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Rural medical education in the WWAMI region: Instituting a rural longitudinal medical school curriculum in association with a rural longitudinal integrated community clerkship experience

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Abstract

The shortage of rural physicians is an old problem and with this in mind there have been efforts at linking in an intentional fashion, a number of related rural programs within the University of Washington School of Medicine's WWAMI (Washington, Wyoming, Alaska, Montana and Idaho) program curriculum with the goal of solving the persistent problem of physician workforce issues in rural areas. The idea of combining a four year rural longitudinal medical school curriculum with an extended rural longitudinal integrated community clerkship (LICC) experience is relatively new in medical education. The defining characteristics of LICCs are: residing in one location over an extended period of time, continuity experience with both a group of patients and faculty providers, and the capacity to meet the majority of the year's core clinical competencies through this experience. In summary, the combination of a four year rural longitudinal medical school curriculum with a rural longitudinally integrated community clerkship experience in the primary year of clinical training is thought to be a viable model to return students to practice in rural and underserved areas of the WWAMI region. Experience has shown that by intentionally linking a series of rural focused experiences within a comprehensive rural medical school curriculum, success can be achieved in returning students to rural and underserved practices.

Keywords: Rural medical curriculum, community based education, undergraduate medical education, United States.

Introduction

The shortage of rural physicians is a phenomenon that is neither new nor knows national boundaries. There have been a multitude of attempts with varying programs in undergraduate medical education, with

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varying success, targeted at solving this problem. As Geyman stated in his 2000 article on educating physicians for rural practice: "It remains clear that the educational pipeline to rural medical practice is long and complex, with many places for attrition along the way" (1). With this in mind there have been recent efforts at linking, in an intentional fashion, a number of related rural programs within the University of Washington School of Medicine's WWAMI (Washington, Wyoming, Alaska, Montana and Idaho) program curriculum with the goal of solving the persistent problem of physician workforce issues in rural areas.

The idea of combining a four year rural longitudinal medical school curriculum with an extended rural longitudinal integrated community clerkship (LICC) experience is relatively new in medical education. A number of important characteristics are crucial to the success of these programs, including a robust pipeline program that creates an adequate rural applicant pool for medical school admissions. Equally important is the admissions process, in that it must be intentional in targeting students with key rurality markers. The intentional development of a rural focused curriculum that nourishes and guides the student throughout their medical school experience is also an important part of these programs. The prevention of "leaks" from the programs during medical school is just as important as the pipeline that brings rural applicants to the educational program. The combination of a targeted admissions process with a rural focused curriculum, as well as, a rural LICC takes these programs to a new level of intentionality in rural training.

LICCs are a recent and unique approach to teaching in the clinical years of undergraduate medical education. This is in contrast to the traditional clinical educational model of short (4-6 weeks) clinical clerkships. The defining characteristics of LICCs are: residing in one location over an extended period of time, continuity experience with both a group of patients and faculty providers, and the capacity to meet the majority of the year's core clinical competencies through this experience. The continuity experience of spending a significant period of time in a community with a group of preceptors and patients is really the defining characteristic of LICCs, which are truly integrated experiences (2,3).

This review describes the historical development of the rural medical programs at the University of Washington School of Medicine (UWSOM) and the design of a new rural LICC experience in the existing rural longitudinal medical school curriculum.

The WWAMI program

The University of Washington School of Medicine WAMI (Washington, Alaska, Montana, Idaho) program began in 1971 as a four state partnership to help address the physician workforce shortages present within each state. All of these states have significant rural populations. Including Wyoming, which joined in 1996, the WWAMI area encompasses 27% of the United States land mass with just 3% of the population. The vast distances and low population densities create a significant rural and underserved population. Access to adequate healthcare is diminished in these rural settings. In four of the five WWAMI states more than 59% of the population lives in rural areas (4).

The WWAMI states experience ongoing shortages of physicians in rural areas. In Montana, for example, 55 of 56 counties are either partially or completely designated as federal primary care shortage areas (5). Nine of these 56 counties are totally without physicians. The National Health Service Corp currently lists a total of 59 primary care openings in the state of Montana (6). The picture is quite similar in the other WWAMI states and highlights the continued need of physicians for the rural areas of the WWAMI region.

