Physician Education and Rural Location: A Critical Review

by

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ABOUT THE CENTER

The WWAMI Rural Health Research Center (RHRC) is one of five centers supported by the Federal Office of Rural Health Policy (FORHP), a component of the Health Resources and Services Administration (HRSA) of the Public Health Service. The major focus of the WWAMI RHRC is to perform policy-oriented research on issues related to rural health care. Specific interests of the Center include investigations of rural health workforce, investigation of the changing patterns of obstetric and neonatal care in rural areas, and the influence of the restructuring of health care on rural provider availability, clinical performance, and outcomes.

The WWAMI Rural Health Research Center is based in the Department of Family Medicine at the University of Washington School of Medicine, and has close working relationships with the WWAMI Center for Health Workforce Studies, Programs for Healthy Communities (PHC), and the other health science schools at the University, as well as with other major universities in the five WWAMI states: Washington, Wyoming, Alaska, Montana, and Idaho. The University of Washington has over 25 years of experience as part of a decentralized educational research and service consortium involving the WWAMI states, and the activities of the Rural Health Research Center are particularly focused on the needs and challenges in these states. The WWAMI RHRC also works closely with the associated Area Health Education Centers.

The Rural Health Working Paper Series is a means of distributing pre-publication articles and other working papers to colleagues in the field. Your comments on these papers are welcome, and should be addressed directly to the authors. Questions about the WWAMI Rural Health Research Center should be addressed to:

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Executive Summary

The shortage of physicians in rural America is a long-standing problem that has persisted as physicians continue to preferentially settle in metropolitan, suburban, and other nonrural areas. The last two decades have seen a variety of strategies introduced by federal and state governments and by medical education programs in an effort to ameliorate this problem and promote the choice of rural practice by physician graduates.

This critical review was undertaken to assess what has been learned from the various initiatives taken by predoctoral and graduate medical education programs in the United States to encourage preparation for, and choice of, rural medical practice. The particular focus of the report is upon "small rural" communities with populations less than 10,000 people. These are the communities most influenced by chronic geographic maldistribution of physicians, which continues despite a marked increase in the nation's supply of physician since World War II.

Selection, Recruitment, and Retention

Many studies have been performed in recent years that have shed light on the issues of selection, recruitment, and retention of physicians in rural practice. Important factors in this equation across most of these studies include rural background; stated interest in family medicine/primary care in rural and underserved areas; service orientation and values; positive influence of spouse or partner; rural experience during medical school/residency; and support of rural goals and interests during the training years. Special admissions policies and profiling of applicants have been found to be effective by a number of programs in selecting applicants with strong likelihoods of pursuing future rural practice. In comparison to nonrural medical students, rurally-oriented students tend to be slightly older; more likely to be married and to have children; usually white; are in public medical schools; prefer family practice; and have taken rural underserved electives (Society of Teachers of Family Medicine Group on Rural Health, 1998). Although there is considerable variation by program and region, there is a significant gender difference in selection of rural practice, with an overall male-to-female ratio for physicians across all states of 5.4 to 1 (Doescher et al., 1998).

Predoctoral Medical Education

Many factors have been found to influence the extent to which a particular educational program can cause rural physicians to emerge at the end of the educational pipeline. Beyond the admission of medical students with backgrounds and/or interests in rural communities, these factors include type and mission of the medical school; presence of a family practice department; visibility of credible
faculty role models with rural experience, sequential required educational experiences in rural settings, and availability of advising programs to effectively create a bridge to residency training, the next segment of the rural pipeline. There is wide variation by medical school in the proportions of medical graduates entering rural practice, ranging from 2.3 to 41.2 percent. The four characteristics of medical schools most strongly associated with graduates selecting rural practice are: (1) location in a rural state; (2) public ownership; (3) focus on production of family physicians; and (4) lesser amounts of research funding from the National Institutes of Health (Rosenblatt et al., 1992). A recent study of 121 U.S. medical schools revealed that the three best predictors of medical graduates’ choice of generalist practice are: (1) students’ level of interest in primary care at time of matriculation to medical school; (2) the number of weeks of required family medicine curriculum time; and (3) the percentage of students with rural background (Senf et al., 1997). Six medical school programs are briefly profiled that have successfully prepared numerous graduates who have entered rural practice.

**Graduate Medical Education**

Although 151 of U.S. nonmilitary family practice residency programs claim some type of rural mission, it is often unclear how substantial this mission is. There are now 31 rural training track (RTT) sites in 26 programs that are clearly rural in location, as well as 22 additional non-RTT programs in rural locations (Saver et al., 1998). There are another 25 programs that do not report a rural mission, but have an RRT, rural clinic, or rural fellowship (Bowman & Penrod, 1998).

Most family practice residencies with rural missions have designed their curricula for that goal. Common areas of emphasis include: advanced obstetrics, emergency care, general trauma care, pre- and postoperative care, surgical assisting, geriatrics, medical specialties, counseling, practice management and informatics, and community assessment. Based on their national study of U.S. family practice residencies, Bowman and Penrod have constructed the following profile of a program most likely to graduate rural physicians: (1) has more required rural and obstetrical training months; (2) has full or partial rural mission; (3) is located in a more rural state; (4) has program director with rural experience; (5) has a procedural emphasis; (6) has fewer residents who are minority or female; and (7) uses fewer types of other major graduate programs for rotations (Bowman & Penrod, 1998).

Rural training tracks are still small in number, but they appear to be a promising approach to effective training of rural physicians. Rosenthal and his colleagues have identified five major elements of successful RTTs: (1) academically sound urban component of program; (2) supportive urban medical center; (3) financially viable rural hospital; (4) a modern rural practice unit; and (5) a robust rural community (Rosenthal et al., 1998).
Another promising development in graduate training for rural practice is one or another type of rural fellowship. Most of these deal with advanced obstetrics, emergency care or other areas of procedural training.

**Federal and State Programs**

The National Health Service Corps (NHSC) is the major federal program designed to address physician shortages around the country in rural and other underserved areas. Although the NHSC has served a vital need in providing a large volume of health services in underserved rural communities since 1970, its physician retention rates in original placement practices are relatively low (12-21% in two studies) and 29 percent in nonmetropolitan practice (Pathman et al., 1992; Rosenblatt et al., 1996).

The national Area Health Education Center (AHEC) Program was also created in 1970, again with an overall goal to serve the health care needs of underserved populations, generally with an emphasis in primary care training. Many regional and statewide AHECs have been formed since the 1970s. Their educational outcomes in terms of preparation, placement and retention of physicians in rural areas have not been rigorously evaluated.

There has been an increase in various types of state service-contingent programs around the country since 1990. There are now over 800 physicians involved in obligated service in 34 programs, including scholarship, loan and loan repayment programs. So far, service completion rates for physicians are 98 percent for scholarship programs and 94 percent for loan repayment programs (Pathman, 1998).

**Some Key Issues**

Among the many issues involved in efforts to increase the physician supply in rural underserved areas, nine stand out as especially important:

1. What will the future rural health system look like?
2. What should be the specialty mix in small rural practices?
3. More physicians need to be trained, recruited to, and retained in rural practice.
4. Selection of rurally-oriented students is no longer a mystery, but remains an issue.
5. Residency training needs to be carefully structured to prepare graduates for rural practice, including real-world rural experience.

6. Despite the demonstrated success of rural training models, accreditation barriers persist.

7. Rural training and practice sites no longer need to be isolated.

8. Rural health care services are still under reimbursed, threatening the viability of rural training programs as well as physician recruitment and retention in rural practice.

9. Many fiscal barriers to the production and retention of rural physicians are within the purview of federal and state governments, but a coherent strategic approach has not been taken.

Concluding Comment

As the 1998 Council on Graduate Medical Education’s Tenth Report (COGME) concludes, the most pressing challenge in geographic maldistribution of rural physicians is in “small rural” areas (less than 10,000 people, not adjacent to metropolitan areas). The predominant need here is for family physicians. Internists, pediatricians, and obstetrician-gynecologists generally require a catchment area large enough to support five or more physicians (i.e., communities of over 10,000 people). Although osteopathic physicians are more likely than allopathic physicians to select family practice and to settle in rural areas, they still account for only 5 percent of the nation’s physician workforce and are unevenly distributed by state (Council on Graduate Medical Education, 1998).

Recommendations*

Education Support

1. Congress should commit 20 percent of federal Title 7 family practice residency funding to residency training for rural practice (i.e., family practice residencies with clear rural mission and curricula, as well as proven or expected success in placing graduates in rural practice; the 20 percent figure is consistent with the proportion of the population living in rural America).

* This is a partial list of recommendations; a complete list of recommendations is provided at the end of this report.
2. Continue Title 7 funding for predoctoral medical education programs that demonstrate output of rural physicians, and accord priority to program applications with rural goals.

3. Increase federal training grant funding for further development and expansion of rural training tracks (RTTs).

**Accreditation by Residency Review Committees**

1. The Family Practice Residency Review Committee should tailor its requirements to facilitate increased quality training in rural places by:
   - Supporting rural rotations away from the Family Practice Center (FPC) of up to 6 months.
   - Defining the FPC more broadly to include RTT sites.
   - Allowing one resident at a time in an RTT site.
   - Assessing quality of rural teaching programs more by educational outcomes than by process.

**Support of Rural Practice Environment**

1. Expand the Medicare Incentive Program, which pays a bonus for physician services to residents of designated shortage areas, to include practices in remote small towns irrespective of current shortage area designation status. Explore the consequences of limiting the payments to generalists and increasing the incentives.

2. Develop a supplemental reimbursement system for Medicaid similar to the Medicare Incentive Program for rural health services in Health Professions Shortage Areas (HPSAs).

3. Fund the development of telehealth programs linking academic health science centers with rural practice and teaching units for purposes of teaching, continuing medical education, and appropriate consultation. Also expand telehealth linkages between smaller regional health centers and their rural catchment areas regarding appropriate consultations and regarding referrals to tertiary medical centers.

4. Continue the funding of the National Health Services Corps (NHSC) with a stronger philosophic goal to nurture and support the retention of obligated physicians in rural practice (i.e., to work more effectively to meet the professional, personal and family needs of physician assignees), as well as to provide needed local medical service in shortage areas.
Research and Policy Development

1. Track the graduates of all rural medical education programs in terms of selection and retention in rural practice.

2. Evaluate the effectiveness of rural medical education initiatives and programs in terms of the preparedness of graduates for rural practice (e.g., quality of care and scope of practice).

3. Evaluate and monitor gender differences in terms of selection and retention in rural practice and fund and evaluate innovative demonstration projects aimed at increasing female physician practice within rural areas.

4. Conduct research and demonstration projects to evaluate the feasibility and outcomes of telehealth projects, including considerations of the appropriate range of services, reimbursement, medicolegal issues, collaborative relationships among health care professionals, cost effectiveness, outcomes of care, and the appropriateness of telehealth connections and referral patterns.
INTRODUCTION

The shortage of physicians in rural America is a long-standing problem that has persisted as physicians continue to preferentially settle in metropolitan, suburban, and other nonrural areas. The last two decades have seen a variety of strategies introduced by federal and state governments and by medical education programs in an effort to ameliorate this problem and promote the choice of rural practice by physician graduates.

