Stengthening the Medical Workforce in Rural Canada: The Roles of Rural/Northern Medical Education

Component 1: Rural Medical Education: A Review of the Literature

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Executive Summary

The provision of an equitable and sustainable level of high-quality healthcare in rural communities has been a challenge to the Canadian healthcare system for some time. Rural communities have suffered from a shortage of primary care physicians for many years and have felt this chronic shortage longer and more severely than urban areas. It has been argued that one of the main challenges to a sustainable rural healthcare system is the ongoing maldistribution of physicians. Some rural hospitals have been at risk of closing because of a lack of physicians, while others have experienced a drastic decrease in the level of healthcare they can provide. Rural populations are not only perceived to have lower levels of health than urban populations, but actually do tend to consist of older, poorer, sicker, less educated populations. The aging of the rural population places a significant additional demand on the resources of the healthcare system. It has been argued that medical education has an important role to play in providing adequate training for rural practice, as well as in the recruitment of rural doctors. There have been suggestions of a reorientation of medical education toward rural medicine issues, and of making rural medicine practice experiences into required components of both undergraduate training and residency in family practice. Some also believe that this approach should progress on a continuum, from pre-medicine on to undergraduate and postgraduate medical education, and proceeding through a physician's career through continuing medical education (CME). According to some, a systematic, coordinated initiative aimed at the whole physician lifecycle may be warranted.

This report presents a synthesis and review of the literature related to the evidence, initiatives and approaches to rural/northern medical education, particularly its role in strengthening the medical workforce in rural areas. An extensive literature review was conducted involving the literature databases MEDLINE (January 1990-March 2003), ERIC (January 1990-March 2003), and PsychInfo (January 1990-March 2003). The search also encompassed an online search for reports not included in these literature databases, online searches for additional articles by authors who were frequently identified in the database search and a review of bibliographies of these studies and reports. Each article or report was critically reviewed and classified according to its methodology into one of the following categories: informed opinion article, descriptive study, quasi-comparative study and comparative study. This classification is drawn from Pong et al. (1995). Studies were also classified according to themes, using categories identified by the research team. These themes emerged from the literature that was examined. The results of the literature review are organized according to the following six categories:

Pre-medicine;
Financial issues;
Admissions;
Undergraduate curriculum interventions;
Postgraduate curriculum interventions;
Continuing medical education (CME).

The results of the literature review suggest that evidence exists to support the notion that student background characteristics, such as rural origin, as well as students' interest in and attitudes towards rural practice and family medicine, are important considerations for medical schools. Students of rural origin with an interest in rural medicine or rural primary care are more likely than non-rural students to enter rural practice. Another key factor related to eventual practice in rural communities

is the provision of rural learning experiences. There is evidence that rural experiences during undergraduate and postgraduate medical training can influence the subsequent decision to practice in rural communities. Exposure to the challenges and opportunities unique to rural medicine is thought to have a powerful effect on students who are considering a future rural practice. As a result, there have been calls to train more medical students in a rural medicine context, modify the curriculum to provide additional skills training, and introduce a third year of medical training to better prepare family practice graduates for rural medicine. The main findings from the literature review would appear to support the notion that medical schools need to place an emphasis on three key areas: the recruitment of future physicians from rural settings to rural practice; the need for exposure to rural medicine in medical school; and the role of rural exposure during residency training.

1 Introduction

1.1 Sustainable Rural Healthcare: The Recruitment and Retention Challenge

The provision of an equitable and sustainable level of healthcare in rural communities has been a challenge to the Canadian healthcare system for some time (Tepper & Rourke, 1999; Rourke, 1997; Hutten-Czapski, 1998; Mennin & Kaufman, 2000). Rural communities have suffered from a shortage of primary care physicians for many years and have felt the chronic shortage longer and more severely than urban areas (Ramsey, Coombs, Hunt, Marshall & Wenrich, 2001; Kermode-Scott, 1999). It has been argued that one of the main challenges to a sustainable rural healthcare system is the ongoing maldistribution of physicians (Rourke, 1997). Some rural hospitals have been at risk of closing because of a lack of physicians, while others have experienced a drastic decrease in the level of healthcare they can provide (Rourke 1998a; Rourke 1998b).

During the early 1990's, 11.3% of Canada's family physicians practiced in rural communities (Sanmartin & Snidal, 1993; Roberts, Davis, & Wells, 1991). This number increased slightly to 16.5% in the mid-1990s (Rourke, 1996). According to Hutten-Czapski (1998), there has been as much as a fourfold difference in physician-to-patient ratios between urban (1:193) and rural centres (1:797) in Canada. Over 1,500 more rural family doctors are needed in Canada to bring the rural physician–to-population ratio up to the current average. Unless current trends are changed, it has been estimated that by 2021 there will be 18.0% fewer rural doctors for the rural population than there are now (Rourke & Strasser, 1996). This problem also exists in other countries. In the United States, 20.0% of the population resides in rural areas, but only 9.0% of physicians practice there (Rabinowitz, Diamond, Markham & Paynter, 2001). The Australian medical workforce is also maldistributed, with significant undersupply in rural and remote areas and oversupply, particularly in general practice, in some urban locations (Prideaux et al., 2001). The situation is not encouraging when we consider that very few physicians move from urban to rural practices after they have established their careers (West et al., 1996).

Rural populations are not only perceived to have lower levels of health than urban populations, but actually do tend to consist of older, poorer, sicker, less educated populations (Rourke, 2000). The aging of the rural population places a significant additional demand on the resources of the healthcare system. Rural areas have also been found to have higher infant mortality and injury-related mortality rates. One study conducted in Washington State demonstrated that women who live in communities with poor local hospital access are more likely to bear infants who are premature and have prolonged hospitalizations with higher costs (Nesbitt, Connell, Hart & Rosenblatt, 1990). A lack of community-based maternity services can also compromise the care for women who do not have the financial means to travel to other communities.

The problem of recruiting and retaining physicians is particularly troublesome for rural communities (Silver, 1994). In many instances, specialist support and referral services are a long time and distance away from the rural community and physician. This can place enormous stress on a rural physician, particularly when emergencies occur (Rourke, 1997). In rural areas with a small hospital, the rural physician's scope of practice can include office-based family practice, house calls and nursing home visits, and hospital-based medicine. This work is usually supplemented by emergency medicine shifts, obstetric deliveries and sometimes GP anesthesia (Rourke, 1991; 1997). Compared with their urban counterparts, rural GPs are much more involved in hospital work,

providing general care, emergency services and obstetric deliveries in addition to their office practices (Rourke, 1993).

According to Florizone (1997), general practitioner (GP)-to-population ratios in all northern health regions and in many other rural communities throughout British Columbia are below the provincial average. The most northerly health regions in BC have the lowest GP-to-population ratios and the lowest long-term GP retention rates (Thommasen, 2000; Thommasen & Thommasen, 2001). Health indices data also reveals that health regions with high standardized mortality rates, high regional smoking rates and high teen pregnancy rates have lower long-term GP retention rates. The results from this study suggest that low long-term GP retention is related to variables that are associated with increased workload: namely, low GP-to-population ratios and poor community health status.

Rural practice can be defined in different ways. Leduc (1997) developed a General Practice Rurality Index (GPRI) for Canada which includes six variables for defining rural: remoteness from a basic referral centre, remoteness from an advanced referral centre, drawing population, number of GPs, number of specialists and presence of an acute care hospital. Rourke (1997) has defined rural practice as practice in nonurban areas, where most medical care is provided by a small number of GPs with limited or distant access to specialist resources and high technology health care facilities. According to Britt et al. (1993) there is no one entity that is "country general practice". Its characteristics can vary greatly depending on the size and remoteness of the population that its physicians serve. General practitioners working in large country towns have, for example, more in common, in some ways, with metropolitan GPs than with their counterparts in small and medium country towns. Similarities can be seen in terms of proximity to large hospitals and the availability of the services of medical specialists. According to Chan and Barer (2000) the degree of 'rurality' cannot only be expressed in terms of physical geography, but should also take the conditions under which physicians practice into account.