At its inception in 1971, there were five main goals of the WWAMI program: (i) admit more students to medical school from all participant states, (ii) train more primary care physicians, (iii) bring the resources of the UWSOM to the citizens and communities of each state, (iv) avoid capital costs of building a new medical school, (v) redress the maldistribution of physicians by placing more physicians in the rural areas of each state (7). Throughout the years all except the last of these initial goals have been met.

The UWSOM is still the only public allopathic medical school serving this vast five state region. All the states have been able to admit a dedicated group

of students annually into the WWAMI program. Wyoming admits 16 students yearly, Alaska, Montana and Idaho each admit 20 students and Washington admits 140 students. All WWAMI students spend their first year in their home state at one of six sites, partnering with regional state universities to provide the first year curriculum except for the 100 Washington students who begin the first year in Seattle at the UWSOM. All students throughout the five state region return to Seattle for the 2nd year of pre-clinical education. In the 3rd and 4th years the students complete clinical experiences in Seattle as well as traveling throughout the WWAMI region to over 40 different communities to complete their clinical training. There are over 4,400 clinical faculty that participate in teaching WWAMI students throughout the region.

The resources of the UWSOM have been leveraged in the region in multiple and varied areas such as supporting the regional Area Health Education Centers (AHECs), pre-medical conferences, the Office of Multicultural Affairs, the Native American Center of Excellence, WWAMI Rural Health Research Center, WWAMI Center for Health Workforce Studies, Graduate Medical Education, Continuing Medical Education and many other efforts. These and other initiatives have helped tie the region and its medical resources to the UWSOM.

All of the partner universities have provided classroom and laboratory resources for their first year students. However, they have not had to invest in significant infrastructure costs to provide for this first year curriculum. The multi-state WWAMI program has continued to meet the accrediting standards of the Liaison Committee on Medical Education by meeting common goals, objectives, experiences and evaluations. Each state has a university phase dean who oversees this first year program. The regional partner states also have clinical deans who oversee the clinical teaching experiences within each state. These experiences include both required and elective clinical clerkships and many other forms of clinical contact for the students in the region.

Making an impact upon the maldistribution of physicians in rural and underserved areas has been the most difficult goal to achieve. The UWSOM has a number of programs that have been developed to offer rural experiences designed to help meet the WWAMI rural physician workforce need. The Rural/ Underserved Opportunities Program (R/UOP), commenced in 1988, is a one month rural observation experience is offered to students in the summer between the first and second years of medical school. In the summer of 2009 there were 117 students (out of a class of 216) participating in this program.

In 1996 the WWAMI Rural Integrated Training Experience (WRITE) was started. Modeled after the successful RPAP (Rural Physicians Associate Program) program at the University of Minnesota, this program offers a five month longitudinally integrated rural experience (8). Currently up to 16 WWAMI students may participate at 15 different rural locations within the WWAMI region. In addition UWSOM offers a number of required clerkships in the third year of medical school in rural communities under 10,000 including: Family medicine, internal medicine, pediatrics, obstetrics and gynecology.

Despite these rural offerings and other programs the WWAMI region continues to experience a shortage of physicians in rural areas. In 1987, nearly a quarter of graduates from the WWAMI program practiced in rural areas (9). By 1994 the number of graduates in rural practice in the previous five year period had decreased to 20%, and decreased to 17.7% over the next five years. In spite of this downward trend the WWAMI program graduates practicing in rural areas continues to be above the recently quoted figure of 8.8% of current medical school graduates intending to practice in a rural area (10). The UWSOM is recognized as a leader in training primary care physicians with a recent history of nearly 50 % of graduates entering a primary care specialty every year, which exceeds the US average by approximately 10%.