This literature review was performed to elucidate what has been learned from the various initiatives taken by predoctoral and graduate medical education programs to encourage preparation for, and choice of, rural medical practice. Since geographic maldistribution of physicians is an international problem, the experience in other countries was also reviewed where useful to policy analysis and development.

It is understood that there are multiple definitions of "rural," and that no single definition meets everyone's perceptions and needs. In general, we consider rural areas not adjacent to a metropolitan area with a city of 25,000 to 49,000 people as "big rural," while those with towns of less than 10,000 are "small rural." Since the crux of rural health problems are in "small rural" areas, this report will focus primarily on that definition of rural.

A 1990 paper by Cordes provides a useful and interesting backdrop to this review in terms of the changing profile of rural America. In exploring seven myths about rural America, he noted that rural populations are no longer declining, but growing; that manufacturing, not farming, is now the major source of employment in rural areas; that similarities are greater than differences in terms of economic structure in rural and urban America; that rural America is no longer isolated from mainstream America, and that rural people have knowledge, attitudes and beliefs very similar to urban people; that rural people are not healthier and happier than urban people; and that rural America is much more diverse than previously thought (Cordes, 1990).

About 20 percent of Americans live in rural areas (over 50 million people), while only 9 percent of the nation's physicians practice there (Council on Graduate Medical Education, 1998, p. 11). The extent of geographic maldistribution of physicians is illustrated by Figure 1, which compares active physicians per 100,000 population by location in 1995 (Figure 1). The locations of the physicians by specialty in 1995 are shown in Figure 2. It is apparent from both figures that rural communities with less than 10,000 people not adjacent to metropolitan areas ("small rural") represent the major problem of geographic maldistribution, and that family physicians and general practitioners are the predominant physicians in those areas. As the nation's supply of physicians has increased steadily since World War II, small
rural communities have not shared in the growth of physician supply as have larger communities, as shown in Figure 3 (Council on Graduate Medical Education, 1998, p. 12).

A Health Professions Shortage Area (HPSA) is defined by the U. S. Department of Health and Human Services as one with a ratio of less than one primary care physician per 3,500 population. There are now more than 22 million Americans living in these rural shortage areas (HPSAs) (North Carolina Rural Health Research and Policy Analysis Program, 1998). Despite this pressing need for rural physicians, the number of medical graduates choosing rural practice has shown further declines in recent years, worsening an already chronic geographic maldistribution problem. Between 1975 and 1995, for example, family practice residency graduates locating in towns of less than 2500 people over 25 miles from a city dropped 60.5 percent to only 3.8 percent of graduates, while those settling in suburbs of large metropolitan areas increased by 23.5 percent to 11.2 percent of graduates (Society of Teachers of Family Medicine Group on Rural Health, 1996).

Although this review will focus primarily on medical education programs, other issues will be considered, including the effectiveness of programs designed to select, recruit and retain physicians in rural practice. While family practice is the largest specialty involved in rural practice, other specialties make important and necessary contributions to rural practice. Where information is available, a multidisciplinary approach will be taken in this review.

**METHODS**

A comprehensive literature search was carried out using key words including "rural health," "training-support," "education-medical," "internship" and "residency." Databases included MEDLINE and Health STAR. A content analysis was performed (by D.L.) after about 125 pertinent articles were retrieved. Summaries of these articles and reports were categorized as follows: general articles/reports; admission/selection policies; undergraduate (predoctoral) medical programs: curricula, clerkships and preceptorships; graduate medical programs: residencies and fellowships National Health Service Corps (NHSC); recruitment and retention strategies; and programs that promote rural practice for allied health professionals.

Contacts were made with the Society of Teachers of Family Medicine (STFM) Working Group on Rural Health. Members of that group were very helpful in providing us with the results of recent surveys and works in progress pertinent to this review. Other relevant materials were identified and reviewed from the recent report, *Barriers to Residency Training of Physicians in Rural Areas*, just released by the

All of the retrieved reports were critically reviewed, and when necessary, additional information was requested of involved individuals, agencies and programs. There is considerable overlap in scope of many of the interventions which have been taken to increase the supply of rural physicians. For the purpose of this review, the following arbitrary categories have been adopted for evaluation of these initiatives:

- Medical student selection, recruitment, and retention.
- Predoctoral medical education.
- Graduate medical education.
  - Location of residencies.
  - Rural training tracks.
  - Fellowships.
- National Health Service Corps.
- State programs.

Figure 4 displays a “pipeline continuum” as a graphic display, showing where these various initiatives fit into the overall challenge of preparing physicians to select and remain in rural practice.

Selection, Recruitment, and Retention

Effect of Special Programs

With respect to physician recruitment to rural practice, Crandall and his colleagues have segmented the varied approaches to this goal into four conceptual models: (1) affinity model, (2) economic incentive model, (3) practice characteristics model, and (4) indenture model (Crandall et al., 1990). The affinity model is the major model represented by rurally-oriented education programs around the country which have directly addressed the challenge of selection and recruitment for rural practice. Our literature search identified 9 illustrative examples of effective educational initiatives towards this mission (Table 1) (Rural Health News, 1997; Baldwin et al., 1995; Elam et al., 1997; Foley, 1994; Kaufman et al., 1980; Knopke et al., 1986; Lancaster, 1985; North Carolina Area Health Education Centers, 1988; Rabinowitz, 1983; Rabinowitz, 1993; Scaletti, 1995; Verby, 1987; Verby, 1988).

There has been active study of many education programs around the country providing new insight into the issues of selection, recruitment, and retention of
physicians in rural areas. Many factors have been found to be important in achieving increased choice of, and retention in, rural medical practice. Two in particular have been found by Rabinowitz to be especially important, both conceptually and in long-term follow-up of one medical school's program. Based upon the 20 year experience of the Physician Shortage Area Program (PSAP) started in 1974 at Jefferson Medical College in Philadelphia, he has demonstrated that a special medical school admission's policy combined with a special educational program (faculty advising, required third-year family medicine clerkship, and fourth-year sub-internship in family medicine) can have a dramatic and sustained positive impact on both selection of, and retention in, rural practice. Reporting on the PSAP classes from 1978 through 1986, Rabinowitz found that PSAP graduates were about ten times more likely to combine a career choice in family medicine with rural practice than non-PSAP graduates, and that 85 percent of PSAP graduates either chose a primary care specialty or practiced in a rural or small metropolitan area or a physician shortage area (Rabinowitz, 1993). The special admissions policy gives preference to otherwise qualified applicants who come from rural backgrounds and state intentions to practice family medicine in rural and underserved areas (Rabinowitz, 1983).

Rabinowitz's work with PSAP is of additional importance in terms of public policy development as a result of a related predictive modeling study whereby he compared the output of primary care rural physicians admitted through either regular or special admissions policies (the latter giving preference to both rural background and interest in family medicine). He projected a 5.5 fold increase in the number of primary care rural physicians resulting from the special admissions program compared with a regular admissions process without preference for rural background and interest in primary care (Rabinowitz, 1986).

**Effect of Gender**

Recent studies indicate that gender of medical graduate also plays a significant role in choice of rural practice. For example, a recent national study reported from the WWAMI Rural Health Research Center revealed that there are less than 7,000 female physicians practicing in rural America, with more than six male physicians for every female physician in rural areas of 17 states (Doescher et al., 1998). There is some variation by state and type of county, but the overall male-to-female ratio was 5.4 across all states. Although the most recent cohort of female medical school graduates was somewhat more likely to select rural practice, they remain underrepresented by 40 to 80 percent among family/general practitioners and general internists (Doescher et al., 1998).

Still another related factor is the role of physicians' spouses or partners in selecting a residency. Arnold and his colleagues studied more than 300 couples,
finding that the partner was the most influential person in the medical graduate's choice of residency. They also noted that women medical graduates were more likely to sacrifice their needs for their partners when conflict arose (Arnold et al., 1990). Since female physicians now comprise a large percentage of physicians in generalist specialties (e.g., 43 percent of residents in U.S. family practice residencies today [personal communication, Residency Assistance Program, Kansas City, Missouri, October 27, 1998]), new strategies should be evaluated and implemented in order to avoid further declines in rural physicians.

**Choice of Initial Practice Location**

A recent national survey of U.S. third-year family practice residents provides useful information concerning factors influencing graduates' choice of location for first practice. Based on 380 programs (68 percent response rate) and over 1000 residents (64% response rate), the size of preferred practice location was found to be strongly correlated with the size of community where residents grew up (Table 2). Many factors were considered in the choice of first practice site (Table 3), but the desires of the graduates' significant others were the most important of all (Costa et al., 1996).

Many regional studies have also examined the factors and patterns affecting choice of initial practice location. A survey of graduates at the University of Oklahoma, Tulsa Medical College showed that spouse desires were the most important factor in practice location decisions (Holmes & Miller, 1986). A study of medical school graduates from the University of Washington and family practice residents in an affiliated residency network in the Northwest revealed that referrals from faculty were the most important source of information affecting choice of practice location, and that the level of receptivity of physicians and others experienced during a community site visit was particularly influential in graduates' decision-making (Riley et al., 1991). Another study of family practice residency graduates in Minnesota found that partners or associates in practice were the graduates' biggest concern, followed by geographic location, recreational activities, call schedule, and opportunities for spouse and children (Anderson et al., 1994). In New York State, graduates of family practice residencies placed high priority on hospital services, colleague interaction and after-hours coverage as they considered initial practice locations (Rosenthal et al., 1992b). Other studies have documented the importance of proximity of residency training sites to rural practice locations. In Texas, for example, more than one-half of family practice residency graduates entered practice within 60 miles of their residency program (Denton et al., 1989). Another study of randomly selected residency programs in 10 specialties showed that primary care physicians chose practice locations closer to their residency programs than did graduates in other specialties (Dorner et al., 1991).
Predictors for Rural Generalist Practice

Looney, Blondell and their colleagues have just completed an interesting modeling study at the University of Louisville exploring to what extent generalist rural practice can be predicted at the time of medical school admission. They found that mathematical models were helpful in predicting who would not select that career (negative predictive value 91.9%) but much less so in predicting who would select rural generalist practice (positive predictive value 37.8%) (Looney et al., 1998). At the University of North Carolina, Madison has found that a service orientation as demonstrated by medical school applicants on their application essay (e.g., volunteer activities, Peace Corp., social need content) predicted a generalist career seven years later (p = 0.0001) (Madison, 1994).

Based on what is now known about generalist specialty choice and rural practice, Rosenthal proposes the following basic approaches to increase the number of future rural physicians (Rosenthal, 1994).

1. Determine medical school’s mission (does it include rural?).

2. Profile applicants.
   - MCATs, GPA (threshold).
   - Community of origin.
   - Community service work.
   - Specialty intent.

