during medical school. Student interest in the program has been very high, attracting the interest of the academically best students in the class.

**POSTGRADUATE MEDICAL EDUCATION AND COMMUNITY-BASED SUPPORT**

In addition to programmatic excellence during medical school, attention has been paid to establishing programs that foster the regional mission in graduate medical education (internship and residency) and support retention of practitioners once established in rural or medically underserved communities. To that end, WWAMI provides:

- Regionally based Graduate Medical Education (GME) in family medicine, medicine and psychiatry. There are also resident rotations in pediatrics and psychiatry.
- Continuing Medical Education (CME).
- Telephonic and telemedicine consultative services (MEDCON).
- Regional access to an outstanding on-line and fixed collection health sciences library and information center.
- Programs for Healthy Communities (PHC).
- Generation of new knowledge to support community development and program development—WWAMI Rural Health Research Center and the WWAMI Center for Health Workforce Studies.

Programs for Healthy Communities (PHC), established originally as Community Health Services Development (CHSD), had its roots in research looking at survival of rural hospitals, conducted in the WWAMI Rural Health Research Center. Over the past 12 years, PHC and CHSD have worked in over 70 communities across the region. PHC has assisted communities to improve planning for needed health services and worked with communities in implementing completed plans. PHC/CHSD has provided an essential element of WWAMI, allowing for direct service to the community in fulfillment of the school’s regional mission through assisting communities to directly address their own medical service needs and to provide a better place for WWAMI graduates to successfully establish an enduring practice.
The federally supported Area Health Education Center (AHEC) program has supported WWAMI in PHC and in the implementation of R/UOP.

**WWAMI Programmatic Outcomes**

Over the course of the past three decades, the goal of the WWAMI program has been to train the next generation of physicians for participating states in a cost-effective manner.

At the time of graduation from the UWSOM, 86 percent of graduating students indicate that they plan to practice within the five-state area, placing WWAMI in the top five of all U.S. medical schools for percentage of graduates planning to remain “in state” following their graduate medical education training.

Looking at the number of WWAMI graduates returning to the sponsoring state of origin as a percent of those starting there, the following return rates have been realized over the past 30 years: Alaska, 67 percent; Idaho, 66 percent; and Montana, 55 percent. Wyoming graduated its first class in the summer of 2001. The national average of students graduating from state-supported medical schools who stay in that state to practice is 41 percent, placing WWAMI significantly above the national average.

As mentioned above, WWAMI graduates choose careers in primary care and enter medically underserved areas to practice in numbers significantly above the national average for U.S. medical schools. Efforts to establish outreach during high school, attention to selection factors during application to medical school, educational experiences that expose students to community-based education in rural settings and support of community-based health service development have all contributed to this outcome.

Another critical outcome measure is cost. Nationally, the average annual cost of educating medical students varies widely, currently ranging between $44,000 and $79,000 per student per year. Using Montana as an example, in 1975 the average cost per student to the state was around $15,000 a year. In the year 2000, this cost was just over $37,000, which, after adding student tuition ($9,200), brought the total annual cost to just over $46,000. This average cost
per student is very competitive with national averages even when the additional costs of the vast decentralization of programs have been taken into account.

To summarize, WWAMI has been both cost effective and has provided (in numbers and percentages substantially above the national average) physicians who return to their state of origin as well as physicians who enter primary care.

**WWAMI: ENDURING SOLUTIONS FOR WHAT BOthers RURAL HEALTH**

In this new millennium, rural health-care delivery in the United States continues to be challenged by difficult, persistent problems. These challenges include:

- Physician and other health-care professional shortages (maldistribution of human resources);
- Financial shortfalls in publicly sponsored health plans (Medicare and Medicaid);
- Disproportionate (compared to urban) numbers of uninsured people; and
- Thin hospital margins—nationally, on average, rural hospitals are currently realizing negative margins.

Even though WWAMI, as an educational program, has focused on preparation and distribution of new physicians in primarily rural states like Montana, it has also provided research efforts to better define the challenges listed above. In addition, WWAMI has created an enduring community-based infrastructure to design and implement solutions to many of the perplexing problems that continue to haunt rural health in the United States. The end result is a national and international model upon which other regional programs can model an approach to meet the needs of rural and medically underserved communities through a medical education-based system.
Targeting Primary Care in WWAMI Partnerships from Grade School Through Community Practice

K-12

Area Health Education Centers sponsor career days, health fairs, preceptorships with health personnel and academic enrichment programs for the spectrum of students.

U-DOC High School Programs are 4-6 week summer enrichment programs sponsored by the UWSOM Office of Multicultural Affairs at affiliated state universities. The program’s goal is to foster, affirm and encourage the interest of high school students living in medically underserved areas in the medical profession by allowing them to explore medical careers and to get a valuable introduction to college life.

COLLEGE

Minority Medical Education Program annually brings 75 minority undergraduate students to the UW campus for six weeks of science courses, MCAT preparation, healthcare lectures, mentorship experiences, and medical school applications and admissions.

School of Medicine’s Committee on Admissions has 18 family practitioners, including four from rural areas. Twelve committee members are from Alaska, Montana, Idaho and Wyoming. The school’s mission statement emphasizes dedication to “meeting the health-care needs of our region, recognizing the importance of primary care.”
Primary Care Mentorship and Advisory Program assigns students to faculty members in the disciplines of their choice who serve as their mentors and career advisors.