Longitudinal integrated community clerkships

In response to the declining numbers of graduates in rural practice, the UWSOM investigated developing a new longitudinal rural medical curriculum, that included a rural LICC. Rural medical programs incorporating a rural LICC experience such as Minnesota's RPAP (11), South Dakota's Yankton

Campus (12), North Dakota's ROME (13), and the University of British Columbia's Northern Medical Program (14) have been successful in returning graduates to rural practice. Starting in 1971, Minnesota's RPAP has 953 graduates in practice, with 77% in primary care specialties, and over 57% returning to practice in rural areas (15). One of the oldest rural medical education programs in the US, the Physician Shortage Area Program (PSAP) at Jefferson, has had a 34% return of its graduates into rural practice (16). The Rural Medical Education Program (RMED) at Illinois-Rockford has seen 62% of its graduates settle in rural areas (17). Other examples of longitudinal rural medical education curriculums include the Wisconsin Academy of Rural Medicine at the University of Wisconsin (18), University of Alabama Rural Scholars Program (19), and WIRHE at the University of the Witwatersrand, South Africa (20).

The combination a four year rural longitudinal medical school curriculum with an extended rural LICC experience in primary clinical year is similar to the Parallel Rural Community Curriculum (PRCC) developed by Flinders University, South Australia in 1997 (21) and the more recent Northern Ontario School of Medicine (NOSM) in Ontario (22). Here we report on the development of this type of program at UWSOM.

Targeted rural underserved track (trust) program

The Targeted Rural Underserved Track (TRUST) was launched in 2008 in the Montana WWAMI region using key elements of other successful programs. These included a targeted admissions process, a longitudinal rural curriculum, specific rural experiences throughout training including an extended LICC experience and emphasis on exposure to primary care specialties.

The explicit goal of the TRUST program is to increase the number of WWAMI students who choose residencies in primary care or other needed specialties and then return to practice in the rural and underserved areas of the WWAMI region. The TRUST program is a four-year rural longitudinal medical school curriculum based upon the RUOP and WRITE programs, with an embedded LICC experience (see figure 1). The objectives of the Montana TRUST program at the UWSOM include:

- Create an integrated pathway for WWAMI students interested in rural and underserved medicine.
- Assist students in the planning and application process for medical school.
- Create a targeted admissions process for those students interested in the TRUST program.
- Enhance the curriculum by linking current programs that focus on rural medicine with new curricular elements that will create a four year rural longitudinal medical school curriculum.
- Develop a continuity mentorship with a rural clinician that will began before matriculation and continue throughout all four years of medical school.
- Link the rural clinical experiences currently present at the UWSOM so that students are exposed to the satisfaction, challenges and lifestyle of rural physicians.
- Expose students to the issues of rural and underserved medicine through a journal club, evening seminars, specific rural health electives and attendance at regional and national meetings on rural health.

The Montana TRUST program begins with pipeline encouragement. A U-doc program provides a summer university campus experience for high school students from underrepresented groups within medicine. The program highlights health career education with encouragement to enter medical school or an allied health career. An additional pipeline aspect of the program is a premedical conference held biannually at Montana State University Bozeman.

This conference, which is targeted to rising juniors and seniors in college, helps students improve their knowledge of the medical school application process. It includes sessions on the medical school application process, MCAT preparation, paying for medical school, mock interviews, tours, question and answer periods with current WWAMI students and residents.