3. Admit students with plans appropriate to the school’s mission.
   - “Cocker spaniel breeders tend to start with cocker spaniels.”

4. Require rural immersion experiences in curriculum.

5. Follow up.

The latest information from the AAMC surveys of medical school graduates provides some interesting information on the 1995 graduating class. Only 294 senior medical students stated interest in future rural practice in towns with less than 10,000 people (out of 13,000 respondents among 16,000 total graduates). In comparison to nonrural students, the rurally-oriented students were slightly older; more likely to be married and have children; were usually white; were graduating from public medical schools; preferred family practice (30% had decided on family practice before medical school); and twice as many took rural/international electives and did volunteer work in public health clinics or other underserved programs (Society of Teachers of Family Medicine Group on Rural Health, 1998).
Despite the various interventions that have been tried and the success of some programs in producing rural physicians, there is a relative decline in the numbers of medical school graduates choosing rural practice. Figure 5, for example, shows a flat production of rural family physicians while the total numbers of U.S. family practice residency programs and graduates have grown (Society of Teachers of Family Medicine Group on Rural Health, 1997). This situation is also exacerbated by the aging of other rural physicians. In Iowa, and Nebraska, for example, 30 to 50 percent of general surgeons practicing in rural areas have indicated their plans to retire or stop doing operative obstetrics in the near future (Society of Teachers of Family Medicine Group on Rural Health, 1998).

**Pre-doctoral Medical Education**

As Bowman has pointed out, many educational efforts have failed over the years because of a lack of appreciation of the complexity of issues involved in successfully identifying and preparing physicians for rural practice, and the expectation of an illusory quick fix (Bowman, 1998). The approach now promoted by him and others of the STFM Work Group on Rural Health is comprehensive and multifaceted, recognizing the importance of a continuous educational pipeline consisting of concurrent and coordinated activities and spanning the spectrum from preprofessional, admissions, early experiences, clinical experiences, recruitment and retention. It is now apparent that “leakage” of potential rural physicians from this pipeline may occur at various points in the pipeline, particularly when bridging does not occur from one segment to the next (Bowman, 1998).

In the above context, experience with medical education programs in recent years has now shown that many factors influence the extent to which a particular educational program can cause rural physicians to emerge from the end of the pipeline. Beyond the admission of medical students with backgrounds and/or interests in rural communities, these factors include type and mission of the medical school, presence of a family practice department, visibility of credible faculty role models with rural experience, sequential required educational experiences in rural settings, and availability of advising programs to effectively create a bridge to residency training, the next segment of the rural pipeline.

The STFM Group on Rural Health recently completed a survey of U.S. family medicine departments assessing the status of predoctoral curricula in rural health. Responses were received from 89 departments (68 percent response rate). It was found that about 50 percent of responding medical school/departments include a rural component in their mission; that those departments have required rural courses; and that there is a wide variety in timing and length of these courses (Stearns, 1998).
**Characteristics of Medical Schools**

In their comprehensive study of U.S. medical schools, Rosenblatt et al. found that schools ranged from 2.3 to 41.2 percent of graduating medical students selecting rural practice. They observed that 12 medical schools accounted for more than one-quarter of rural graduates between 1976 and 1985, and that four characteristics of medical schools were strongly associated with graduates who selected rural practice: (1) location in a rural state, (2) public ownership, (3) focus on production of family physicians, and (4) lesser amounts of research funding from the National Institutes of Health. Based on a definition of “rural” as nonmetropolitan counties (Office of Management and Budget definition), they also noted marked differences by specialty and gender, as shown in Table 4 (Rosenblatt et al., 1992). By far the largest number of graduates ending up in rural practice were family physicians (with a nearly 6:1 male-to-female ratio), with general internal medicine the second most likely specialty to produce rural physicians.

Institutional commitment to the needs of rural health is an important element in the success achieved by those medical schools that have effectively produced rural physicians. It is not surprising that the most successful medical schools in this respect are located in rural states, are state/public institutions, and are more recently established, often with a priority to train primary care physicians. Table 5 illustrates these points showing those medical schools which have graduated at least 30, 25 and 20 percent of their graduates into family practice residency programs.*

Senf and her colleagues recently published the results of a national study of 121 U.S. medical schools involving a multivariate analysis of predictors of medical students’ choice of generalist practice. They found that the three best predictors of that outcome were (1) the student’s level of interest in primary care at time of matriculation into medical school, (2) the number of weeks of required family medicine curriculum time, and (3) the percentage of students with rural background. The timing of the required family medicine clerkship time (i.e., third vs. fourth year) was much less important than the overall length of required curriculum time. They also found that 75 percent of the medical schools reported increased interest in family medicine from matriculation to the first postgraduate year; general internal medicine also had a mean increase from matriculation to practice while general pediatrics had a decline (Senf et al., 1997).

**Curricula**

There are many variations of predoctoral curricula which have been successful in preparing medical graduates for rural practice. The following six

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* AAFP data on medical school graduates entering family practice residencies, by school.
examples surfaced prominently from our literature review to reflect some of these variations as well as the common themes alluded to above (Table 6).

The University of Minnesota Duluth has, for many years, had the highest proportion of its graduates entering family practice of any medical school in the country. A two-year school with a clear mandate to recruit and train medical students for rural practice, its graduates complete their training at the University of Minnesota, often opting for the strong Rural Physician Associate Program (RPAP) program there (Table 1). With only 48 students in each class, the Duluth program is a classic example of what can result from a clear institutional commitment to rural health (Boulger, 1991).

Jefferson Medical College is another excellent example of what can be done through a carefully planned and implemented targeted admissions and curricular effort. Their success in preparing and placing graduates in rural practice is all the more impressive in view of the urban (Philadelphia) location of the school and its other nonrural institutional missions in a well-established school. Although Physician Shortage Area Program (PSAP) students (Table 1) had slightly lower grade-point averages/scores than Regular admission students during the first two years and on Parts I and II of the National Board examinations, there was no significant difference between the two groups in their clinical performance on clerkships or Part 3 of the National Boards (Rabinowitz, 1993; Rabinowitz, 1998).

Mercer University, a newer medical school, was founded with a clear mission to produce primary care physicians for rural and other underserved areas of Georgia. It adopted the McMaster model for problem-based learning in the basic science years, and promoted generalist values and practice throughout the four years of predoctoral education. Its outcomes in terms of family practice and primary care training/practice have been consistently impressive (Ackermann & Comeau, 1996).

The Upper Peninsula Program, established by Michigan State University in 1974, has effectively demonstrated that excellent predoctoral medical education can be provided, even in the basic science years, in a rural, practice-based setting. For the first eight years of the program, all but ten weeks of the four-year curriculum was conducted on the Upper Peninsula, about 400 miles north of the main campus in East Lansing. Using a problem-based approach, together with visiting basic scientists from the main campus, and community-based clinical experiences, in all of the major clerkships were provided on the Upper Peninsula. The Upper Peninsula faculty feel that the shift in 1982 to the first two years in East Lansing has resulted in less interest in family practice since then (Brazeau et al., 1990).

The West Virginia School of Osteopathic Medicine has educated, placed, and retained more primary care physicians in Appalachia from 1978 through 1990 than
any other U.S. medical school. It has done this through a clear mission to serve rural Appalachia, and through a “pipeline” approach from admission to placement in practice. It has participated in the Southern Region Education Board (SREB) with other states sharing Appalachia (Georgia, Mississippi, Maryland and Alabama). Through this consortium, students from these other states have matriculated at West Virginia University without paying out-of-state tuition and fees. As of 1990, 50 percent of the school’s first 40 graduates had entered primary care practice in rural Appalachia (Roberts et al., 1993).

The University of Washington School of Medicine, as the only medical school for the five-state area of Washington, Alaska, Montana, Idaho, and most recently Wyoming, has since the early 1970s conducted a decentralized regional medical education program. Medical students, admitted from all participating states, take their first year at state universities in their home states. During their clinical years, they are encouraged to take community-based clerkships, most of which are in rural communities. Innovative programs include an elective rural experience for 80-90 students during the summer following the first year (the Rural/Underserved Opportunities Program—R/UOP), a six-month integrated training experience during the third year in a rural setting (WWAMI Rural Integrated Training Experience—WRITE) Program and the Idaho Track, which allows students to complete all third-year required clerkships within the state of Idaho. Started with federal funding and a grant from the Commonwealth Fund, the WWAMI program transitioned to state funding in the 1980s, and has remained a self-sustaining enduring model of decentralized, community-oriented medical education for over 25 years. Over the last 20 years, one half of the University of Washington’s medical graduates have selected the primary care specialties of family medicine, general internal medicine, and pediatrics, and over 40 percent have returned to practice in their home state of origin (Baldwin et al., 1995; Hunt et al., 1995).

Graduate Medical Education

Rural Mission and Location

As part of their study of barriers to residency training of physicians in rural areas, Saver and his colleagues profiled the locations of all U.S. family practice residency programs by urban influence codes. They found 31 rural training track (RTT) sites in 26 programs which are clearly rural (nonmetropolitan) in location, as well as 22 additional non RTT programs in rural locations. They also identified 96 programs listing some kind of rural descriptor; of these, 23 are in counties in metropolitan areas with populations more than one million (Saver et al., 1998). It was therefore difficult in many instances to determine the extent of rural
commitment based on programs' self-description in the 1997 Directory of Family Practice Residency Programs.

In a recent national study of U.S. nonmilitary family practice residency programs, Bowman and Penrod achieved a 96 percent response rate, and found that 151 programs claimed a rural mission. There was considerable variation by region of the country, as shown in Figure 6. In addition, there are 25 additional programs which do not report a rural mission, but which have an RTT, rural clinic or rural fellowship (Acosta, 1998; Bowman & Penrod, 1998). Table 7 displays the extent and nature of rural emphasis reported by 353 family practice residencies (Bowman & Penrod, 1998); these self-reports must be qualified, however, since it is often unclear how rural these experiences are or of what quality.

**Curricula**

As part of Bowman and Penrod's study, 100 family practice residencies reported on the presence, extent and nature of rurally-oriented curricula. Two-thirds of these programs provide specific didactic on rural topics, 80 percent have curricula on computer skills, 78 percent provide Internet access, 60 percent use telemedicine for teaching or consultative purposes, and 45 percent have a medical library containing rural health resources. Topics that to date have not been covered adequately include rural health policy, rural hospital issues, networking, development of alliances, referrals to tertiary medical centers and consultants, significant other's transition and adaptation of significant others, personal transition and adaptation of the physician, assumption of unanticipated community roles, and utilization of nonallopathic providers. Responding programs listed the following areas in which rural physicians may feel inadequately prepared: medical specialties, geriatric home care and assessment, rehabilitation medicine, counseling, practice management and informatics, advanced obstetrics, nutrition, community assessment, and newborn and childhood disorders (Bowman & Penrod, 1998). Another recent national study by Norris, Coombs and Carline, explored the educational needs assessments of over 600 family physicians currently practicing in rural areas. They confirmed many of the findings of Bowman and Penrod's study while adding certain other common needs areas (such as general trauma care, pre- and postoperative care, and surgical assisting) (Norris et al., 1996).