The contention that rural practice is unique and different from other forms of practice has led to proposals that rural medicine should be considered a distinct discipline. Strasser (1995) explores this issue and concludes that if rural general practice does not yet qualify as a distinct discipline then it is well on the way towards such a status. According to him, rural practice meets all of the necessary criteria to be considered a distinct discipline: formation of an academic body and training programs; the emergence of a body of literature; and external recognition of the discipline in health care delivery. Martel (1995) concurs with Strasser stating that rural practice should be identified as a distinct form of general practice and that such recognition is crucial to the well-being of community hospitals and rural health care. In a recent article, Hays (2003) also questions whether or not rural practice should be considered a distinct discipline. The author states that rural-oriented curricula tend to focus on local or regional health issues; that the implementation of training is different because of the need to teach students in smaller and more dispersed communities; and that the involvement of the community tends to be stronger (Hays, 2003).

1.2 Recruitment and Retention Factors

The recruitment and retention of physicians in rural communities is affected by numerous factors: the physician's background (CMA, 1992; Rourke & Rourke, 1995; Rourke, 1993; Thommasen & Thommasen, 2001; Ebbesson, 1988; Brooks et al., 2002); exposure to rural communities during

medical training (CMA, 1992; Rourke & Rourke, 1995; Rourke, 1993; Thommasen & Thommasen, 2001; Brooks et al., 2002); and, various financial, professional and lifestyle issues (CMA, 1992; Rosenthall, Rosenthall & Lucas, 1992; Rourke & Rourke, 1995; Rourke, 1993; Pope, Grams & Whiteside 1998; Thommasen & Thommasen, 2001). Specific professional and lifestyle issues include having partners in practice, on-call schedules, family concerns and availability of recreational facilities (Fryer, Stine, Vojir & Miller, 1997; Costa, Schrop, McCord & Gillanders, 1996; Anderson, Bergeron & Crouse, 1994; Pathman, Konrad & Ricketts, 1994). The inadequacies of fee-for-service in the rural setting, especially as payment for on-call services in low-volume emergency rooms, can also be a deterrent to rural practice.

A 1991 study by the Canadian Medical Association of 2,400 rural physicians identified the professional and personal factors most important to a decision to stay or leave rural practice. It was found that the decision is complicated by both personal and professional concerns. Professional factors for leaving rural practice included work hours, professional back-up, specialty services, additional training, hospital services, continuing medical education (CME) and earning potential. Personal concerns included children's education, spousal job opportunities, recreation, cultural opportunities and retirement (CMA, 1992). The degree of isolation and the size of the community in which a rural practice is located have also been identified as important recruitment and retention factors. Rural physicians practicing closest to urban areas reported the greatest satisfaction with their work, the level of professional backup, hours of work, CME, availability of specialists, spousal job opportunities, cultural opportunities, and access to educational facilities for their children. Rural physicians who practiced in the most distant and isolated rural areas reported the least satisfaction.

Workload is an important consideration in retaining rural physicians. A study by Mainous, Ramsbottom-Lucier, and Rich (1994) examined the relationship between clinical workload and satisfaction among rural primary care physicians. The authors analyzed data collected from the survey 'Practice Patterns of Young Physicians' conducted by the American Medical Association (AMA) in 1987. More than three hundred (n=373) full-time rural primary care physicians responded to this survey. The study findings indicate that 49% of respondents were dissatisfied with their workload. Twenty-four percent (24%) of physicians were somewhat or very likely to leave their rural practice within the next two years. Twenty-one percent (21%) of respondents indicated 'working too many hours' as the reason for this decision. Other grounds included 'financial reasons' (15%) and a 'preference for another geographic location' (15%). The authors note that while workload satisfaction is a strong predictor of the likelihood of leaving, the quantitative indicators of workload measured (i.e., number of hours worked, number of patients seen, number of patient-care hours worked) are not. These results suggest that any retention strategy must address the practitioner's satisfaction with his/her workload, instead of simply intervening to reduce the workload (Mainous, Ramsbottom-Lucier, & Rich, 1994).

The personal and professional needs of a physician's spouse and family exert one of the greatest influences on career choice and practice location (Carter, 1987b; Bowman, 2003; Fickenscher, 1992; Homan, 1994; Rourke, 1993; Rabinowitz & Paynter, 2002; Chiasson, Roy, & Smith-Chiasson, 1995; Rosenthal, Rosenthal, & Lucas, 1992; Piterman & Silagy, 1991; Lahaie, 1991). Nonetheless, the needs of the spouse and children of the rural physician are too often overlooked in recruitment efforts. A spouse, especially one with a career, may be relegated to a trivialized position by a move to a rural area, and the desired level of educational facilities may be unavailable

for children. This problem (known as the "Trailing Spouse Syndrome" in human resources and management literature) deserves more attention. The needs of the spouse must be addressed in the recruitment process and the evolving needs of children as the family grows are major factors in retention and must be given adequate attention (Crouse, 1995).

Rourke, Rourke, and Belle Brown (1996) report that the opportunity for spousal employment has a stronger influence on female rather than male physicians. The chief factor affecting a female physician's decision to practice in a rural area might be the presence or absence of job opportunities for her partner. Juggling medical careers with marriage and children can also be difficult in a rural setting. For example, the hospital and after-hours call responsibility can be difficult for physicians who are mothers. It is also more difficult to find practice coverage for maternity leave. This poses special challenges for the future of rural practice as the proportion of female medical graduates steadily grows. This is confirmed by other studies which suggest that women are less likely to choose rural practice than their male counterparts (West, Norris, Gore, Baldwin, & Hart, 1996; Britt, Miles, Bridges-Webb, Neary, Charles, & Traynor, 1993; Dickinson, Hickener, & Radford, 1995; Ernst & Yett, 1984).

It is essential that communities identify recruitment strategies that are most appropriate and cost effective for their regions, settings and health care systems (Kindig, 1990; O'Driscoll, 1999). There are several strategies highlighted in the literature that are being used to recruit physicians to rural areas. Recruitment fairs are being used in Ontario to recruit students to rural practice (Sibbald, 1998a). The University of Saskatchewan is providing resident family physician services, visiting consultant services, and family practice resident training in its northern communities (Irvine, 1988). Wilkinson, Symon, Newbury, and Marley (2001) describe the impact of a network of rural academic family practices in South Australia on the recruitment and retention of general practitioners. The recruitment strategies included: local and international advertisements; personal networking; an employment package that included assistance with relocation and accommodation; an academic appointment; and university support. Continued support from university staff and support for leave and locum needs helped to reduce personal and professional isolation. The network also offered physicians access to modern facilities and information technology. The authors identify the development of partnerships and ensuring local flexibility as paramount in recruiting and retaining rural physicians.

1.3 Challenges of Rural Practice

There are a number of factors that attract physicians to rural practice and rural life in general. These include: lifestyle; the quality of physician-patient relationships; the diversity of care; the variety and challenge of medical problems; financial incentives; and lower cost of living (Lahaie, 1991; Seim, 1997; Higgins & Szafran, 1990). Nonetheless, an increasing number of rural physicians are experiencing higher levels of stress and frustration. They work longer hours, suffer more fatigue, stress and sleep deprivation, have higher rates of dysfunctional family life, suffer from low job satisfaction, endure professional isolation and are more likely to die on the job than to retire (O'Reilly, 1994; Thommasen & Thommasen, 2001). The reasons for leaving rural practice are varied and include: poor earning potential; difficulty with social adjustment; lack of orientation to cultural aspects of the community; lack of educational opportunities for children; and conflicts with local hospitals (National Rural Health Association, 1998; MacIsaac, Snowdon, Thompson, Crossland, & Veitch, 2000; Crouse, 1995). Low job satisfaction has, in turn, been associated with

depression, burnout and the intention to move (Chambers & Campbell, 1996; Sibbald, 1998; Martel, 1995; Young & Spencer, 1996). This has been confirmed by Thommasen, Lavanchy, Connelly, Berkowitz, & Grybowski (2001). The authors surveyed a random sample of 198 rural physicians in British Columbia in order to determine the prevalence of depression and burnout among physicians working in rural communities. Sixty-six percent (66%) responded. The results indicated that 31% of physicians suffered from mild to severe depression. About 13% reported taking antidepressants in the past 5 years. The self-reported burnout rate was 55%. More than half the respondents were considering relocation.