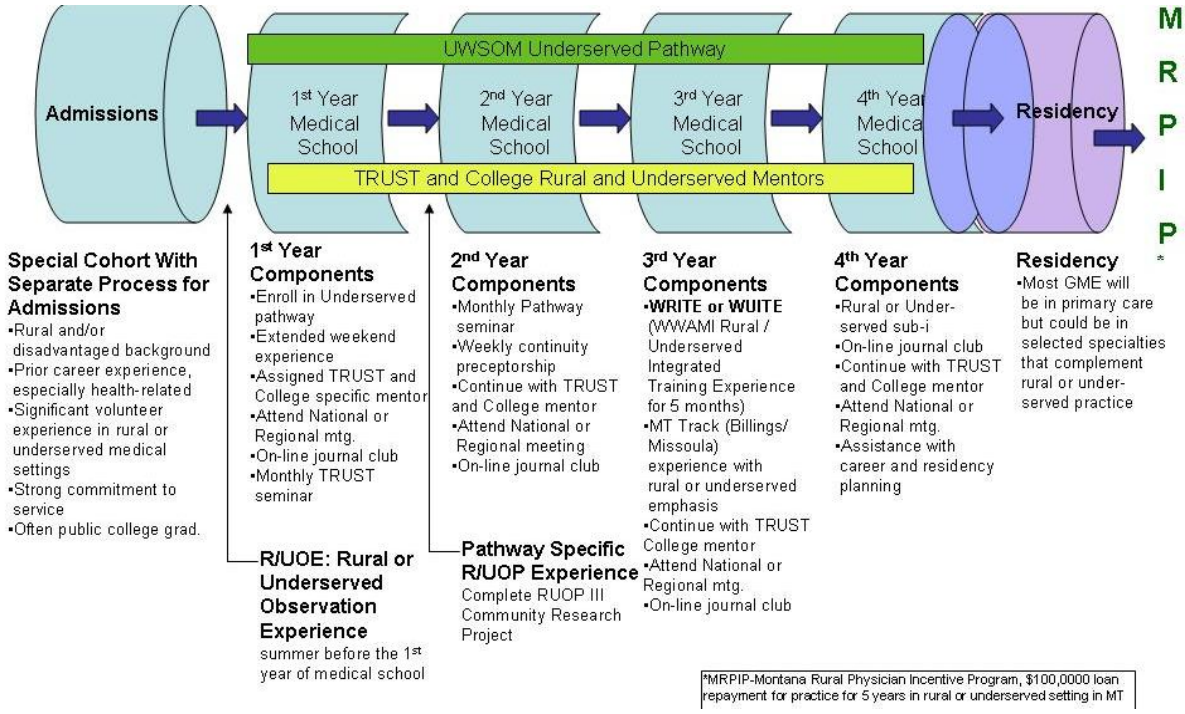

Figure 1. MONTANA TRUST - Targeted Rural and Underserved Track.

Many colleges and universities within Montana have minimal advising for the health sciences, so this conference helps all applicants by providing an equal opportunity for some basic health careers advising, with the goal of allowing all Montana residents to submit a robust medical school application.

A rural targeted admissions process, which admits a cohort of students with a rural background and rurality characteristics was developed. Specific characteristics targeted during the admissions process, which have been identified by others as resulting in a higher return to rural areas include: rural background, attending a public college in the home state, economically disadvantaged, volunteer service background, an underrepresented group within medicine, prior career experience, and having a spouse from rural background (23,24). The admissions committee is asked to evaluate the applicant's knowledge of rural medicine as a career, the applicant's experience in rural Montana settings and their likelihood of returning to practice within those rural settings.

After admission and prior to starting classes, the TRUST students are placed with rural mentors drawn from rural teaching faculty. After an interview with the student to determine an appropriate placement, each student is placed with a rural mentor. The pre-matriculation experience is a two week placement that occurs during the summer prior to starting classes. The goals of this experience include the following: begin a mentor relationship with a rural physician, become acquainted with a rural community and the multitude of health care resources available in a rural community. Emphasis is placed on spending time with members of a rural health care team such as: hospital administrators, laboratory technologists, radiology technicians, physical therapists, pharmacists, home health care providers, emergency medical technicians (including riding with the local ambulance teams), and other healthcare experiences of value. Observation time with the physician is minimized during this exposure because of the student's lack of clinical skills.

Upon entering the first year curriculum the TRUST students are required to participate in a number of activities. An elective course in rural health care is part of the TRUST curriculum. The goals of the course are to provide, from a rural perspective, historic and current information about the health care industry, health care systems, the economics of health care, health policy and the education of health care providers. In addition an emphasis on rural health care

delivery systems and an examination of the infrastructure of the Montana health care delivery system is emphasized. TRUST students participate in extended weekend experiences with their rural TRUST mentors in both the fall and spring of that first medical school year. These weekend experiences allow the cementing of the relationship between the student, mentor and community. Monthly participation in a journal club (either in person or online) that explores articles of interest to rural and underserved medicine is required of TRUST students.