Using information gathered in their study, Bowman and Penrod were able to construct a profile of a family practice residency program most likely to graduate rural physicians: (1) has more required rural and obstetrical training months; (2) has full or partial rural mission; (3) is located in a more rural state; (4) has program director with rural experience; (5) has a procedural emphasis; (6) has fewer residents who are minority or female; and (7) uses fewer types of other major graduate
programs for rotations. Table 8 provides telling evidence of the importance of three of these predictors (Bowman & Penrod, 1998).

**Rural Training Tracks (RTTs)**

Faced with the increasing problem of training rural physicians to replace a declining number of physicians practicing in rural areas, some U.S. family practice residency programs have developed, since the late 1980s, a new strategy to address this problem—the rural training track (Rosenthal et al., 1992a). These tracks involve structured programs in which the first residency year is in a large urban teaching center while the second and third residency years are provided in a small family practice group practice and an associated community hospital in a distant rural community. Actually, the “one and two” is not entirely a new phenomenon. Up to seven such programs were developed in the late 1970s (Geyman, 1977a; Geyman, 1977b), but the idea did not catch on at that time and most (such as the University of California Davis, Merced and Redding programs) later became three-year programs in the more rural setting.

Rosenthal and his colleagues have recently published an initial evaluation of one-two RTTs based on a 1996 survey. They reported on 13 such programs, most with one to three rural training sites each. Based on completed reports from 17 RTT sites, 55 percent of these sites were located in federally designated HPSAs; there is an average of three full-time faculty in each rural family practice office; those offices not adjacent to the rural hospital are an average of two miles away; and the average size of the rural hospital is 173 beds (range 14 to 308). As of 1996 a total of 99 residents had graduated from RTT programs, 76 percent of whom entered rural practice (16% within 50 miles of the RTT sites) (Rosenthal et al., 1998).

Although RTTs appear to represent a promising approach to training rural physicians, their numbers are still relatively small and they are too new to allow long-term evaluation. Rosenthal et al have identified five major elements of successful RTTs: (1) academically sound urban component of program; (2) supportive urban medical center; (3) financially viable rural hospital; (4) a modern rural practice unit; and (5) a robust rural community (Rosenthal et al., 1998).

Early experience with RTTs has revealed several kinds of problems. First, resident recruitment can be difficult, since it involves a major move after the first year and raises all of the issues of rural location thereafter. Second, there are many challenges to the initial organization and development of an RTT, as discussed by Damos and his colleagues in a recent paper based upon their experience with RTT development at the University of Wisconsin (Damos et al., 1998). Third, rural faculty development is an important need, and new communication and collaborative relationships need to be developed between participating institutions. Fourth, funding of RTTs is also problematic. Saver et al found a wide range of
estimates of RTT costs per resident year, concluding that it is not yet known whether RTTs cost less, more, or about the same as traditional family practice residencies (Saver et al., 1998). It is known, however, that existing reimbursement mechanisms do not favor RTT development. Only 6 percent of Medicare’s Prospective Payment System payments goes to rural hospitals with less than 100 beds. At the same time, Medicare represents about 40 percent of the net income of rural physicians and hospitals (National Rural Health Association Health Policy Based Medicare Reform Work Group, 1996). Medicare GME dollars flow directly to hospitals instead of outpatient teaching groups. Slifkin and her colleagues have found that the number of nonmetropolitan hospitals with residents in training that receive any GME funding is very small; in her recent analysis of the 70 such hospitals, most were over 150 beds in size and only 14 percent had less than 50 beds (Slifkin et al., 1998). In addition, reimbursement for rural health services is often lower than for comparable services provided in urban settings. For example, Medicare offers to pay HMOs 18 percent more for the care of urban than rural enrollees (National Rural Health Association Health Policy Based Medicare Reform Work Group, 1996).

The BBA97 made several changes that potentially could facilitate increased rural training depending on how they are implemented and on how hospital administrators and educators respond. The BBA97 and the associated initial regulations allow GME payments to qualified nonhospital entities (e.g., Federally Qualified Health Centers, Rural Health Clinics, and Medicare+Choice organizations), new residencies to be initiated in underserved rural communities by rural hospitals (i.e., they are exempt from the resident number cap), and several other relevant positions. However, it will be some time before any effects of these changes can be evaluated.

**Fellowships**

In view of specific curricular needs, often felt by future rural physicians to be incompletely provided within the three-year family practice residency, some programs have developed additional fellowship training opportunities to meet these needs. According to Bowman and Penrod’s 1996 survey of 353 U.S. family practice residencies, responding programs gave the following self-report of these programs: obstetrical fellowship (42 programs—11.9% of respondents); rural fellowship (16 programs—4.5%); and fellowship or procedural emphasis (70 programs—19.8%) (Bowman & Penrod, 1998). It is not clear from these responses what all of these fellowship programs are, and to date there is almost no literature on the structure or outcomes of these programs. A notable exception is the recent report by Norris and Acosta on the fellowship in rural family medicine at Tacoma Family Medicine, Washington (Norris & Acosta, 1997). They reviewed their experience with their one-year fellowship after its first five years. There were 40-60 applicants each year for the 8 fellow positions. The curriculum included 6 months of advanced obstetrics
(including Cesarean section competency), a 1 month rural rotation for community medicine, and 5 months of electives. The most common electives selected by the fellows were (in descending order of frequency) OB ultrasound, colposcopy, anesthesia, gynecology, sports medicine, minor surgery, orthopedics, neonatal intensive care unit, and exercise stress testing. The fellowship was rated highly by its graduates (90% felt it met their needs). Eighty percent of the graduates are practicing in communities of less than 10,000 people, while the remainder are in academic practice, large community practice, or surgical fellowships (one graduate is preparing for missionary practice abroad) (Norris & Acosta, 1997).

Experience of Specialties Other than Family Practice

Our literature search retrieved reports almost entirely limited to family practice. Published reports of initiatives to prepare other specialties for rural practice are rare. Saver et al recently went beyond their literature review on this subject to include key informant interviews and e-mail postings to listserv for educators in selected other specialties. Their success was also extremely limited in finding experience in rural medical education in other specialties (Saver et al., 1998).

A small pilot program involving internal medicine residents from Beth Israel Hospital and the Harvard Primary Care Program was reported in 1980. Although the initial four residents enjoyed a 4-6 week placement in rural practices, no follow-up evaluations have been published (Stern et al., 1980). Another rural clinic rotation for internal medicine residents was reported in Florida in 1978, but again, no follow-up reports are available (Crandall et al., 1978). More recently, one month ambulatory care block rotations in community settings (unclear how rural) have been established by the University of Minnesota Internal Medicine Residency Program (Parenti & Moldow, 1995). In general, however, the small number of internal medicine residencies located in rural counties are based in large multispecialty groups (such as the Geisinger Clinic) with more of a referral than primary care practice (Saver et al., 1998).

In pediatrics, Kairys and Newell described in 1985 their rural primary care pediatric residency program at Dartmouth-Hitchcock Medical Center (Kairys & Newell, 1985). Residents were assigned to selected practices in towns within 45 miles for one day per week in years 2 and 3 plus 3-4 week rotations in all three years; no follow-up evaluations have been published.

In surgery, Asher and her colleagues evaluated their experience over a ten-year period at the University of Louisville with a third-year rural surgery rotation. They found that the residents’ experience was useful educationally, and that 44 percent of the 58 respondents subsequently entered rural surgical practice (Asher et
al., 1984). The University of South Alabama attempted to start a rural track for general surgery residents, but abandoned the attempt because of various developmental problems. The Oregon Health Sciences University is presently considering development of such a track, but it is still only in a planning stage (Saver et al., 1998, p. 8). A recent search by Saver and his colleagues revealed no currently operational general surgery programs with a rural orientation and mission (personal communication, Barry Saver and Gary Hart, Seattle, Washington, September 8, 1998).

Federal and State Programs

National Health Service Corps (NHSC)

The NHSC is the major federal program designed to address physician shortages around the country in rural and other underserved areas. Established in 1970, this program has placed over 15,000 physicians in more than 5000 different underserved communities at a cost of over $2 billion (Rosenblatt et al., 1996). The NHSC has provided a large volume of health services in underserved rural communities over the years, including many that would not otherwise attract, much less retain, physicians. Although the program has provided vital and much needed rural health care services for over 25 years, its record in terms of physician retention and long-term improvement of local health care services has been less impressive. In a comparative study of NHSC and non-NHSC rural physicians, after 8 years of practice, Pathman found group retention rates of 12 percent vs. 39 percent in the original practice and 29 percent vs. 52 percent in nonmetropolitan practice for the NHSC and non-NHSC physicians, respectively (Pathman et al., 1992). Rosenblatt and his colleagues studied a later cohort of NHSC physicians, finding by 1994 that 21 percent were still in the assigned practice and another 5 percent practicing in the same county (Rosenblatt et al., 1996). A philosophical debate surrounds the NHSC program—whether it is an onerous payback obligation in return for educational assistance or a program addressing the long-term retention of rural physicians. Pathman et al recently studied 675 physicians in the NHSC scholarship program; although 51 percent initially expected to work in underserved areas for more than 10 years, only 14 percent planned to stay more than 5 years in their assigned practice (Pathman et al., 1994).

Area Health Education Centers (AHECs)

The national Area Health Education Center (AHEC) Program was also created in 1970, again with an overall goal to serve the health care needs of underserved populations. Since then many regional and statewide AHECs have
been formed. Many have made successful transitions from federal to state funding. They all emphasize primary care education, with some degree of affiliation with academic health science centers. Although AHECs have been in operation for almost 30 years, they have not been well evaluated in terms of educational outcomes.

In a study of all AHEC projects reported by Blondell et al in 1989, it was found that about two-thirds of the 38 AHEC projects had some interaction with family practice residency programs. They also found that AHEC resources are probably underutilized by family practice residencies for rural education projects (Blondell et al., 1989).

For all the years that AHECs have been in operation, there are very few reports in the literature of their educational outcomes. One exception is the experience in Arkansas. In that state, AHEC has supported rural preceptorships to 110 second and third-year students, has sustained support for third-year community-based clerkships in family medicine for more than 85 percent of the class, and has provided elective or selective training for 60 percent of the senior class. In post graduate education, AHEC has supported the development of 6 family medicine residency programs throughout the state. Of the 315 graduates from these programs, 70 percent have remained to practice in Arkansas with 60 (19%) practicing in communities with fewer than 10,000 people (Arkansas Area Health Education Center, 1998).

Hynes and Givner examined the extent to which AHECs have impacted the primary care physician-to-population ratio in rural counties between 1975 and 1985. They found that AHEC counties with less than 50,000 people averaged only 3 to 5 percent higher primary care physician-to-population ratios than non-AHEC counties over that time period (Hynes & Givner, 1990). Some AHECs have been associated with substantially more impact on physician-to-population ratios in rural counties. The North Carolina AHEC, for example, has been part of an ongoing collaboration with affiliated universities and community-based education programs over a sustained period, and by the late 1980s North Carolina’s 76 most rural counties had physician-to-population ratios approximately 15 percent higher than those of 2297 comparably rural counties elsewhere in the United States (Mayer, 1990). At the same time, the extent to which the AHEC itself led to this positive outcome in North Carolina is unclear.