In an isolated setting a physician carries greater responsibility and must use a wider variety of medical skills (Pope et al., 1998; Kingsmill, 1997; Baldwin et al., 1995; Strasser, 2001; Rourke, 1996). Most rural family physicians are required to perform a greater number of procedures than their urban counterparts (Al-Turk & Susman, 1992; Hamilton, 1995; Britt et al., 1993). In one study, Wise et al. (1994) distributed a questionnaire to rural and urban physicians and responses were compared by geographical area, practice characteristics and level of postgraduate training. There were significant differences between rural and urban practices. Rural doctors had to practice a wider range of clinical skills in an environment with restricted access to health professional support. Hays et al. (1994) working in Queensland, Australia surveyed 311 rural doctors to compare their training and practice profiles with those of 142 city doctors. They found that doctors who were more than 80 km or 1 hour's travel time from the nearest, most frequently accessed hospital were more likely to practice a greater range of clinical and procedural skills. This higher level of responsibility requires rural physicians to maintain competency in a number of advanced clinical areas without first-hand access to the latest medical technology and specialist consultation. Access to CME, critical in maintaining competence and confidence to function effectively in a rural environment, is often limited because of a lack of locum coverage and the distance to be traveled (Pope et al., 1998).

Several studies have suggested that improving the professional and personal lives of rural physicians can encourage retention (Howe, Lehnherr, & Katterhagen, 1994; Rourke, 1993; WONCA, 1996; Adams, 1998a; Kiroff, 1999; Florizone, 1997). Rourke (1993) has identified a number of factors which can be modified to keep physicians in rural communities: increased support for CME; the availability of group practice opportunities; improved hospital facilities; reasonable workloads, and financial incentives. Adams (1998a) recommends improving the quality of life for rural physicians and their families by providing increased holiday time and a maximum workload per day. The author also suggests increased pay, the provision of study leaves, and expanded graduate training for rural doctors in procedural skills and basic life support. Kiroff (1999) agrees with these recommendations and notes that reducing the rural physicians' professional isolation and providing them with opportunities for continuing professional development will aid in retention. Many physicians actually appreciate the professional freedom which rural practice allows, but the workload and the subsequent lack of time off must be addressed as they cause great dissatisfaction to many rural physicians (Florizone, 1997).

1.4 Role of Medical Education

It has been argued that the medical school has an important responsibility to society and rural communities in the preparation of physicians to enter community practice (Brooks, 1994; Rourke, 1996). There is clear evidence that physician characteristics, training environments and a rural

training curriculum are important factors that interact with one another and influence recruitment and retention. A number of organizations and leading experts on rural medical education have suggested that the education that medical students receive should be reoriented toward rural medicine issues, and that rural medicine practice experiences should be required components of both undergraduate training and residency in family practice. Many authorities insist that this education should progress on a continuum, from premedicine on to undergraduate and postgraduate medical education, and continuing into a physician's career through CME (Bowman, 2003; Hart, Salsberg, Phillips, & Lishner, 2002; Strasser, 2001). Exposure to the challenges and opportunities unique to rural medicine is thought to have a powerful effect on students who are considering a future rural practice (CMA, 1992; Rourke & Rourke, 1995; Rourke, 1993).

According to Barer & Stoddart (1992) a systematic, coordinated initiative aimed at the whole physician lifecycle may be warranted. Aspects of such an initiative might include: science enrichment programs for rural high schools; the reservation of seats in medical school for qualified applicants interested in practicing in rural areas; the restructuring of undergraduate medical education, particularly in third and fourth years, to incorporate more exposure to community and ambulatory practice; the provision of more rural clinical sites in family practice programs through the inclusion of more clinical faculty members from rural areas; and the development of new residency training programs designed explicitly to prepare generalist specialists to serve as rural regional consultants. There have been calls for more rural-focused medical schools, such as the proposed Northern Ontario Medical School, while others have called for the expansion and reform of existing schools, reopening the doors to international medical graduates (IMGs), or using alternative health providers such as nurse practitioners to make up the deficit (Hutten-Czapski & Thurber, 2002). In Australia, new medical schools and greater training opportunities have been established in rural and remote Australia (Dunbabin & Levitt, 2003).

According to Tepper and Rourke (1999) medical schools need to place an emphasis on three key areas: the importance of recruitment of future physicians from rural settings to rural practice; the need for exposure to rural medicine in medical school; and the role of exposure in residency training. Selective medical school admission policies to enhance primary care career choice and rural preference have been shown to increase the number of physicians serving in rural areas (Rabinowitz, 1988; Rabinowitz, 1993; Brazeau et al., 1990; Verby et al., 1991; Boulger, 1991). Physicians from rural communities have been shown to choose rural practice settings to a greater degree than their urban colleagues (Rabinowitz, 1988, Roberts et al., 1991, Strasser, 1992a; Stratton et al., 1991; Tepper & Rourke, 1999). According to Rabinowitz et al. (1999) increasing the number of physicians who have grown up in rural areas is the most effective way to increase the number of rural physicians. As part of the Jefferson Longitudinal Study, the authors analyzed data concerning the graduates of Jefferson Medical College practicing in Pennsylvania between 1972 and 1991. Rural background was overwhelmingly the most important independent predictor of rural practice (Rabinowitz, Diamond, Markham & Hazelwood, 1999).

The effectiveness of any medical school initiative appear to be dependent on approaches in which recruitment and retention issues are addressed in advance long before the rural student enters post-secondary education. A positive example of a multi-faceted rural medicine education initiative is that which exists in the province of Manitoba (Hutten-Czapski, 1998b). In this program, guidance counselors have been enrolled to help promote rural medicine as a career choice to rural high school students. At the undergraduate medical school level, rural experience programs have been

introduced for first-year students. Financial incentives in the form of a medical school bursary of $15,000 per year are available for third and fourth-year students. A return of service in rural areas is required. At the postgraduate level, rural family medicine rotations are also supported financially. Advanced training programs, 6-12 months in duration, have been introduced in the areas of anaesthesia and obstetrics. Additional residency slots for specialty training in psychiatry have also been made available for physicians prepared to serve in rural and northern areas. In addition, recruitment grants ranging from $30,000 to $44, 000 are available for setting up practice in designated areas.

Numerous medical education interventions designed to facilitate rural practice choice have been discussed in the literature. These interventions include: special admissions programs that select students based on characteristics predictive of rural, primary career choice (Rabinowitz e al., 1999); medical school curricular efforts (Boulger, 1991; Brazeau et al., 1990; Kaufman et al., 1989; Roberts et al., 1993; Stearns, Stearns, Glasser & Londo, 2000; Verby et al., 1991); residency and fellowship training programs (Rosenthal et al., 1992a, 1998); and special, earmarked government funding to enhance the nature of rural medical education initiatives (Brooks, 1994). Despite the many interventions that have been reported, medical schools on their own cannot solve all of the issues and concerns surrounding the recruitment and retention of rural physicians. The difficulties of a sustainable rural healthcare system, including the recruitment and retention of physicians, are complex and multi-factorial and require the involvement of federal, provincial and municipal governments, health administrators, professional associations and societies. The role of the medical school is but one of a number of factors that must be addressed to develop a sustainable rural healthcare strategy.

2 Literature Search and Review Methodology

This section describes the literature search process and strategies, as well as the various sources of information used.

2.1 Literature Search Process

The literature search process included the following major steps:

- Identification of key words and search strategies;
- searches of online databases for potentially relevant articles;
- search for additional articles by authors who were frequently identified in databases;
- review of references already in our possession to identify potentially useful studies;
- screening of abstracts to identify articles and reports for further review;
- organization of the studies in bibliographic format using two different software packages - Microsoft Word and EndNote - the latter enables users to download bibliographic citations from online databases such as MEDLINE directly into a formatted bibliography;
- compilation of the articles and reports listed in the bibliography;
- review and classification of the studies collected;
- review of the reference sections of selected articles and reports for additional studies.

2.1.1 Literature Search Strategies and Keywords

A set of limiting criteria was adopted in order to make the literature search and review tasks manageable. The literature database searches were limited to studies and reports published in the English language and mainly to studies published since 1990. A limited number of pre-1990 studies were included if they were of particular significance and importance (e.g. meta-analysis or meta-review studies). As well, only studies conducted in Canada and countries which have health care systems similar to that of Canada (i.e. Australia, United States, Great Britain, Norway, etc.) were included.