First year TRUST students are also assigned to a UWSOM College mentor who has experience in rural or underserved medicine. The UWSOM College system seeks to focus on personalizing medical education for students, while providing a deepening understanding of fundamental clinical skills and professionalism. The College system offers consistent faculty mentoring, a four-year integrated curriculum of clinical skills, and the teaching of the Introduction to Clinical Medicine course. In addition evening TRUST seminars are scheduled which cover topics of interest to rural and underserved medicine. TRUST students are also required to enroll in the UWSOM's Underserved Pathway. The Underserved Pathway supports medical students interested in working with the underserved by providing an assortment of mentorship, academic, and experiential activities. The goal of the Underserved Pathway is to prepare future physicians to work with a variety of underserved populations by providing a foundation in both their knowledge base and real-world experiences.

Year 2 - Rural/underserved opportunities program (R/UOP)

Between the first and second years of medical school the TRUST students are required to participate in the Rural/Underserved opportunities Program (R/UOP). During this 4-week immersion experience in community medicine, students live in rural or urban underserved communities throughout the WWAMI region. The students work side-by-side with local physicians providing health care to a variety of underserved populations. The goals of R/UOP are:

- To provide students with an early exposure to the challenges and rewards of practicing primary care medicine in a rural or urban underserved setting.
- To promote in students a positive attitude toward rural and urban underserved community medicine.
- To provide students with an opportunity to learn how community health care systems function.

All students who graduate from the UWSOM are required to complete a research project called the Independent Investigative Inquiry (III). During the R/UOP experience the TRUST students are required to complete their III by using the "Community Oriented Primary Care" framework which combines primary care with concepts of public health (25). Through completion of the III project within R/UOP, TRUST students learn of the important issues affecting health in a community and emphasizes their relevance to rural clinical medicine. This exposure to population based medicine is a unique experience for medical students.

During the second year of medical school all WWAMI students come together in Seattle for the continuation of their preclinical curriculum at the UWSOM.

The faculty of the Underserved Pathway assists in this transition by connecting with these students during their required time in Seattle. Underserved seminars and dinners are held for the TRUST students. Connections between the TRUST students and their College mentors also occur during this second year. The college mentor instructs the TRUST students ½ day per week in the Introduction to Clinical Medicine course.

This course teaches the basics of medical interviewing, physical examination skills, documentation, clinical reasoning, oral case presentations, development of professionalism and other topics. During the second year, the TRUST students enroll in part two of the Rural Health elective class, a case based course focusing on chronic health care in rural communities.

Year 3 - The write program

During the third year, with the beginning of the clinical curriculum, Montana TRUST students have the choice of returning to Montana as a WRITE student or completing the third year Tracks in Billings or Missoula, Montana. The Tracks allow students to complete all of their third year required clerkships in either Billings or Missoula. Currently there are three WRITE sites in Montana: Libby, Lewistown and Helena. We are expanding the number of WRITE sites in Montana in order to accommodate all of the TRUST students at these sites. Montana TRUST students have priority for assignments at these instate WRITE sites. The eventual goal of the program is to offer enough WRITE sites within the WWAMI region to accommodate the TRUST students. In this manner, students would have multiple experiences in the same community culminating in the third year LICC experience.

The WRITE program, a LICC experience, is designed to provide selected third-year medical students with an appropriate mix of ambulatory and hospital experience during a 20-week clinical education experience at a rural primary care teaching site. Throughout the program, the WRITE student has the opportunity to form an ongoing relationship with patients and to develop a practice style while learning how to treat a broad range of medical, surgical and psycho-social problems. Learning experiences emphasize the rural physician's responsibilities and roles of diagnosing, treating and managing the majority of health problems on a longitudinal, continuing basis, while calling upon all the health care resources available in the community.

The intent of the WRITE experience is to allow students interested in primary care to fulfill the following tasks:

- Become intimately familiar with the day-to-day workings of a rural community practice.
- Become a member of a rural practice team.
- Develop a continuity experience with a patient panel.
- Become socially integrated into a rural community.
- Meet educational milestones in a unique teaching environment.
- Instill confidence and professionalism.
- Develop the ability to become independent learners and problem solvers.