**State Programs**

State-funded scholarship, loan and loan repayment (and similar) programs with service obligations for primary care providers are currently under study by Pathman and his colleagues through funding by the Agency for Health Care Policy
and Research. They have identified 64 such programs so far, and have developed profiles for 34 programs. Based upon their analyses so far, presented at a Topical Symposium in September 1998, the following preliminary findings have been made (Pathman, 1998):

- There were 886 physicians in all specialties serving state obligational service in 1996, as well as 301 physician assistants/nurse practitioners and other health care professionals (Table 9).
- Of the 34 programs profiled, 14 involve loan repayment and 9 involve student scholarships.
- These programs are relatively new, with 79 percent of placements being made between 1994 and 1997.
- The programs are managed under various auspices, including Higher Education Commissions, State Health Departments, Offices of Rural Health, and Professional Associations.
- Obligated terms of serve range from 12 to 48 months (median 24 months) with annual financial benefits to physicians ranging from $5000 to $31,000 (median $15,000).
- Two-thirds of physicians placed by these State Programs have practiced in communities of 50,000 people or less, with a mean per capita income of $17,500 in 1996 and a nonwhite population of 17.4 percent.
- Based on initial analyses of 22 State programs, service completion rates are very high for physicians (98% for incentive programs and 94% for loan repayment programs).
- Based upon review of 26 state programs which provided ethnicity data, most of these programs do not target minorities and minority provider participation is comparatively low.

Lessons from Abroad

Faced with the generic problems of physician shortages in rural areas, recent years in Canada and Australia have seen active initiatives to address this problem. All 18 of Canada’s family practice residencies offer rural practice experience to their residents, usually in the second (of two) postgraduate year. There are some additional elective third-year programs for advanced skills training (particularly in anesthesia, emergency medicine, and obstetrics) (Rourke, 1996). A Canadian Rural Medicine Network is being organized by the College of Family Physicians of Canada for purposes of collaborative curriculum and faculty development. Rural training in Canada varies considerably by program, ranging from 1 month required rural block rotations to 12 months, contextual experience with continuity in a rural practice (Rourke & Rourke, 1995). A one-year anesthesia training program has been
developed at the University of Western Ontario for family physicians needing these skills; 60 percent of program graduates were later found to be providing anesthesia services within their rural practices (Casson, 1988). At Dalhousie University in Nova Scotia, where rural rotations have been required for residents in all specialties, strong trends to enter rural practice have been demonstrated for both primary and nonprimary care specialties (Gray et al., 1994).

In Australia, the government has provided funds for the Rural Health Support, Education and Training (RHSET) program, a Faculty of Rural Medicine has been organized within the Royal Australian College of General Practitioners (RACGP), and guidelines have been established for academic rural general practice units (ARGPs). The ARGPs are to be based in exemplary rural “demonstration” practices, and will be involved in practice-based research as well as teaching of medical students, residents, practicing physicians, and allied health professionals. The minimum number of academic physicians in an ARGPU has been set at 3, and an additional research/evaluation staff member is recommended (Hays et al., 1992). A Rural Medicine Curriculum Design Project, which has already developed specific curricular goals and objectives in surgery, anesthesia and obstetrics has been initiated (Craig & Nichols, 1993; Craig et al., 1993). It is anticipated that advanced obstetrics training, to include Cesarean section competency, will probably involve a 12-month program, including 3 months in a rural setting (Craig & Nichols, 1993).

Both Canada and Australia still see the need for further curriculum design for more effective preparation for rural practice. Rourke has called for this curriculum to be “high-quality, academically sound, needs-driven, evidence-based, learner-centered and outcome measured” (Rourke, 1996).

In a recent international effort, a training policy has been developed by the World Organization of Family Doctors (WONCA). Nine recommendations were made, ranging from selection of medical students to development of educational programs and national rural health strategies (WONCA Working Party on Training for Rural Practice, 1996).

Some Key Issues

Among the many issues involved in efforts to increase the physician supply in rural underserved areas, nine stand out as particularly important in our view:

1. **What will the future rural health system look like?**

The last 25 years have seen major changes in local rural health care settings throughout the country, and many of the trends compound the access problem.
During the 1980s, for example, about 10 percent of the nation’s rural hospitals closed as a result of low censuses, economic problems and other difficulties (personal communication, Gary Hart, Seattle, Washington, October 1998). The rural physician workforce is aging and young physicians disproportionately favor practice settings in larger or metropolitan areas. Solo practice has become the exception in primary care, and is not tenable in the long-term in small rural areas. Many small communities of less than 2500 people are too small to support a primary care group practice.

A logical and promising development in many small rural areas around the country is the growth of family practice groups of at least three or four physicians, if the community and its surrounding area is large enough to support such a practice. A local hospital may be available for acute care of common medical problems and obstetric care. To this basic family practice group, the practice or community may add additional support staff, such as a family/geriatric nurse practitioner or a physician assistant, mental health professional, and perhaps others. If the referral area is sufficiently large, other specialties that might become involved include general surgery, obstetrics-gynecology and internal medicine. Adequate after-hour and weekend coverage is always a problem in a small rural setting. Although local family physicians often provide emergency care, rural hospitals increasingly contract with nonlocal emergency physicians for emergency care services (e.g., 59% of hospitals under 100 beds in a Washington State study published in 1992 [Williamson et al., 1992]).

The small town with one or two physicians may have lost its acute care general hospital. If it is not successful in converting to some form of limited service facility and recruiting more physicians, it may be best served by nurse practitioner/physician assistant providers working in collaboration with a primary care group practice in an adjacent larger community.

Many small rural hospitals are on the brink of closure due to reimbursement shortfalls and the lack of community support. Some may be stabilized through a Hospital Services District. Even in instances where a small acute care hospital has closed, an Ambulatory Hospital Services District may be helpful in stabilizing local rural health care services around acute and chronic care, emergency care, and related primary care without availability of local acute inpatient beds. Such districts have been successful in Arizona and Washington State, and are potentially feasible in 33 other states with authorizing legislation (Taplin et al., 1994). Conversion to a limited service facility is another important strategy, which has been shown to retain appropriate hospital-based services in rural communities threatened by actual or imminent hospital closure. An excellent example is the Montana Medical Assistance Facility (MAF), which for over 10 years has demonstrated a successful model for conversion of rural hospital services that has been replicated in Wyoming, Kentucky, and Florida (Christianson et al., 1990; National Rural Health Association,
1996). The Balanced Budget Act of 1997 established a Critical Access Hospital Program based on the experience of the Montana MAF Program. It remains to be seen how successful this program can be in stabilizing threatened small hospitals as limited service facilities.

Although the above trends and patterns may be common to many small rural populations of less than 10,000 people, there will likely to continue to be considerable variation from one area of the county to another, and no single set of solutions will apply everywhere.

2. **What should be the specialty mix in small rural practice?**

   Access to a comprehensive range of primary care services in a stable local health care system requires, in a small rural setting, that the group of physicians be generalists (especially family physicians) capable of sharing call. Today, most physicians feel that this should be no more often than every third night/weekend. In some cases, general internists, and occasionally pediatricians, are able to broaden their skills sufficiently through continuing medical education to share in the generalist call schedule. If an obstetrician is added to the group, family physicians with advanced obstetric skills can share obstetric calls. In most instances, other specialties will likely gravitate to somewhat larger rural communities of sufficient size to support an emergency medicine group in a secondary care hospital, as well as a larger mix of other specialists. It seems certain, therefore, that family practice will remain the predominant specialty upon which small rural health systems need to be based.

3. **More physicians need to be trained, recruited to, and retained in rural practice.**

   As we have seen, while the rural population is growing, the rural physician population is aging and relatively declining, and there are many barriers along the long pipeline of rural physician supply that make the overall problem challenging. Changes need to take place within the medical education community, accreditation bodies, environment of rural practice, and government at state and federal levels. On the positive side, however, the last 25 years have seen considerable growth of knowledge and experience concerning strategies to address the problem. Excellent educational models have been developed. It seems likely that more rural physicians can be trained and retained in rural practice if the numbers of family practice teaching programs with explicit rural missions can be increased, accreditation barriers removed and fiscal problems addressed for rural teaching practices as well as rural practice. However, it is abundantly clear that rural residency training cannot be successful if the rural practice environment is hostile or unappealing to program graduates.
4. **Selection of rurally-oriented students is no longer a mystery, but remains an issue.**

   The pipeline for prospective rural physicians starts well before medical school. What we now know is that the most likely candidates for future rural practice are white; are usually male; have rural background/interests; favor primary care (in many instances family practice was already chosen before or early in medical school); and have demonstrated interest in people or social concerns. In spite of this knowledge, most Admissions Committees of medical schools do not include primary care physicians or have a special rural track, and the selection committees in most family practice residencies do not explicitly target the above criteria in their selection process.

5. **Residency training needs to be carefully structured to prepare graduates for rural practice, including real-world rural experience.**

   Rural physicians need a broader range of knowledge and skills than primary care physicians practicing in urban areas surrounded by consultants in most specialties and the technology/resources of larger hospitals. Rural physicians need to have procedural skills in emergency medicine, surgery, obstetrics, and perhaps anesthesia, be skilled in community medicine, have computer and business skills, and also be attuned to team and group practice. A three-year family practice residency can provide the necessary preparation, but only if it is carefully structured to make full use of all 36 months. This, in turn, requires a strong rural mission and sufficient immersion in rural training settings. We now have some successful operational models of curricula and structures of family practice residency training for rural practice, including rural training tracks and rural fellowship programs. Unfortunately, there are too few of them, and the overall pattern of graduate education in primary care remains more urban based and oriented. Further, the trend in many urban settings toward hospitalist practice threatens to decrease the emphasis on inpatient training in some residency programs.

6. **Despite the demonstrated success of rural training models, accreditation barriers persist.**

   For family practice residencies, the current RRC requirement of all but 2 months/year in the Family Practice Center (generally more urban) for continuity of care reasons, is the most limiting factor in providing sufficient rural immersion in rural training settings. For those rurally-oriented programs which have established rural training tracks (RTTs) there are still other barriers to accreditation (e.g., one vs. two residents in an RTT at any one time). There is a general need for accreditation bodies to relax some of the continuity of care restrictions and take a broader view of
the “family practice center” to include rural training sites. In other primary care specialties, the RRC requirements are much more restrictive in terms of rural practice. In internal medicine, for example, the program director plus at least four half-time additional faculty must be present for everyday teaching.