The following terms were used in the on-line searches. These terms were usually combined in order to refine the search results:

- Education
- Education-Medical-Undergraduate
- Education-Medical-Graduate
- Education-Medical-Continuing
- Rural
- Rural Health
- Rural Population
- Physicians in Rural and Under Served (or Underserved) Areas (we used both versions of this term as it yielded different search results)
- Hospitals, Rural
- Primary Care in Rural Areas
- Medically-Underserved-Area (or medically under served areas) (as above, use of both versions yielded different results)

Searches were conducted on the following databases: MEDLINE (January 1990-March 2003), ERIC (January 1990-March 2003), and PsychInfo (January 1990-March 2003). Additional searches were conducted in MEDLINE using the names of authors frequently identified in the database search:

- I.H. Buttfield
- M. Craig
- G.E. Fryer
- R. Hays
- P. Hutten-Czapski
- S. Iglesias
- M. Kamien
- A. Kaufman
- T.E. Norris
- D. Pathman
- P.M. Paulman
- H.K. Rabinowitz
- R.A. Rosenblatt
- T.C. Rosenthal
- J. Rourke
- J. Stearns
- M.A. Stearns
- C. Stine
- R. Strasser
- J.E. Verby
- C. Whiteside

2.1.2 Other Searches

Literature database searches are often constrained by the coverage of the databases, the keywords adopted, and the journals indexed. The research team therefore conducted some additional searches for information. Curran (2002), Rourke (1996a; 1996c), and Brooks et al. (2002) were reviewed for potentially useful studies. Searches were conducted of the following potentially relevant sources:

- The Canadian Library of Family Medicine in-house FAMILI database (references from non-indexed medical journals from the supplement section of FAMILI 1990 to present).
- The CME database of the University of Toronto's Office of Continuing Medical Education.
- The on-line table of contents of the *Canadian Journal of Rural Medicine*, the *Australian Journal of Rural Health*, the *Journal of Rural Health*, and the *Rural and Remote Health Online Journal*.
- The reference sections of selected articles and reports for additional potentially useful studies.
- The Internet - a general search was conducted using some of the keywords listed above.

2.1.3 Review of Articles and Reports

Articles selected for review and inclusion in this literature review and synthesis were obtained from the following sources: the Health Sciences Library and the Queen Elizabeth II Library at Memorial University of Newfoundland; other university libraries; and in the case of some reports, the Internet, individual authors, associations, and federal, provincial, or state government departments. As of September 2003, a total of 447 articles/reports had been identified, of which 429 had been reviewed and found to be useful for inclusion in the study.

Each article was reviewed by one of the co-investigators and classified according to its study methodology. This classification was based on the following categories: informed opinion article; descriptive study; quasi-comparative study; and comparative study. This classification is based on work by Pong et al. (1995). In general, informed opinion articles are considered to provide the least valid evidence and comparative studies the most valid evidence for the relationship between an intervention and an outcome.

i. ***Informed opinion article:*** This category includes summaries of relevant literature. The article/study typically does not describe the methods or results of original research. Examples include articles which discuss the pros and cons of different approaches to training practitioners to work in rural/remote areas, but provide no original data. These articles may cite findings from other studies. Non-systematic review articles are included in this category.

ii. ***Descriptive studies:*** These are studies which describe the methods and results of original studies, but whose purpose is not to compare the outcomes of different interventions. This category includes a wide variety of study designs such as survey and case study.

iii. ***Quasi-comparative studies:*** (without contemporaneous local comparisons) These are original studies whose purpose is to compare the outcomes of different interventions. In these studies, the outcomes occurring in the intervention group are compared with the outcomes in historical or non-local controls. Differences in group characteristics and data collection methodology, as well as other external factors, tend to decrease the validity of such studies.

iv. ***Comparative studies:*** These are original studies that compare the outcomes of different interventions. The outcomes are measured in a similar manner and are compared between/among groups. These groups are similar in all other respects. Comparative studies may be sub-classified and rated according to their methodological strength, as follows:

> *Cross-sectional:* Outcomes and interventions are measured at the same time.
>
> *Case-control:* Participants with positive and negative outcomes are compared for differences in intervention.
>
> *Cohort:* Participants with different interventions are followed longitudinally and compared for outcomes.

Pre-/post-test: Participants are compared for outcomes before and after interventions.

Clinical trial: Subjects are randomized to receive different interventions and are compared for outcomes.

Community trial: Community members or groups are randomized to receive different interventions and are compared for outcomes.

Systematic review: Results from several original comparative studies are systematically compared and synthesized. These include meta-analyses.

Studies were also classified according to subject matter, using categories identified by the research team. The results of the literature review are presented according to these themes:

i. ***Pre-medicine:*** This category encompasses literature which focuses on descriptions or research on the outcomes of initiatives that aim to encourage more rural (elementary/secondary) students to choose careers in the health professions.

ii. ***Financial Issues:*** This category encompasses literature which focuses on descriptions or research on outcomes of initiatives related to financial programs or incentives to enhance career choice in primary care areas and/or practice in rural areas.

iii. ***Admissions:*** This category encompasses literature which focuses on descriptions or research on outcomes of admission policy initiatives to enhance entry of students from rural or under-served areas into medical school.

iv. ***Undergraduate Medical Education:*** This category encompasses literature that focuses on rural medical education curriculum descriptions, curriculum-related activities and initiatives, and the outcomes of curriculum initiatives at the undergraduate medical education level which influence the career paths of medical students.

v. ***Postgraduate Medical Education:*** This category encompasses literature that focuses on rural family medicine residency training or curriculum-related activities and initiatives, rural family medicine training streams, and the outcomes of those initiatives which influence the career paths of medical residents. This category also includes literature related to advanced procedural skills training.

vi. ***Continuing Medical Education (CME) and Professional Development (PD):*** This category encompasses literature that focuses on the continuing medical education (CME) and professional development needs of rural physicians, as well as the barriers and challenges in addressing CME and professional development in rural practice areas.

3 Findings From The Literature Review

3.1 Pre-Medicine

The pre-medicine category encompasses literature which focuses on descriptions or research on the outcomes of initiatives that aim to encourage more rural (elementary/secondary) students to choose careers in the health professions. The literature in this category focuses on rural students and the distinct disadvantages that they experience in pursuing a career in medicine. The literature suggests that rural students are at a disadvantage by the very fact of living in a rural area and attending a rural school. A number of authors suggest that these disadvantages are related to a lack of advanced science curricula, career counseling and career information. These are characteristics of many rural schools experiencing poor funding, geographic isolation and low student numbers. Many studies highlight the importance of focusing efforts in rural physician recruitment at this level. The concept of the "rural pipeline" is often used to characterize the process of physician recruitment. It encompasses the idea that the production of generalist physicians is a process that occurs from pre-medicine and continues on through the provision of practice support to physicians in rural areas (Hart, Salsberg, Phillips, & Lishner, 2002; Bowman, 2002; Council on Graduate Medical Education [CGME], 1998). According to Jackson and Jackson (1991a) education for medical practice needs to begin long before medical school, as early as kindergarten and continuing on through secondary education. The key seems to be the creation of a "pipeline" that reaches out to rural communities to encourage the selection and success of rural students (CGME, 1998).

The literature search and review uncovered 44 studies that focused on specific issues related to pre-medicine. These studies ranged from informed opinion discussion papers to rigorous comparative study designs. The majority of the studies in this category were of an informed opinion type. Thirty studies (68.0%) were informed opinion, 8 (20.5%) descriptive, and 5 (11.4%) were comparative. One of the main shortcomings evident in the pre-medicine literature category is the lack of rigorous study designs of a comparative nature. Also lacking are studies, reports and articles that evaluate, outline or describe specific programs designed to meet the pre-medicine needs of rural students. It is unclear what types of programs or initiatives would have clear benefits to students in promoting medicine as a career or enhancing academic pursuits. What is clear is that a number of academic programming areas within rural schools (e.g., advanced science courses) are hampered by a lack of funding or small student numbers. Nonetheless, there are alternatives in program delivery that may be explored for offering advanced academic programs or even career counseling services and programs to students in rural communities.