Not only does the WRITE program benefit students but it also benefits the rural medical community in a variety of ways: physicians who participate in the program apply for and receive a UWSOM faculty appointment, WRITE is an opportunity to showcase the community, thereby leading to improved physician recruitment, the medical community's relationship with the UWSOM promotes greater mutual understanding of each other's respective roles, faculty from the UWSOM travel to rural sites to offer consultation and give medical education presentations, the Dean's Office at UWSOM Medicine support community-based rural medical education by providing funding to the WRITE Sites to cover infrastructure expenses of the practice and travel for specific faculty development opportunities. Teaching students offers practicing physicians the opportunity to renew their practices, stay current, further professional growth and helps prevent practice burnout (26).

During the WRITE experience students receive 10 weeks of credit for family medicine, four weeks of credit for internal medicine, three weeks of credit for pediatrics and three weeks of credit for psychiatry. There is a possibility at a number of WRITE sites to extend the experience by 4 weeks and receive credit for a rural surgery selective which meets the fourth year surgery requirement at UWSOM. Both students and preceptors participate in a one day orientation in Seattle prior to the start of WRITE. The WRITE students are required to complete readings, course requirements and end of clerkship tests as required by individual departments. There are webinar case presentations which occur throughout the WRITE experience. The students log all patient encounters, host two UWSOM faculty visitors and complete a community service project using the COPC framework learned during their R/UOP III experience.

The outcome data from the WRITE program is encouraging. Since 1996 there have been 66 graduates that have matched into residencies: 65% have matched into primary care residencies with 40% into family medicine, 18% into internal medicine, 6% into pediatrics and 2% into medicine/pediatrics (see figure

2). The 40% of WRITE graduates matching into family medicine residencies exceeds the UWSOM figure of 18.5% during that same period and the US average of 10.2% during that time period. Since the inception of the WRITE program there have been 43 graduates who have entered practice, of whom 72% are practicing in a primary care specialty (see table 1). A total of 15 graduates (35%) have returned to rural areas to practice. Rural is defined as an area with a Rural Urban Commuting Area (RUCA) score of 4 or greater (27). Of the physicians in rural practice, 66% are family physicians. There currently are five WRITE graduates practicing in WRITE communities.