7. **Rural training and practice sites no longer need to be isolated.**

Advances in medical informatics and telemedicine have the potential to remove communications and knowledge barriers between rural and urban areas, but so far have not been widely applied in rural practice. Barriers to wider use of these advances include physician habit patterns, reimbursement and medicolegal issues, and availability of startup funding. This situation, however, is changing rapidly. At least 11 states now use Medicaid funds to pay for telemedicine services. Under the BBA97, HCFA has been directed to establish reimbursement mechanisms for telemedicine services to HPSAs by January 1, 1999. The National Library of Medicine has committed $42 million over the next several years in 19 demonstration projects to evaluate the efficacy of telemedicine in a variety of geographic locations and clinical settings. In addition, the Telecommunications Act of 1996 was passed in an effort to equalize costs of these services around the country (National Rural Health Association, 1998). Various types of telehealth systems are being employed by several residency programs that help in the training of rural residents.

8. **Rural health care services are still underreimbursed, threatening the viability of rural training programs as well as physician recruitment and retention in rural practice.**

As pointed out in the Spring 1998 issue of *Rural Health News* by the North Carolina Rural Health Research and Policy Analysis Program, rural physicians spend up to 16 percent more time per week in direct patient care for 38 percent more patient visits compared to their counterparts in the largest metropolitan areas. Rural physicians are more dependent on Medicare and Medicaid than urban physicians, yet both programs usually pay physicians at lower rates than private insurers (North Carolina Rural Health Research and Policy Analysis Program, 1998). There is growing awareness in government and health policy circles, however, that reimbursement strategies are a necessary element in resolving the rural physician shortage problem. There are some potentially useful developments in this direction, but it is still too early to assess their impact. Starting in January, 1997, for example, Medicare reduced the urban/rural payment differential by consolidation of rural and urban areas in some states. The Medicare Incentive Program with its 10 percent supplement in some rural areas is another potentially useful change (Council on Graduate Medical Education, 1998, p. 23).
9. *Many fiscal barriers to the production and retention of rural physicians are within the purview of federal and state government, but a coherent strategic approach has not yet been taken.*

The National Health Service Program (NHSC) is a good example of a program that could have been more effective in the retention area had a different philosophy been taken to its overall goal. In the 28 years since the program's inception, its retention rates in rural practice have been marred by low morale among rural physician assignees, and the relationship between obligated physicians and program administrators has often been more adversarial than collaborative. Had the primary goal of that program been to more aggressively nurture the future careers rural physicians, the outcome by now would probably be more impressive. A coherent strategy could be implemented within government through coordinated policy changes in the areas of reimbursement (Medicare and Medicaid), funding of graduate medical education, and other economic incentives for educational programs with a rural mission and for physicians interested in rural practice.

**Comment**

As the 1998 Council on Graduate Medical Education's Tenth Report (COGME) concludes, the most pressing challenge in geographic maldistribution of rural physicians is in "small rural" areas (less than 10,000 people, not adjacent to metropolitan areas). The predominant need here is for family physicians. Internists, pediatricians, and obstetrician-gynecologists generally require a catchment area large enough to support five or more physicians (i.e., communities of over 10,000 people). Family practice is clearly the mainstay of the solution for small rural areas. Some general internists have significantly contributed to the rural physician supply, but other specialties (including pediatrics) have not gravitated to small rural areas, probably largely because of a more narrow breadth of training and practice and the lack of call coverage in their specialties. Osteopathic physicians are more likely than allopathic physicians to select family practice (46% vs. 11%), and are more likely to locate and remain in rural areas (18.1% vs. 11.5%). Though increasing in number, however, osteopathic physicians still account for only 5 percent of the nation's total physician workforce, and are unevenly distributed by state (Council on Graduate Medical Education, 1998, pp. 13-15).

Although there is a substantial literature on recruitment and retention of physicians in rural practice, there is much less published work on the effectiveness of rurally-oriented medical education programs. Furthermore, most reports are program specific and limited to the extent that applicants were biased on the basis of preexisting interest in rural training and practice. Even if most of the residents who
are in rural training programs already had an interest in practicing in rural areas, however, the rural training programs almost certainly strengthen that resolve and make them more confident in their ability to do so. These rural training programs may also reduce the training attrition to urban areas by keeping their residents physically away from urban places, potential spouses, job offers, specialty training, and the like. The strongly positive reported outcomes for many of the programs seem to substantiate the plausibility of this argument. And finally, it can be argued that even if rural training programs did not result in more physicians choosing rural practice, they would be worth keeping and expanding because they better train physicians for the unique demands of rural practice.

A significant question is whether expanding rural programs to include residents who have less or no preference for rural practice will be effective in substantially increasing their likelihood of locating and staying in rural places. Long-term demonstration projects aimed at evaluating the costs (e.g., more urban generalists trained in a rural setting) and benefits (increased numbers of rural generalists) of such a strategy are desirable. Armed with such information and better information from more finely tuned studies of current programs would allow policy makers and training administrators to decide on the most effective methods of increasing rural physician supply from the several alternatives (e.g., increased rural reimbursement, expanded rural training programs, expanded state and federal rural loan repayment programs, and better state recruitment and retention activities).

Regardless of the level of evidence about the rural training of residents, there are significant structural barriers to the expansion of rural residencies and RTTs. Of particular importance are problems associated with the current GME funding scheme that makes receiving adequate program funds difficult for rural programs and with RRC requirements that make it difficult and sometimes impossible to train residents in rural places, especially in small and remote rural places.

The following recommendations are based on the findings of this critical review, which has documented significant progress in medical education for rural practice while further clarifying the present challenges and directions for further development.

**Recommendations**

**Education Support**

1. Congress should commit 20 percent of federal Title 7 family practice residency funding to residency training for rural practice (i.e., family
practice residencies with clear rural mission and curricula, as well as proven or expected success in placing graduates in rural practice; the 20 percent figure is consistent with the proportion of the population living in rural America).

2. Increase the flow of federal Title 7 funds for rural programs to include direct funding to rural hospitals and/or RTT sites; make process of grant applications less burdensome and costly.

3. Continue Title 7 funding for predoctoral medical education programs that demonstrate output of rural physicians, and accord priority to program applications with rural goals. Make continued funding of such programs dependent on successful output of rural physicians.

4. For Title 7 Department of Family Medicine grant requests, give priority to departments with a demonstrated rural mission and expected/proven success in placing graduates in rural practice. Make continued funding of such departments dependent on successful production of rural physicians.

5. Increase federal training grant funding for further development and expansion of rural training tracks (RTTs).

6. Increase funding for expansion and further development of rural medicine fellowships for advanced skills development.

7. Create incentives for medical schools to develop rural missions for preparing medical students and residents for future rural practice.

8. Foster the development, through grant funding, of rural rotations for general surgery, especially in collaboration with family practice teaching sites.

**Accreditation by Residency Review Committees**

1. The Family Practice Residency Review Committee (RRC) should tailor its requirements to facilitate increased quality training in rural places by:
   - Supporting rural rotations away from the Family Practice Center (FPC) of up to 6 months.
   - Defining the FPC more broadly to include RTT sites.
   - Allowing one resident at a time in a RTT site.
   - Assessing quality of rural teaching programs more by educational outcomes than by process.
2. The Internal Medicine RRC should consider the revision of faculty supervision and curricular requirements to enable internal medicine residencies to develop rural programs or tracks.

**Support of Rural Practice Environment**

1. Expand the Medicare Incentive Program, which pays a bonus for physician services to residents of designated shortage areas, to include practices in remote small towns irrespective of current shortage area designation status. Explore the consequences of limiting the payments to generalists and increasing the incentives.

2. Develop a supplemental reimbursement system for Medicaid similar to the Medicare Incentive Program for rural health services in HPSAs.

3. States should consider development of Ambulatory Health Services Tax Districts in rural areas where the rural hospital is threatened with closure, or has already closed.

4. Implement the Critical Access Hospital Program in order to stabilize hospitals in small towns and maintain an environment conducive to rural practice by generalist practitioners.

5. Fund the development of telehealth programs linking academic health science centers with rural practice and teaching units for purposes of teaching, continuing medical education, and appropriate consultation. Also expand telehealth linkages between smaller regional health centers and their rural catchment areas regarding appropriate consultations and regarding referrals to tertiary medical centers.

6. Continue the funding of the NHSC with a stronger philosophic goal to nurture and support the retention of obligated physicians in rural practice (i.e., to work more effectively to meet the professional, personal and family needs of physician assignees), as well as to provide needed local medical service in shortage areas.

7. Promote generalist medical education initiatives at Indian Health Service (IHS) sites.

**Research and Policy Development**

1. Track graduates of rural medical education programs, both individually and collectively, in terms of selection and retention in rural practice.
2. Evaluate the effectiveness of rural medical education initiatives and programs in terms of the preparedness of graduates for rural practice (e.g., quality of care and scope of practice).

3. Evaluate state and federal initiatives to increase recruitment and retention of rural health care professionals, including the influence of economic incentives.

4. Continue evaluations of NHSC in terms of service, recruitment, retention and physician satisfaction.

5. Conduct a national evaluation of the effectiveness of AHECs and their specific programs, with a particular emphasis upon demonstrated outcomes.

6. Further monitor gender differences in terms of selection and retention in rural practice and fund and evaluate innovative demonstration projects aimed at increasing female physician practice within rural areas.

7. Evaluate and monitor the influence of changing patterns of reimbursement to rural providers of health services.

8. Study the influence and sequelae of managed care in rural practice.

9. Conduct research and demonstration projects to evaluate the feasibility and outcomes of telehealth projects, including considerations of the appropriate range of services, reimbursement, medicolegal issues, collaborative relationships among health care professionals, cost effectiveness, outcomes of care, and the appropriateness of telehealth connections and referral patterns.