3.1.1 The Disadvantages Encountered by Rural Students

A number of authors in this field of study have made the suggestion that one means to increase the number of practicing rural physicians may be to admit more rural students to medical school. The problem is that many rural students simply do not pursue medicine as a career, either because they have not been introduced to this profession as a career option or do not have an adequate academic background in the sciences to be admitted. In general, medicine as a career does not appear to be attracting enough students from rural areas (McDonald, 1990; Rourke, 1996). Those rural students who do develop an interest in a career in medicine often have to overcome several barriers. Rural students are often placed at a distinct disadvantage because of a lack of career counseling services and programs (McDonald, 1990; Kamien 1995; Fickenscher, 1992). Many rural students also lack

the necessary academic resources, have fewer school subject choices, and lack access to the same level of academic or extracurricular activities as urban students (McDonald, 1990; Kamien, 1995; Fickenscher, 1992; Myers, Bruce, Kaufman, & Kindig, 1990; Knopke, Northrup, & Hartman, 1986). The lack of appropriate courses may limit the opportunity for talented rural high school students to succeed in higher education, particularly in the sciences. Students from smaller high schools in rural areas also generally have lower standardized test scores than their urban counterparts (Crump, Fricker, Moore, & Coakley, 2002). These disadvantages often result in lower numbers of rural students applying to medical school and in lower acceptance rates among those that do apply.

3.1.2 Suggestions for Targeting Rural Students

The literature suggests it is imperative for medical schools, as well as other stakeholders in governments and rural communities, to introduce initiatives that will promote medicine and encourage rural students to consider a career in medicine (Jackson & Jackson, 1991a; Payne, 1993; Hamilton, 1995; Rourke, 1993; Kamien & Buttfield, 1990b; World Organisation of Family Doctors [WOFD], 1995; Dhalla et al., 2002; Norington, 1997). Hamilton (1995) suggests that rural physicians should become mentors to encourage young people growing up in rural areas to pursue medicine as a career. The literature also suggests that programs and services need to be introduced that will provide rural students with a greater level of exposure to science curricula. Rourke and Strasser (1996) have identified career promotion days at rural schools and the development and distribution of videos on rural medicine as possible means for promoting medicine among rural students. Programs that stimulate interest in science and medicine in rural junior high and high schools, as well as counseling programs, are also needed (Barer & Stoddart, 1999; Vaneslow, 1990). Bruce (1990a) suggests working with rural alumni to establish junior- and middle-school health career clubs. Kamien and Buttfield (1990b) also recommend providing help to students with examination preparation to enable them to compete more successfully with urban students. In Manitoba, guidance counselors have been enlisted to help promote rural medicine as a career choice to rural high school students (Hutten-Czapski, 1998).

The literature identifies several specific programs that have been developed in Canada, Australia, and the United States to encourage rural students to consider a career in medicine. Shack (1999) described the rural outreach program at the University of Toronto which was intended to promote medicine as a career to rural high school students and encourage rural students to pursue medical studies. According to Shack, the program is designed to be "informal, interactive and portable" (p.165). Presentations are made to rural high school students by medical students of rural origin and include discussions about medical school and what it means to be a rural physician. Shack notes that part of the appeal of such presentations is the fact that rural high school students were able to identify with a presenter who was of a similar age and from a similar background.

Medicine has not traditionally been an attractive career path for Aboriginal students (Rafuse, 1994). There are few Aboriginal physicians who can serve as role models for the younger generation. According to Rafuse (1994) a level of insensitivity and lack of commitment has existed among Canadian medical schools in terms of the needs of Aboriginal students. In 1994, only four of Canada's sixteen medical schools (University of Alberta, University of Toronto, University of Manitoba, and University of British Columbia) had programs that addressed Aboriginal health sciences career development, recruitment and retention. Over the years, a number of initiatives

appear to have been undertaken among some schools to address the needs of aboriginal students and to encourage the training and graduation of more physicians of Aboriginal origin. Square (1996) discusses the efforts of the University of Manitoba's Northern Medical Unit (NMU) which operates a network of nursing stations in northern Manitoba communities. One of the disadvantages faced by rural students who want to pursue a career in medicine is the lack of academic supports in their communities. The NMU has attempted to support Aboriginal students who want to pursue a career in medicine by helping them prepare for university academic life through tutorials and extended courses in chemistry, reading, writing, and study skills. The hope is that these students will eventually return to live and work in Aboriginal communities. Rafuse (1994) also describes a project of the Native Physicians' Association in Canada (NPAC) which involved the production of a series of videos for school career fairs in rural Aboriginal communities. The Association has also attempted to encourage native physicians and medical students to attend career fairs on reserves and in urban areas that have significant Aboriginal populations, to answer students' questions and to act as role models.

In Australia, the Rural Incentives Program (RIP) was established by the Australian Government in 1992 to help improve rural Australians' access to general practice services (Kamien, 1995). One of the goals of the program was to assist Australian medical schools in setting up programs that would encourage medical students to pursue a career in rural practice. Similarly, Gill and Tonks (1996) outline some initiatives undertaken by the Rural Practice Training Unit (RPTU) in South Australia which supported rural high school students to undertake tertiary health training, particularly training in medicine. The RPRU contacted the area's high school principals and career counselors and invited them to identify students in their respective schools who had the career aspiration and the abilities to become medical students. These students were then targeted with information on medical careers. The RPTU also organizes presentations for high school students by medical students who are working in rural areas. Rural student clubs have also been organized in Australian medical schools. Jackson, Jackson, & James-Wallace (1993) describe the SPINRPHEX Club, established for students and practitioners interested in rural practice, health, and education. The goal of most rural student clubs is to raise the profile of rural practice, both within the university community and the community at large. Members of the SPINRPHEX Club make regular visits to rural high schools to promote and encourage medicine as a career pursuit.

Medical schools in the United States have introduced initiatives at the pre-medicine level. The University of Alabama has established the Biomedical Sciences Program (BioPrep) in five of the state's rural high schools. The objective of this program is to assist rural, disadvantaged high school students in developing both the academic and the social skills required to enter, and succeed in, a health career. Knopke, Northrup, and Hartman (1986) evaluated the effects of this program by conducting a comparative (cohort study) with three groups of students - a pilot group of 114 BioPrep program participants, a set of internal control groups at each of five rural high schools, and a group of external control students. Each project school was matched with a rural school in another school system whose students followed the traditional curriculum. BioPrep students had enhanced access to a standardized curriculum and exams, lab equipment, and better-trained teachers. Comparison of all three groups at the beginning of the study showed no significant differences in grade point average (GPA) or California Achievement Test (CAT) index scores. After four years of the program, some differences were visible between the pilot group (those participating in the BioPrep program) and the control groups (those who followed the traditional curriculum). Thirty-seven percent (37%) of the students who attended the BioPrep program had

chosen to pursue careers in medicine, dentistry, nursing, and other health professions as compared to 15% of the students who had followed the traditional high school curriculum. The study findings indicated that the scores of the BioPrep students on college entrance exams exceeded the Alabama and national norms, as well as the scores of the students in the control groups.

Crump, Fricker, Moore, and Coakley (2002) describe the High School Rural Scholars Program, a program that places high school seniors in shadowing opportunities with health professionals in their home towns while, at the same time, preparing them for the standardized academic examinations. The authors evaluated the impact of this program on 20 high school students across 5 rural counties in Kentucky. The study findings indicated that student scores on a standardized academic examination increased by 5.7% after participation in the program. Students also showed increased knowledge of the strengths and weaknesses of health care in their towns, as well as increased understanding of the roles of various health professions.