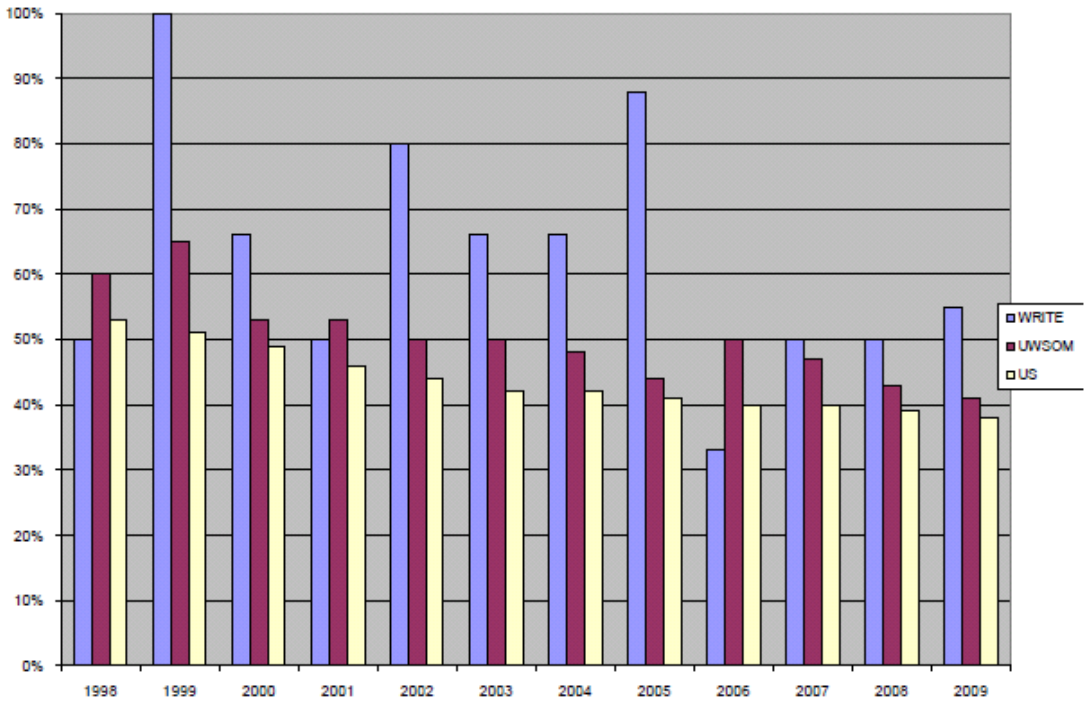

Figure 2. WRITE and the Residency Match Rates_Primary Care.

Table 1. WRITE Practice Outcomes 2009

WRITE Graduates in Practice

Total	Primary Care	Family Medicine	Internal Medicine	Pediatrics
43	31 (72%)	19 (44%)	9 (21%)	3 (7%)

WRITE Graduates in Rural Practice

Total	Practicing Rural	Primary Care	Family Medicine	Internal Medicine	Pediatrics
43	15 (35%)	13 (30%)	10 (23%)	2 (5%)	1 (2%)

The fourth year of the TRUST program consists of appropriate elective choices for the specialty path chosen. TRUST students are encouraged to return and do a four week elective at their TRUST sites. Assistance with specialty and career planning is intensified within the third and fourth year of training. Discussions are currently occurring regarding linkages with appropriate primary care and specialty residencies within the UWSOM network. These linkages may include direct or early admissions into these residencies as well as the possibility of significant clinical experience at these residencies in the fourth and final year of clinical training. Continuing the continuity experience with residency training time back at TRUST sites will be encouraged.

Conclusion

In summary, the combination of a four year rural longitudinal medical school curriculum with a rural longitudinally integrated community clerkship experience in the primary year of clinical training is thought to be a viable model to return students to practice in rural and underserved areas of the WWAMI region. Experience has shown that by intentionally linking a series of rural focused experiences within a comprehensive rural medical school curriculum, success can be achieved in returning students to rural and underserved practices.

References

[1] Geyman JP, Hart LG, Norris TE, Coombs JB, Lishner DM. Educating generalist physicians for rural practice: how are we doing? J Rural Health 2000;16(1):56-80.

[2] Norris TE, Schaad DC, DeWitt D, Ogur B, Hunt D. Longitudinal integrated clerkships for medical students: an innovation adopted by medical schools in Australia, Canada, South Africa, and the United States. Acad Med 2009;84:902-7.

[3] Carnegie Foundation for the Advancement of Teaching. Educating physicians: a call for reform from the Carnegie foundation for the advancement of teaching. Stanford, California: Carnegie Foundation for the Advancement of Teaching, 2009. Accessed 2009 Dec 08. URL: http://www.carnegiefoundation.org/sites/default/files/Carnegie_AAMC_2009.pdf.

[4] Ramsey PG, Coombs JB, Hunt D, Marshall SG, Weinrich, MD. From concept to culture: the wwami program at the university of Washington school of medicine. Acad Med 2001;76:765-75.

[5] US Department of Health and Human Services, Health Resources Services Administration. Find shortage areas: HSPA by state and county. Washington DC: US Department of Health and Human Services, 2009. Accessed 2009 Dec 09. URL: http://hpsafind.hrsa.gov/HPSASearch.aspx.

[6] US Department of Health and Human Services, Health Resources Services Administration, National health service corps. Washington DC: US Department of Health and Human Services, 2009. Accessed 2009 Nov 20. URL: http://nhscjobs.hrsa.gov/List.aspx.

[7] Schwarz MR. The wami program: 25 years later. Med Teach 2004;26(3):211-4.

[8] Verby JE, Newell JP, Andresen SA, Swentko WM. Changing the medical school curriculum to improve patient access to primary care. JAMA 1991;266:110-3.