10. Study the influence of changing computing/medical informatics and communication systems on rural practice.
References


Table 1: Approaches to Selection, Recruitment, and Retention of Primary Care Rural Physicians

<table>
<thead>
<tr>
<th>Institution</th>
<th>Program</th>
<th>Elements</th>
<th>Results</th>
</tr>
</thead>
</table>
| University of Alabama               | Biomedical Sciences Preparation Program (Bio Prep) | Selected rural high school students  
- Accelerated course work  
- Clinical experience  
- Summer programs                                                                 | 42% of students made career choice by 9th grade versus 7% of non-Bio Prep students          |
| Jefferson Medical                   | Physician Shortage Area Program (PSAP)       | Selection process with preference for rural background and interest in family medicine  
Special predoctoral program, including required family medicine clerkship                  | Graduates 10 times more likely to choose rural family practice                             |
| University of Arkansas              |                                              | Selective admission with rural preference  
Curriculum changes in primary care  
Statewide AHECs                                                                             |                                                                                            |
<table>
<thead>
<tr>
<th>Institution</th>
<th>Program</th>
<th>Elements</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Washington</td>
<td>WWAMI Program</td>
<td>Selective admissions with rural preference</td>
<td>One half of graduates enter primary care fields (FP, GIM, Peds)</td>
</tr>
<tr>
<td>(Baldwin et al., 1995)</td>
<td></td>
<td>Decentralized predoctoral and graduate training</td>
<td>41.5% return to home state of origin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>State-funded residency program network</td>
<td></td>
</tr>
<tr>
<td>University of New Mexico</td>
<td></td>
<td>Alternative primary care track with rural training sites</td>
<td>25% of graduates in rural hospitals or facilities</td>
</tr>
<tr>
<td>(Kaufman et al., 1980; Scaletti, 1995)</td>
<td></td>
<td>Delayed hospital-based training</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multidisciplinary training including medicine, nursing, pharmacy, and others</td>
<td></td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>Rural Physician Associate Program</td>
<td>Third-year students in rural 9-12 month preceptorship</td>
<td>After 16 years, 75% of graduates enter primary care, 58% practice in communities less than 50,000 population</td>
</tr>
<tr>
<td>(Verby, 1987; Verby, 1988)</td>
<td>(RPAP)</td>
<td>Stipends from rural physicians as physician associates</td>
<td></td>
</tr>
<tr>
<td>University of North Carolina</td>
<td></td>
<td>Statewide AHECs for predoctoral and residency primary care education</td>
<td>51% of graduates in family practice</td>
</tr>
<tr>
<td>(North Carolina Area Health</td>
<td></td>
<td></td>
<td>10% in towns &lt; 10,000 population</td>
</tr>
<tr>
<td>Education Centers, 1988)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institution</td>
<td>Program</td>
<td>Elements</td>
<td>Results</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>St. Elizabeth Medical Center</td>
<td>Supervised rural moonlighting program for family practice residents</td>
<td>Initial experience of two residents promising; no report since 1994</td>
<td></td>
</tr>
<tr>
<td>Family Practice Residency,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dayton, OH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foley, 1994</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>University of Kentucky</td>
<td>Decentralized Center for Rural Health (Hazard, KY), working with</td>
<td>Multidisciplinary training programs (family practice residency, nursing,</td>
<td>88% of 92 graduates located in rural counties, with 77% in rural Kentucky</td>
</tr>
<tr>
<td>(Elam et al., 1997; Rural</td>
<td>affiliated State Office of Rural Health</td>
<td>physical therapy, laboratory science)</td>
<td></td>
</tr>
<tr>
<td>Health News, 1997)</td>
<td>Early admission program</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allows application to one medical school during second undergraduate year</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2: Size of Practice Location Preference by Size of Community Where Most of Life Was Spent

<table>
<thead>
<tr>
<th>Size of Practice Location Preference</th>
<th>Size of Community Where Residents Grew Up</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large city 5000,000 or more</td>
<td>Large City: 40.3</td>
<td>8.3</td>
</tr>
<tr>
<td></td>
<td>Moderate City: 26.4</td>
<td>52.6</td>
</tr>
<tr>
<td>Moderate city 50,000-500,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small city 10,000-50,000</td>
<td>Large City: 21.5</td>
<td>26.0</td>
</tr>
<tr>
<td></td>
<td>Moderate City: 11.8</td>
<td>13.2</td>
</tr>
<tr>
<td>Town 10,000 or less</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Spearman r = 0.44, p < 0.01

Shaded areas indicate correspondence between size of community in which resident grew up versus size of community for preferred practice location.

Table 3: Most Important Factors to Graduating Family Practice Residents in Choosing Their First Practice Site

<table>
<thead>
<tr>
<th>Factor</th>
<th>Rank</th>
<th>% Responding Important*</th>
<th>Mean Likert Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant other’s wishes</td>
<td>1</td>
<td>85.2</td>
<td>4.30</td>
</tr>
<tr>
<td>Medical community friendly to family physicians</td>
<td>2</td>
<td>76.3</td>
<td>4.02</td>
</tr>
<tr>
<td>Recreation/culture</td>
<td>3</td>
<td>60.7</td>
<td>3.64</td>
</tr>
<tr>
<td>Proximity to family/friends</td>
<td>4</td>
<td>60.1</td>
<td>3.64</td>
</tr>
<tr>
<td>Significant other’s employment</td>
<td>5</td>
<td>59.0</td>
<td>3.55</td>
</tr>
<tr>
<td>Schools for children</td>
<td>6</td>
<td>58.2</td>
<td>3.44</td>
</tr>
<tr>
<td>Size of community</td>
<td>7</td>
<td>53.8</td>
<td>3.49</td>
</tr>
<tr>
<td>Initial income guarantee</td>
<td>8</td>
<td>52.8</td>
<td>3.45</td>
</tr>
<tr>
<td>Benefits plan</td>
<td>9</td>
<td>52.8</td>
<td>3.42</td>
</tr>
<tr>
<td>Proximity to spouse’s family/friends</td>
<td>10</td>
<td>51.3</td>
<td>3.37</td>
</tr>
<tr>
<td>Weather/geography</td>
<td>11</td>
<td>50.6</td>
<td>3.45</td>
</tr>
<tr>
<td>Need for physicians</td>
<td>12</td>
<td>46.1</td>
<td>3.25</td>
</tr>
<tr>
<td>Significant other’s school oppor.</td>
<td>13</td>
<td>45.6</td>
<td>3.04</td>
</tr>
<tr>
<td>Maximum potential income</td>
<td>14</td>
<td>45.4</td>
<td>3.24</td>
</tr>
<tr>
<td>Familiar with physicians in area</td>
<td>15</td>
<td>35.6</td>
<td>2.92</td>
</tr>
<tr>
<td>Community service commitment</td>
<td>16</td>
<td>35.2</td>
<td>2.86</td>
</tr>
<tr>
<td>Affordable housing</td>
<td>17</td>
<td>33.5</td>
<td>2.97</td>
</tr>
<tr>
<td>Opportunity to teach</td>
<td>18</td>
<td>31.5</td>
<td>2.86</td>
</tr>
<tr>
<td>Familiar with hospital</td>
<td>19</td>
<td>31.0</td>
<td>2.81</td>
</tr>
<tr>
<td>Loan payback plan</td>
<td>20</td>
<td>27.6</td>
<td>2.49</td>
</tr>
<tr>
<td>Signing bonus</td>
<td>21</td>
<td>26.3</td>
<td>2.61</td>
</tr>
<tr>
<td>Residency nearby</td>
<td>22</td>
<td>22.1</td>
<td>2.48</td>
</tr>
<tr>
<td>Medical school nearby</td>
<td>23</td>
<td>13.4</td>
<td>2.19</td>
</tr>
<tr>
<td>Military service commitment</td>
<td>24</td>
<td>13.3</td>
<td>1.74</td>
</tr>
</tbody>
</table>

n = 1,012


* 4-5 on Likert scale on which 1 = not important and 5 = very important.
Table 4: Number and Percentage of Physicians Graduating from American Medical Schools, 1976 Through 1985, Who Were Practicing in Rural Counties in 1991, by Specialty and Gender

<table>
<thead>
<tr>
<th>Specialty Group</th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Family medicine</td>
<td>4,320</td>
<td>31.8</td>
<td>764</td>
</tr>
<tr>
<td>General surgery</td>
<td>753</td>
<td>18.2</td>
<td>74</td>
</tr>
<tr>
<td>Orthopedics</td>
<td>577</td>
<td>12.8</td>
<td>21</td>
</tr>
<tr>
<td>Emergency medicine</td>
<td>628</td>
<td>13.2</td>
<td>92</td>
</tr>
<tr>
<td>Urology</td>
<td>207</td>
<td>12.5</td>
<td>3</td>
</tr>
<tr>
<td>General internal medicine</td>
<td>1,671</td>
<td>13.7</td>
<td>347</td>
</tr>
<tr>
<td>Obstetrics</td>
<td>718</td>
<td>15.0</td>
<td>199</td>
</tr>
<tr>
<td>Ophthalmology</td>
<td>436</td>
<td>12.9</td>
<td>56</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>193</td>
<td>12.0</td>
<td>16</td>
</tr>
<tr>
<td>General pediatrics</td>
<td>490</td>
<td>12.3</td>
<td>318</td>
</tr>
<tr>
<td>Radiology</td>
<td>518</td>
<td>11.2</td>
<td>78</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>471</td>
<td>8.2</td>
<td>93</td>
</tr>
<tr>
<td>Other specialties</td>
<td>584</td>
<td>7.9</td>
<td>109</td>
</tr>
<tr>
<td>Psychiatry</td>
<td>271</td>
<td>7.6</td>
<td>106</td>
</tr>
<tr>
<td>Medical subspecialties</td>
<td>839</td>
<td>6.8</td>
<td>135</td>
</tr>
<tr>
<td>Surgical subspecialties</td>
<td>170</td>
<td>4.6</td>
<td>21</td>
</tr>
<tr>
<td>Pediatric subspecialties</td>
<td>68</td>
<td>4.0</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>12,912</td>
<td>13.8</td>
<td>2,463</td>
</tr>
</tbody>
</table>

Table 5: Graduates of U.S. Medical Schools Entering Family Practice (%) (1994-97), Leading 46 Schools*

<table>
<thead>
<tr>
<th>Medical School</th>
<th>Graduates Selecting Family Practice Residencies (3-year average %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of South Dakota</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>University of North Dakota</td>
<td>School of Medicine and Health Sciences</td>
</tr>
<tr>
<td>University of Minnesota</td>
<td>Medical School - Minneapolis</td>
</tr>
<tr>
<td>Wright State University</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>University of Iowa</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>University of Washington</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>East Tennessee State</td>
<td>James H. Quillen College of Medicine</td>
</tr>
<tr>
<td>University of Arkansas</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>University of Nevada</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>University of South Alabama</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>Mercer University</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>Michigan State University</td>
<td>College of Human Medicine</td>
</tr>
<tr>
<td>University of Utah</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>University of Kansas</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>Southern Illinois University</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>East Carolina University</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>University of Oklahoma</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>Morehouse</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>University of Nebraska</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>University of California</td>
<td>Davis School of Medicine</td>
</tr>
<tr>
<td>University of California</td>
<td>Irvine College of Medicine</td>
</tr>
<tr>
<td>Marshall University</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>University of Arizona</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>University of Missouri</td>
<td>Columbia School of Medicine</td>
</tr>
<tr>
<td>Indiana University</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>Texas Tech University</td>
<td>School of Medicine</td>
</tr>
<tr>
<td>Health Sciences Center</td>
<td></td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>College of Medicine</td>
</tr>
<tr>
<td>Medical School</td>
<td>Graduates Selecting Family Practice Residencies (3-year average %)</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>------------------------------------------------------------------</td>
</tr>
<tr>
<td>Uniformed Services University of Health Sciences</td>
<td>22.4%</td>
</tr>
<tr>
<td>F. Edward Hebert School of Medicine</td>
<td></td>
</tr>
<tr>
<td>University of Colorado</td>
<td>22.2%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>Northeastern Ohio Universities</td>
<td>22.2%</td>
</tr>
<tr>
<td>College of Medicine</td>
<td></td>
</tr>
<tr>
<td>Medical College of Wisconsin</td>
<td>22.1%</td>
</tr>
<tr>
<td>University of New Mexico</td>
<td>22.0%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>University of Missouri</td>
<td>21.8%</td>
</tr>
<tr>
<td>Kansas City School of Medicine</td>
<td></td>
</tr>
<tr>
<td>Ohio State University</td>
<td>21.8%</td>
</tr>
<tr>
<td>College of Medicine and Public Health</td>
<td></td>
</tr>
<tr>
<td>Virginia Commonwealth University</td>
<td>21.8%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>University of Hawaii</td>
<td>21.7%</td>
</tr>
<tr>
<td>John A. Burns</td>
<td></td>
</tr>
<tr>
<td>School of Medicine</td>
<td>21.6%</td>
</tr>
<tr>
<td>Albany Medical College</td>
<td></td>
</tr>
<tr>
<td>Mayo Medical School</td>
<td>21.6%</td>
</tr>
<tr>
<td>Medical University of South Carolina</td>
<td>21.3%</td>
</tr>
<tr>
<td>College of Medicine</td>
<td></td>
</tr>
<tr>
<td>Eastern Virginia Medical School</td>
<td>21.0%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>Meharry Medical College</td>
<td>21.0%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>Rush Medical College of Rush University</td>
<td>20.9%</td>
</tr>
<tr>
<td>University of Massachusetts Medical School</td>
<td>20.8%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>Temple University</td>
<td>20.6%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>Oregon Health Sciences University</td>
<td>20.2%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
<tr>
<td>Case Western Reserve University</td>
<td>20.1%</td>
</tr>
<tr>
<td>School of Medicine</td>
<td></td>
</tr>
</tbody>
</table>