The University of Washington WWAMI Program has been established to serve the health care needs of Washington, Wyoming, Alaska, Montana, and Idaho (WWAMI). The program has developed regional medical education for several neighbouring states that lacked their own medical schools, and encouraged physicians-in-training to practice in the region. The goals of this program are to: increase the number of primary care physicians; to address the geographical maldistribution of physicians in the WWAMI region; and to expand undergraduate, residency, and continuing medical education in the participating states (Hunt, Norris, Ballweg, 1995). Several studies make reference to the WWAMI program's pre-medicine initiatives (Hunt, Norris, & Ballweg; 1995; Malloy, 2003; Ramsey, Coombs, Hunt, Marshall, & Wenrich, 2001). There are enrichment programs for rural and minority students at the high school and college level to help them develop an interest and become competitive for medical school admission. The college-level Minority Medical Education Program, for example, serves as a medical school pipeline for minorities, students from rural areas, and other disadvantaged students (Malloy, 2003; Ramsey, Coombs, Hunt, Marshall, & Wenrich, 2001). It assists underrepresented minority college students obtain science courses, in preparing for the MCAT, coordinates mentorship experiences, and provides information about medical school applications and admission at the University of Washington. Six-week high school enrichment programs, known as U-DOC, have also been developed. These programs enable minority, disadvantaged, or rural students to participate in a summer enrichment experience in order to prepare for college through sessions in sciences and writing (Ramsey, Coombs, Hunt, Marshall, & Wenrich, 2001). WWAMI also offers a K-12 component that aims to identify promising students with an interest in or aptitude for medicine and to increase the participation of under-represented minorities (Malloy, 2003; Ramsey, Coombs, Hunt, Marshall, & Wenrich, 2001). The Medical Scholars Program for rural K-12 exposes these students, as well as undergraduates, to aspects of health care through a week-long immersion program. The Ambassador's Program also encourages K-12 students and mid career adults to pursue healthcare in rural areas.

3.1.3 Summary

Programs intending to enhance the recruitment of physicians to rural practice must begin long before students are admitted to medical school, and must begin with those students and communities in which rural physicians will eventually practice. This is made clear through the concept of the "rural pipeline" which suggests that the recruitment process must begin at a pre-medicine stage by ensuring that we are recruiting and admitting those students to medical school

who are more likely to enter primary care and practice in rural communities. This concept recognizes that pre-medicine activities are the first step in a complex process for the recruitment and retention of physicians to rural communities.

Many rural students are disadvantaged by the very nature of attending school in a rural area. Many rural schools lack the funds and infrastructure to offer the same level of academic programs and extracurricular activities to which students in urban schools are exposed. As a result, these students may not be exposed to medicine as a career option, may not have received the same level of instruction in the sciences, and may not have been exposed to the same social experiences (i.e. community or volunteer experiences) as their urban counterparts. Those who are interested therefore often find themselves at a disadvantage. Those that do apply often do not possess the necessary credentials to succeed. A number of outreach programs designed to promote medicine as a career and to provide academic tutoring for rural students have been described. The literature suggests that the medical school can play a role by promoting medicine as a career and working with career counselors and rural schools in identifying and mentoring rural students with an interest in medicine. A number of activities are described including the mentoring of rural students by rural physicians, providing students with greater access to the courses they need, and helping them to prepare for examinations.

The majority of studies in the pre-medicine category were classified as "informed opinion." These types of reports are useful in that they provide information about what is being done and how it is being implemented. Nonetheless, there is little evidence in the pre-medicine category that indicates the effectiveness of one program or service type versus another. Does a combination of pre-medicine initiatives have a greater impact on rural student recruitment to medical school? The literature does suggest that students raised in rural communities are more likely to return to practice there, hence it makes sense intuitively to offer these types of programs in order to encourage and support rural students. A more rigorous and systematic line of investigative studies on pre-medicine initiatives is required to evaluate the impact and effectiveness of such programming.

3.2 Financial Issues

This category encompasses literature which focuses on descriptions of financial incentive programs, as well as outcome studies on the effectiveness of these financial incentive programs in enhancing the recruitment and retention of rural physicians. The studies and reports reviewed also present a summary and overview of the various funding arrangements and programs which have been established in different countries between various levels of governments and medical schools. A number of key themes emerged from this literature. First, the value of providing undergraduate and/or postgraduate financial incentives in the form of loans, scholarships and bursaries for medical students and residents willing to train and practice in rural and underserved communities was a recurring motif (Recommendations of the CFPC Working Group on Undergraduate Education, 2002; Barer & Stoddart, 1992). Another key theme was the impact of financial incentive programs on physicians' choice of practice location. It has been suggested that financial incentives are important for both recruitment and retention as they are repeatedly identified as a key influence on whether to establish practice in a certain area or to remain in a certain community (Rourke, 1993; Recommendations of the CFPC Working Group on Undergraduate Education, 2002). It has also been recommended that financial incentives can provide some level of compensation for the challenging practice environments in which many rural physicians often find themselves (Canadian Association of Interns and Residents [CAIR], 1992). Rosenblatt and Hart (2000) suggest that physicians might be more likely to practice in a rural area if some sort of financial incentive were offered. Rourke (1991; 1993) also believes that financial incentives should be one element of any strategy to encourage family physicians to practice in rural areas and, at the same time, to encourage them to practice the "riskier, complex, and more lifestyle-disruptive hospital aspects of family medicine". Another theme in the literature involved government or state level approaches to funding medical education and rural medicine training.

The literature search and review uncovered 59 studies which focused on financial issues. These studies ranged from descriptions of financial incentive programs and informed opinion discussions to rigorous comparative study designs. The majority of the articles and reports in this category were classified as informed opinion. Thirty-nine studies (66.1%) were informed opinion, 15 (25.4%) were descriptive, and 5 (8.5%) were comparative.

3.2.1 Undergraduate/Postgraduate Financial Incentives

Several undergraduate and postgraduate program approaches that provide students with a financial incentive for pursuing a course of study in family medicine or rural medicine were identified in the literature. Riley, Myers, Gordon, Laskowski, Kriebel, and Dobie (1991) describe the Rural/ Underserved Opportunities Program, a collaborative effort undertaken by the University of Washington School of Medicine, the WWAMI Area Health Education Center Program, the Washington Academy of Family Practice, and the Family Health Foundation of Washington. Its aim is to provide students with an early introduction to primary care practice in rural and urban underserved settings. Competitive financial incentives were used to attract students between their first and second years. Participants received a stipend of $167 per week and travel and accommodation expenses were also covered up to a pre-set level. Verby (1985) describes the Rural Physician Associate Program (RPAP) at the University of Minnesota Medical School. This program requires third-year undergraduate medical students to work with rural physicians in their offices and hospital practices for nine to twelve months. Students receive $7500 to $10,000 for

their participation in and completion of the program with the money coming partly from the government and participating physician-tutors. There was no requirement for students to pay back the money if they did not return to practice in rural Minnesota. Nonetheless, 60% of the program's participants have gone on to practice full-time in rural Minnesota and the region (Verby, 1985).

Meek and Valentine (1991) discuss the establishment of the Primary Care Bridging Plan at the University of Kansas School of Medicine-Wichita (UKSM-W), which was facilitated by a grant from the Wesley Foundation. The objectives of the program were to encourage medical students to select primary care residency programs and to practice in rural Kansas communities upon completion of residency training. The postgraduate component of the plan involved both a financial incentive and a practice obligation. Residents in family practice, internal medicine, pediatrics, and psychiatry programs in Wichita, Salina, and Kansas City who have completed at least one year of postgraduate training are eligible to apply for participation in the Primary Care Bridging Plan. Residents are matched with a rural Kansas community and must agree to practice year-for-year (one year of practice for each year of financial support received) in this community, as well as to complete a one-month rural rotation during their residency program. During the final two years of a residency program, participants will receive the regular resident salary plus a loan of up to $10,000 per year. In addition, the resident will receive a loan of $6,000 upon graduation and a guaranteed, competitive salary during the first two years of community practice. The loans will be forgiven as the service requirements in the community are met.

All of the programs discussed thus far are American. In Australia, the most popular forms of incentive schemes appear to be scholarship or bursary programs. As for Canada, several studies suggest the importance of financial incentive programs in recruiting students to enter rural medicine. Woollard et al. (2000) suggests that two types of funding sources are required for those students who wish to study family medicine. First, some form of payment or salary should be provided to family medicine residents who take on rural or remote placements. Second, since many medical students and residents often have increased debt-loads, the expenses encountered by residents who wish to take part in rural placements should be covered or reimbursed. This might include provision of funding for travel, accommodations, any necessary equipment, and meals (Woollard et al., 2000; MacLellan, 1998; Blau, 1992). According to Blau (1992) the provision of such funding is essential for training residents in rural or remote locations.