[9] Adkins RJ, Andersen GR, Cullen TJ, Myers WW, Newman FS, Schwarz MR. Geographic and specialty distributions of wami program participants and nonparticipants. J Med Educ 1987;62:810-7.

[10] Association of American Medical Colleges. Medical school graduation questionnaire-2009. Washington DC: Association of Americal Colleges, 2009. Accessed 2009 Dec 08. URL: http://www.aamc.org/data/gq/allschoolsreports/start.htm

[11] Halaas GW, Zink T, Finstad D, Bolin K, Center B. Recruitment and retention of rural physicians: outcomes from the rural physicians associate program of Minnesota. J Rural Health 2008;24:345-52.

[12] Sanford School of Medicine, The University of South Dakota. Avera Sacred Heart Yankton Campus. South Dakota, The University of South Dakota, 2009. Accessed 2009 Nov 20. URL: http://www.usd.edu/medical-school/yankton-campus.cfm.

[13] Schauer RW, Schieve D. Performance of medical students in a nontraditional rural clinical program 1998-99 through 2003-4. Acad Med 2006;81:603-7.

[14] The University of British Columbia. Northern medical program. British Columbia, Canada: The University of British Columbia, 2009. Accessed 2009 Nov 20. URL: http://www.unbc.ca/nmp/

[15] The University of Minnesota. The rural physician associates program. Minnesota: The University of Minnesota, 2009. Accessed 2009 Nov 29. URL: http://www.med.umn.edu/RPAP/outcomes/home.html

[16] Rabinowitz HK, Diamond JJ, Markham FW, Hazelwood CE. A program to increase the number of family physicians in rural and underserved areas: impact after 22 years. JAMA 1999;281:255-60.

[17] Glasser M, Hunsaker M, Sweet K, MadDowell M, Meurer M. A comprehensive medical education program response to rural primary care needs. Acad Med 2008;83:952-61.

[18] University of Wisconsin. Wisconsin academy for rural medicine. Wisconsin, University of Wisconsin, 2009. Accessed 2009 Nov 20. URL: http://www.med.wisc.edu/education/md/warm/main/187

[19] University of Alabama Rural Scholars Program. Snapshot 2006 annual report. Alabama: University of Alabama, 2006. Accessed 2009 Nov 20. URL: http://cchs.ua.edu/system/files/uploads/documents/crm/rural_programs/Snapshot.pdf

[20] University of the Witwatersrand South Africa. Wits initiative for rural health educations. Johannesburg, South Africa: University of the Witwatersrand, 2009. Accessed 2009 Nov 27. URL: http://web.wits.ac.za/Academic/Health/Entities/RuralHealth/.

[21] Worley P, Silagy C, Prideaux D, Newble D, Jones A. The parallel rural community curriculum: an integrated clinical curriculum based in rural general practice. Med Educ 2000;34:558-65.

[22] Strasser RP, Lanphear JH, McCready WG, Topps MH, Hunt DD, Matte MC. Canada's new medical school: the northern Ontario school of medicine: social accountability through distributed community engaged learning. Acad Med 2009;84:1459-64.

[23] Glasser M, Stearns MA, Stearns JA, Londo RA. Screening applicants for a rural medical education program. Acad Med 2000;75:773.

[24] Brooks RG, Walsh M, Mardon RE, Lewis M, Clawson A. The roles of nature and nurture in the recruitment and retention of primary care physicians in rural areas: a review of the literature. Acad Med 2002;77:790-8.

[25] Londo RA, Glasser M. Community-oriented primary care: an early report on a promising innovation. Educ Health 1999;12:299-307.

[26] Shannon SJ, Walker-Jeffreys M, Newbury JW, Cayetano T, Brown K, Petkov J. Rural clinician opinion on being a preceptor. Rural Remote Health 2006;6:490.

[27] WWAMI Rural Health Research Center. Rural-urban commuting area codes (RUCA). Seattle, Washington: University of Washington 2009. Accessed 2009 Nov 27 URL: http://depts.washington.edu/uwruca/

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