ROE (Rural Observation Experience) offers incoming students an opportunity to spend a day or so with practitioners in rural or underserved urban areas.

MEDICAL SCHOOL

WWAMI First Year Sites (University Phase): students from Alaska, Montana, Idaho, and Wyoming take their initial year at state universities in their home states: University of Alaska, Montana State University, University of Idaho and University of Wyoming. Twenty Washington students are on campus at Washington State University in Pullman, joining classes with students based at the University of Idaho. Half-day preceptorships in the offices of local practitioners introduce students to clinical medicine.

Native American Center of Excellence, established in 1993, coordinated biomedical research and recruitment of Native Americans into health-care and medical careers. The Center has established an Indian Health Pathway which provides training and certification to Native American and Non-Native American students who wish to gain solid academic and clinical training focused on Indian Health issues.

CHAP (Community Health Advancement Program). Based in the UWSOM’s Department of Family Medicine, CHAP is an interdisciplinary, community-based, service learning program which over 20 years has provided medical and other health science students the opportunity to combine professional development with medical care for disadvantaged populations. Annually, 300 students participate in dermatology clinics for the homeless, diabetic food care, sports medicine clinics and mentoring sessions for disadvantaged students.

R/UOP (Rural / Underserved Opportunities Program) offers students, between their first and second year, preceptorships with practicing physicians in small towns across the WWAMI states and among the urban medically underserved.

R/UOP Research: 1999 marked the first year for students doing R/UOP to also begin work on community-based research to fulfill their Independent Study in Medical Science requirement during a 12-week summer experience supervised by UW faculty.

MSRTP (Medical Student Research Training Program) provides funded opportunities for students to participate in a full-time, 12-week research project under the supervision of a University of Washington faculty member. Projects include basic science and clinical research as well as health services utilization studies. Students may do their research with faculty members located at the University of Washington as well as the WWAMI sites.

SPARX (Student Providers Aspiring to Rural and Underserved Experiences) is an interdisciplinary effort of the UW Schools of Health Sciences to strengthen the resolve of students interested in rural or underserved practice to enter such practices upon completion of training. The program is funded and supervised under AHEC.
Clerkships: the Community-Based Clinical Clerkship Phase is a six-week required rotation taken in the third year. In this program, taught in a variety of clinical settings, students learn a primary care approach to the diagnosis and management of common medical problems presented in a family practice setting.

WRITE (WWAMI Rural Integrated Training Experience) is a six-month rural medical experience emphasizing continuity of care, integration of medical disciplines, and rural setting activities offered to third year medical students.

POSTGRADUATE

Family Practice Residency Network has residents located at the UW and affiliated sites in Seattle, Yakima, Vancouver, Spokane, Bremerton, Olympia, Tacoma and Renton, Washington; Boise and Pocatello, Idaho; and Billings, Montana.

Rural Fellowships at Tacoma Family Medicine give five graduating residents an additional fourth year of training in rural settings and in learning skills especially needed for practice in rural and underserved areas.

Internal Medicine's Primary Care Residency program spans three years, with a total of 48 residents, 16 in the first year. In the second year, eight residents are located at the Boise Veterans Administration Medical Center and eight are based at Seattle's Harborview or Pacific Medical Centers.

COMMUNITY PRACTICE

Area Health Education Centers and Offices of Rural Health serve as health personnel clearing houses, linking communities looking for physicians with physicians seeking new locations and advising towns on the recruitment process. The six interdisciplinary centers, in cooperation with the region's health professions training programs, place more than 500 students in all disciplines in rural and underserved areas for parts of their training.

WWAMI Rural Health Research Center (RHRC), established in 1988, is one of five federally funded policy-oriented rural health research centers. Based in the UWSOM Department of Family Medicine and working closely with other departments, schools, Washington State Department of Health, and the AHECs, the WWAMI RHRC is engaged in a variety of inquiries, with a focus on rural and underserved health-care issues.

WWAMI Center for Health Workforce Studies, established in 1998 as part of the University of Washington Department of Family Medicine, brings together researchers from medicine, nursing, dentistry, public health, the allied health professions, pharmacy, and social work to perform applied research on the distribution, supply, and requirements of health-care providers, with emphasis on state workforce issues in underserved urban and rural areas in the WWAMI region.

Area Health Education Centers (AHECs) arrange continuing education courses for physicians and other health-care personnel in their areas. Last year the six centers sponsored or co-sponsored programs, conferences, and telecommunications sessions for 19,000
participants. The centers maintain learning resource centers, and the Montana center operates an electronic bulletin board for health-care providers.

**Program for Healthy Communities (PHC)** based at the UW School of Medicine and at the AHECs has worked with over 60 towns in the WWAMI states since 1989 to strengthen health-care delivery systems and improve the practice environment. Assistance includes assessments of community health-care delivery needs and implementation of recommendations within community settings.

**RETENTION SERVICES**

**Division of Continuing Medical Education and Primary Care Departments** present approximately 20 courses a year in Seattle, including an annual program, Advances in Family Practice. Faculty members also regularly visit WWAMI teaching sites to monitor students’ progress, give continuing education sessions, and see patients in consultation.

**MEDCON Telephone Consultation Service** gives all physicians 24-hour, toll-free access for specialists at the medical school.

**Health Sciences Library and Information Center (HSLIC)** facilitates regional on-line access to resources of the National Network of Libraries of Medicine (NNLM).

**Rural Telemedicine Network** provides for telemedicine linkages between rural communities and the UW Academic Medical Center.