3.2.2 Scholarship and Bursary Programs

Garland (1990) has suggested that medical schools need to give greater consideration to the shortage of primary care physicians in rural areas. A number of factors, such as the academic setting, the lack of rural medicine role models, and financial considerations have a heavy influence on decisions to choose specialization as a career path. Garland believes that it is important to counter these influences by offering scholarships or some type of loan forgiveness programming to those students willing to commit themselves to primary care. Financial incentives are intended to enhance the recruitment of those students/residents who are interested in, or specializing in, primary care or family medicine and who intend to work in rural areas. The scholarship and bursary programs that are discussed in the literature are directed towards undergraduate and postgraduate students, as well as practicing physicians. The majority of these programs appear to be organized and administered at a provincial, state or national level rather than as part of a specific medical school's undergraduate or postgraduate program.

Pathman et al. (2000) identify and describe some of the key programs in the United States that provide financial support for physicians in exchange for service in underserved areas. They identified all state programs operating in 1996 that provided financial support in exchange for service in defined underserved areas to students, residents, and practicing physicians. In 1996, there were 82 eligible programs operating in 41 states, including 29 loan repayment programs, 29 scholarship programs, 11 loan programs, 8 direct financial incentive programs, and 5 resident support programs. The number of programs had more than doubled between 1990 and 1996. Common features of state programs were a mission to influence the distribution of the health-care workforce within the state and to increase the number of primary care physicians. Programs to support rural physicians clearly targeted primary care physicians and only a limited number accepted physicians in other specialties.

According to Crandall, Dwyer and Duncan (1990) indenture models, which recruit temporary providers in exchange for scholarship support, loan forgiveness, or licensure, are somewhat ineffective. Several studies have examined one such model, the National Health Service Corps (NHSC), and its effect on the recruitment and retention of physicians in rural and underserved areas of the United States (Pathman, Konrad, & Ricketts, 1992; 1994b; Rosenblatt, Saunders, Shreffler, Pirani, Larson, & Hart, 1996). The NHSC program provides financial support to students training in medicine and other health fields to cover all or part of their education. For each year of support they receive, students incur the obligation to work for a year in a federally designated rural or underserved area of the United States.

Pathman, Konrad, and Ricketts (1992) conducted a nine-year follow-up comparative (cohort) study comparing the retention of physicians serving NHSC program obligations in rural settings to that of non-NHSC physicians working in similar practices. They found that when compared to non-NHSC physicians working in similar rural settings, the retention of rural NHSC physicians was poor. NHSC physicians were much less likely than non-NHSC physicians to have remained in their 1981 practices (14.7% vs. 39.2%; P<.001), in their original communities (22.9% vs. 47.9%; P<.001), or in any rural county (33.6% vs. 52.9%; P=.001). They conclude that part of the National Health Service Corps' retention problem is that it sometimes places in rural settings physicians who are relatively disinclined toward rural living (Pathman, Konrad, & Ricketts, 1992). In 1994, Pathman, Konrad, and Ricketts (1994B) conducted a second comparative-cohort study of the NHSC program with similar results. They surveyed all 675 physicians in the NHSC program (with initial placements between 1987 and 1990), as well as a stratified random sample of 1000 non-NHSC physicians. As in the previous study, the results indicated that the program needs to place emphasis on matching physicians with communities and regions. If physicians do not want to live in rural or underserved areas they are not going to stay there after their obligation has been fulfilled. The comparison of these groups also indicated that 30% of the NHSC-physicians, despite serving in rural areas, thought it was important to live where they had access to city amenities. It is therefore not surprising that the results indicated that NHSC-physicians had greater interest in underserved urban area practice than in rural practice.

Rosenblatt, Saunders, Shreffler, Pirani, Larson, and Hart (1996) examined the long-term career paths and retrospective impressions of family physicians who served in rural NHSC sites in return for having received medical scholarships. The authors surveyed all physicians who graduated from medical school between 1980 and 1983, received NHSC Scholarships, completed family medicine residencies, and served in rural areas (n=383). The study findings are comparable to those of the

previous studies, but do show some positive trends. While one-half of all scholarship recipients left their NHSC assignments almost immediately after completing their obligation, 60.1% of respondents were currently practicing in a location that was in some way at least relatively underserved and 20.9% of respondents were still in their initial NHSC settings (Rosenblatt, Saunders, Shreffler, Pirani, Larson, & Hart, 1996). The length of NHSC obligation appeared to be associated with retention as those who have remained long-term in the area where they were assigned had an initial obligation of at least four years.

Duttera, Blumenthal, Dever, and Lawley (2000) describe an evaluation of a scholarship program in the state of Georgia. Recipients of scholarships are required to complete a period of rural practice after completing their training. Typically, one year of practice is required for each year of scholarship support and those who do not fulfill their practice obligations are required to pay back three times the amount of their scholarship. The authors compared the number and percentage of those entering rural practice (i.e., honouring their commitment) and considered retention rates between scholarship and non-scholarship recipients. The study findings indicate that 44.5% of those who received scholarships repaid their obligation through practice. The remainder repaid in cash. The findings also showed 65% of scholarship recipients who entered practice in 1978-82 were still in their practice sites 10 to 15 years later. Of those who entered practice between 1983 and 1987, 60% were still in their initial practice locations.

Dunbabin and Levitt (2003) provide a description of several scholarship programs which have been established in Australian medical schools between 1998 and 2003, many of which offer funding in return for a commitment to practice. The John Flynn Scholarship is awarded to undergraduates who are prepared to spend two weeks per year for four years in the same rural community. The Rural Australia Medical Undergraduate Scholarship is awarded to medical students with rural origins in return for a commitment to practice in rural areas for at least 7 years after postgraduate training. The Higher Education Contribution Reimbursement Scheme provides graduating medical students with the opportunity to offset their debt by working in rural practice. The Commonwealth Medical Rural Bonded Scholarship Scheme is awarded to medical students in return for a commitment to practice in rural areas for at least six years after completing their fellowship as a GP or specialist.

In Canada, a number of organizations and provinces have established programs to encourage students to enter rural medical practice. The Canadian Medical Association (1992) has established a bursary program to support undergraduate Aboriginal medical students (Square, 1996; Rafuse, 1994). It provides up to $4,000 per academic year to each successful applicant. Recipients also receive memberships in the CMA, the relevant provincial/territorial division and NPAC. Hutten-Czapski (1998) describe a program in the province of Manitoba which offers incentives to both undergraduate and postgraduate students who embark on a course of study in rural family medicine. A medical school bursary of $15,000 per year has been made available to third- and fourth-year students. In addition, rural family medicine rotations are supported at the postgraduate level. O'Maonaigh (1997) discusses the increase in rural practice learning experiences in Newfoundland and Labrador through rural placements and the use of telemedicine. The author refers to bursary programs that have been introduced but does not offer any additional information about the characteristics of the programs or a pending evaluation. MacLellan (1998) also describes the role of a fee differential program for recent medical graduates as a way to encourage practice in a non-University designated area. Similarly, this article does not provide any evidence as to the effectiveness of such an initiative in enhancing recruitment or retention efforts.

3.2.3 Government Approaches to Encourage Rural Medical Education

A number or reports and articles reviewed also examined the role of government and governmental funding programs to support rural medical education and the enhancement of recruitment efforts. Myers (2000) describes two approaches to government funding of medical school education: the just send money" approach and the "prudent purchaser" approach. The "just send money" approach involves the idea that government should subsidize medical education but leave all process and outcome questions to the medical schools and teaching hospitals receiving the subsidies. The "prudent purchaser" approach advocates the funding of medical schools and hospitals for the education of health professionals based on national workforce needs. In this approach to funding provision, governments do not necessarily have to participate in the design of the educational program but should mandate that a program address the needs of a community. Several studies support the latter approach and recommend more government funding for rural medical education initiatives to address physician shortages in rural communities. In the US, Bowman (1996) has suggested that family medicine programs need to collaborate with government, medical schools and community organizations in order to increase the number of physicians in rural communities. Adams (1998b) also advocates more government funding in British Columbia to solve the crisis in rural physician numbers.