* As recognized by "Family Practice Percentage Awards," given annually by the American Academy of Family Physicians (AAFP).
Table 6: Some Exemplary Predoctoral Programs Successfully Producing Rural Physicians

<table>
<thead>
<tr>
<th>Institution</th>
<th>Year Started</th>
<th>Elements</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Minnesota Duluth</td>
<td>1972</td>
<td>Targeted rural admissions 2-year medical school; last 2 years at University of Minnesota First-year preceptorship Second-year preceptorship Rural role models</td>
<td>After 15 years, 52.5% of graduates in family practice with over 41% in towns of less than 20,000 people</td>
</tr>
<tr>
<td>Jefferson Medical College</td>
<td>1974</td>
<td>Targeted rural admissions Applicant commitment to family practice and future rural practice Financial aid Regional third-year family clerkship and fourth-year preceptorship (both schools)</td>
<td>PSAP 52% Family Practice and 21% rural practice versus 1% and 2%, respectively, for regular admissions; 87% retention in rural practice after 5 years</td>
</tr>
<tr>
<td>Institution</td>
<td>Year Started</td>
<td>Elements</td>
<td>Results</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
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<td>--------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Mercer University (Ackermann &amp; Comeau, 1996)</td>
<td>1982</td>
<td>Target admissions for primary care and rural/other underserved areas</td>
<td>Through 1995, 32% of graduates chose family practice residencies and 63% entered FP/GIM and peds residencies of classes of 1986-91; 36% are in family practice and 64% in primary care specialty practice; unclear outcomes in rural practice</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problem-based learning in basic sciences years (McMaster model)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community office practice preceptorship in first 2 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Community science program</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assignment of families</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Traditional 8-week required third-year family medicine clerkship</td>
<td></td>
</tr>
<tr>
<td>Upper Peninsula Program, Michigan State University (Brazeau et al., 1990)</td>
<td>1974</td>
<td>Targeted rural admissions</td>
<td>As of 1989, 35% of program's graduates entered family practice, with additional 9% and 6% in GIM and peds, respectively; since curricular change of 1982, fewer graduates have chosen family practice; graduate differences also noted with fewer women entering family practice (Escanaba, population 38,000) with fourth year</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problem-based learning in first 2 years</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>From 1974 to 1982, all but 10 weeks of 4 years were in Upper Peninsula</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Since 1982 curricular change forced by LCGME, first year in Lansing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>main campus</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Upper Peninsula campus includes third-year clerkship in primary care</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>practice group</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clerkships in Marquette (population 72,000)</td>
<td></td>
</tr>
<tr>
<td>Institution</td>
<td>Year Started</td>
<td>Elements</td>
<td>Results</td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>--------------</td>
<td>--------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>West Virginia School of Osteopathic Medicine (Roberts et al., 1993)</td>
<td>1983</td>
<td>Mission to serve Appalachia</td>
<td>As of 1990, 30 graduates (75%) of SREB consortium returned to home states and 21 (50%) entered rural practice in Appalachia</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Multistate educational consortium (SREB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Personalized recruiting, admission and placement of rural students</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Early and long-term clinical training in rural sites</td>
<td></td>
</tr>
<tr>
<td>University of Washington WWAMI Program (Hunt et al., 1995)</td>
<td>1971</td>
<td>5-state consortium</td>
<td>One-half of graduates enter primary care specialties (See also Table 1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>First basic science year in home state, including primary care</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>preceptorship</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rural Underserved Opportunities Program (R/UOP)—first summer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Decentralized community-based clerkships (37 sites)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>WRITE Program, whereby rural-intensive 6-month clerkship can be chosen to fulfill third-year requirement</td>
<td></td>
</tr>
</tbody>
</table>
Table 7: Rural Emphasis in Family Practice Residency Programs

<table>
<thead>
<tr>
<th>Component of Program as Noted by Program Directors</th>
<th># of Programs</th>
<th>Proportion of Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural rotation, clinic, track, or fellowship</td>
<td>165</td>
<td>46.7%</td>
</tr>
<tr>
<td>Required rural rotation</td>
<td>142</td>
<td>40.2%</td>
</tr>
<tr>
<td>Required rural ambulatory clinic</td>
<td>50</td>
<td>14.2%</td>
</tr>
<tr>
<td>Rural training track</td>
<td>38</td>
<td>10.8%</td>
</tr>
<tr>
<td>Obstetrical fellowship</td>
<td>42</td>
<td>11.9%</td>
</tr>
<tr>
<td>Programs with a rural fellowship</td>
<td>16</td>
<td>4.5%</td>
</tr>
<tr>
<td>Programs with fellowship or procedural emphasis</td>
<td>70</td>
<td>19.8%</td>
</tr>
<tr>
<td>Program director is rural contact person</td>
<td>112</td>
<td>31.7%</td>
</tr>
<tr>
<td>Full rural mission</td>
<td>54</td>
<td>15.3%</td>
</tr>
<tr>
<td>Partial rural mission</td>
<td>97</td>
<td>27.5%</td>
</tr>
<tr>
<td>No rural mission</td>
<td>201</td>
<td>56.9%</td>
</tr>
</tbody>
</table>

n = 353

Table 8: Selected Characteristics and Rural Practice Choice by Family Practice Residency Graduates

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4-6</th>
<th>22+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of required rural</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>months (Number of programs with rural months)</td>
<td>(212)</td>
<td>(82)</td>
<td>(29)</td>
<td>(15)</td>
<td>(4)</td>
<td>(11)</td>
</tr>
<tr>
<td>Graduates choosing rural</td>
<td>24.5%</td>
<td>36.5%</td>
<td>45.6%</td>
<td>52.3%</td>
<td>51.0%</td>
<td>68.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>&gt; 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of obstetrical months taken (Number of programs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduates choosing rural</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23.8%</td>
<td>31.2%</td>
<td>34.1%</td>
<td>42.1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4-6</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of other graduate programs used (Number of family practice programs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graduates choosing rural (mean)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>37.3%</td>
<td>26.4%</td>
<td>25.1%</td>
<td>27.4%</td>
<td>22.5%</td>
<td></td>
</tr>
</tbody>
</table>

Table 9: Estimated Numbers of Health Care Professionals Participating in State-Sponsored Scholarship, Loan, Loan Repayment, and Incentive Programs in 1996

<table>
<thead>
<tr>
<th></th>
<th># Initial Contracts Signed in 1996</th>
<th># of Providers Placed in their First Service Site in 1996</th>
<th>Total # of Providers Serving Obligations in Fall 1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physicians (all specialties)</td>
<td>541</td>
<td>220</td>
<td>886</td>
</tr>
<tr>
<td>Physician assistants</td>
<td>105</td>
<td>99</td>
<td>186</td>
</tr>
<tr>
<td>Nurse practitioners</td>
<td>80</td>
<td>55</td>
<td>115</td>
</tr>
<tr>
<td>Nurse midwives</td>
<td>13</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Other health care professionals (LPN, NA, dentist, etc.)</td>
<td>365</td>
<td>302</td>
<td>556</td>
</tr>
</tbody>
</table>

Data based on straight line extrapolations of information provided by the directors of the first programs responding to the study, representing 34 of an estimated 80 eligible programs nationally.

Note: This study excluded programs receiving federal funds, i.e., the various federal and joint state-federal programs of the National Health Service Corps were excluded.

Figure 1

1996 Active Physicians Per 100,000 Population by Location

- Large Metro: 305
- Small Metro (< 1,000,000): 241
- Rural (city > 10,000 & adjacent to large metro): 128
- Rural (city > 10,000 & adjacent to small metro): 127
- Rural (city < 10,000 & adjacent to large metro): 74
- Rural (city < 10,000 & adjacent to small metro): 78
- Rural (city > 10,000 & not adjacent to metro): 176
- Rural (city = 2,500-10,000 & not adj. to metro): 92
- Rural (city < 2,500 & not adjacent to metro): 55

MD Physicians Per 100,000 Population

Alaska not included.

Figure 2

Patient Care MD Physicians Per 100,000 Population by Location and Specialty (1996)

Alaska not included.
Figure 3
Active MD Physicians Per 100,000 Population by Year and Location

- Large Metro
- Small Metro
- Rural (city > 10,000 & adjacent to metro)
- Rural (city > 10,000 & not adjacent to metro)
- Rural (no city of 10,000 and adjacent & not adjacent to metro)

Alaska not included.
Figure 4
Physician Education and Rural Location: A Pipeline Continuum

**High School/College**
- Rural and minority health professions programs (e.g., AHEC sponsored)
- Early admissions programs
- Primary care mentorship programs
- Rural observation experience
- Local high school encouragement & opportunity activities

**Medical School**
- Rural mission
- Admission policies
- Profiling of candidates
- Curricula for primary care
- Advisor and mentor programs
- Rural experience programs

**Graduate Training**
- Selection Process
- Location of residencies
- Rural goals of programs
- Rural curricula/experience, e.g.,
  - breadth of curriculum
  - rural rotations
  - rural training tracks (RTTs)
  - fellowships
- Rural training support (e.g., e-mail, telehealth teaching, library services, & travel reimbursements)

**Rural Practice**
- Continuing medical education (CME)
- National Health Service Corps (NHSC)
- Indian Health Service (IHS)
- Other approaches to sustain and nurture retention in rural practice, e.g.,
  - telehealth
  - reimbursement incentives
  - retention & clinical support programs

Rural Physician Training Pipeline

Attrition
Figure 5

Family Physician Graduates by First Practice Locations and Totals by Year

Figure 6

Family Practice Residency Programs with Rural Missions

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