In Canada, financial incentives appear to be a predominant strategy for recruiting and retaining physicians to work in rural communities (Chan & Barer, 2000). Several provinces or territories offer subsidized incomes or guaranteed minimum income contracts; 'return-of-service' bonuses and grants; funded rural locum programs; specific funding for rural area on-call coverage; student loans, grants, and bursaries tied to 'return-of-service commitments'; and funding to allow rural/remote physicians to take advantage of continuing education/skills upgrading opportunities (Chan & Barer, 2000). Government funding also enables medical schools to establish programs and services which they might otherwise be unable to afford. The Ontario government, for example, supports several rural training initiatives - the Northeastern Ontario Family Medicine Program (NOFM) at Laurentian University, linked with the University of Ottawa; the Northwestern Ontario Medical Program (NOMP) and Family Medicine North Program at Lakehead University, linked with McMaster University; the Northern Academic Health Science Network (NAHSN) based in Sudbury and Thunder Bay; the South Western Ontario Rural Medicine (SWORM) program, based in Goderich and linked with the University of Western Ontario; and the Rural Ontario Medical Program (ROMP), based in Collingwood and linked with McMaster University (Expert Panel on Health Professional Human Resources, 2001).

Moores, Woodhead-Lyons, and Wilson (1998) describe several educational programs and initiatives at the University of Alberta that aim to increase the participation of students and residents in rural health care and that encourage them to take up practice in rural areas. The programs aim to expand and enrich rural educational experiences at undergraduate and postgraduate levels and to supplement family medicine postgraduate education with a third-year special skills program for rural practice. The programs are sustained by reliable funding from the Government of Alberta through the Rural Physician Action Plan (RPAP), as well as the provision of adequate infrastructure and commitment by university faculty, rural physicians, and communities. The RPAP program has also established a Student Loan Remission Program (Wilson, Woodhead-Lyons, and Moores, 1998). Between 1991 and 1994 the program provided a remission of $10,000 at the end of two

years of rural service in an approved underserviced community. In 1994, the maximum remission was increased to $20,000.

Similar initiatives have also been introduced in Australia. In 1992, the Australian Government established the Rural Incentives Program (RIP) (Kamien, 1995) to provide support to Australian medical schools in establishing rural-oriented programs that would encourage medical students to pursue a career in rural practice. In the United States, unfortunately, as Maudlin, Newkirk, Snook, and Cooper (2000) note, federal funding cutbacks have threatened the viability of many rural medical education programs. As a result, the onus for sustaining the programs has been passed on to hospitals. As an example, the Spokane family medicine rural training track program which offers rural based medical education learning experiences will only be sustained if the local hospital and medical group support the financial and educational requirements of the program. The problem remains that many community hospitals, especially those in rural areas, simply do not have the resources required to fund university programs. The support of the federal government is, therefore, essential for many of these programs to be sustained.

3.2.4 Financial Incentives and Physicians' Choice of Practice Location

What impact do financial incentives have on a physicians' choice of practice location? Xu, Veloski, Hojat, Politzer, Rabinowitz, and Rattner (1997a; 1997b) examined the relationship between physicians' choice of practicing in rural areas and background characteristics such as financial aid obligations. The study findings indicated that physicians' decisions to practice in underserved or rural areas were associated with several factors, including growing up in an underserved area, prior expressed interest (before medical school) in serving in an underserved area , and their federal and/or state financial aid obligations. In this study, the financial programs had a positive impact on the recruitment and retention of physicians who chose to practice in rural and underserved areas. In another study, Rabinowitz, Diamond, Hogat, and Hazelwood (1999) analyzed previously collected data from the Jefferson Medical College longitudinal study involving 1609 medical graduates between 1972 and 1991. The authors wanted to determine which factors might be predictive of a graduate's choosing to practice in a rural location. The findings indicated that growing up in a rural area ($p<0.001$) and entering medical school with plans to become a family physician ($p<.001$) were the most important independent predictors of practice in a rural area. No other variable, including debt, added significantly to the likelihood of rural practice.

Miller and Crittenden (2001) surveyed 229 medical students to determine how different types of financial incentives (in this case a "payback program" and an "expanded loan repayment program") influenced students' intentions to return to their home states. Payback programs require medical school graduates to return to their home states to practice. If they do not return, they will be obligated to repay any subsidy received from their home state. Conversely, loan repayment programs assist in the repayment of educational loans of medical graduates who return to practice in qualifying rural and underserved areas, which may or may not necessarily be in their home states. The study findings show that medical students appear willing to consider loan repayment programs instead of payback programs upon completion of their training. Eighty-four percent (84%) of students indicated that they would be more likely to return to their home states if expanded loan repayment programs were available in return for service in areas of need. The authors discovered that payback programs may dissuade more competitive students from entering medical schools with such requirements, compromising the pool of students most likely to return to rural areas.

3.2.5 Summary

One of the main shortcomings of the literature in this category was the fact that only a handful of studies examined in a systematic and detailed manner the actual impact of financial incentives and related financial aid programs on the recruitment and retention of physicians in rural communities. The studies of the National Health Service Corps (NHSC) program in the US do suggest that return-for-service financial aid programs are effective in recruiting physicians to practice in rural and underserved areas. The main shortcoming of programs of these types is that most individuals do not remain in the rural or underserved area once their commitment is completed. Therefore, these programs often provide only a short-term fix for what is a longer term problem. A large number of the studies in the financial incentives category do provide useful descriptive summaries of different approaches to financial incentives. The limitation of these articles and reports is that we simply do not know the actual impact of the various programs on physician recruitment and retention. A number of authors do suggest that financial obligations are a major concern for many graduating physicians as a result of higher tuition fees. It has been suggested that these obligations often influence physicians' choice of practice location. The rationale behind financial incentive programs targeting medical students with an interest in rural medicine is to encourage their commitment to rural medicine and practice in a rural area. It is unclear whether these programs are effective in the long term retention of rural physicians. It would appear from the literature reviewed that such programs may be effective in enhancing initial recruitment. Longer term retention is unclear. Studies of the impact of the National Health Service Corps would suggest that the longer the practice obligation, the greater the chance of physician retention.

3.3 Admissions

It has been suggested that medical students of rural origin are more likely to choose to practice in rural communities. A number of research studies tracking longitudinal practice locations of physicians have found that students of rural origin are more inclined to practice in rural communities. As a result, a number of authors have suggested that one possible solution to the rural physician shortage is to train more students of rural origin who will choose to practice in rural areas (Rosenblatt & Hart, 2000; CGME, 1998). However, the findings of Dhalla et al. (2002) indicate that rural students are underrepresented in Canadian medical schools. Their research indicates that the characteristics of first-year medical students in Canadian medical schools were not representative of the general population, particularly in terms of community of origin and socio-economic class.

The literature reviewed discusses the student background characteristics that are believed to have an influence on decisions to practice rural medicine. This section also describes and examines admissions policies and programs. This literature describes proactive admissions policies and measures for increasing the number of students of rural origin in medical schools. One of the most powerful ways to address the shortage of physicians in rural areas is to change the medical education system so that it selects, trains, and employs more health-care workers who are likely to choose to practice in rural areas (CGME, 1998). Tepper and Rourke (1999) believe that medical schools need to recognize the importance of recruitment of students from rural settings. Medical school faculty and admissions committees need to be aware of the characteristics of those students more likely to enter rural practice and consequently the types of students they should be admitting. The Canadian Association of Interns and Residents (1992) has also advocated changes and improvements in admissions policies in order to address the shortage of rural physicians. Our literature search and review uncovered 60 studies that focused on specific issues related to admissions. These studies ranged from informed opinion discussions to rigorous cohort comparative study designs. The majority of the studies in this category were of an informed opinion design type. Thirty-four studies (56.7%) were informed opinion, 13 (21.7%) were descriptive, 2 (3.3%) were quasi-cohort comparative and 11 (18.3%) were cohort-comparative.

3.3.1 Characteristics of Students Who Would be More Likely to Practice Rural Medicine

Hart, Salsberg, Phillips, & Lishner (2002) argue that rural backgrounds and rural interest are important considerations for medical schools that are trying to increase their output of rural physicians. Physicians from rural communities have been shown to choose rural practice settings to a greater extent than their urban colleagues (Rabinowitz, 1988, Roberts et al., 1991, Strasser, 1992a; Stratton et al., 1991; Tepper & Rourke, 1999; Looney, Blondell, Gagel, & Pentecost, 1998). Kassebaum and Szenas (1993) found that medical students with rural backgrounds were four times more likely than students with non-rural backgrounds to plan rural practice at graduation (13.2% versus 3.2%). Rabinowitz, Diamond, Hogat, and Hazelwood (1999) analyzed data on the graduates of Jefferson Medical College practicing in Pennsylvania between 1972 and 1991. They determined that rural background was overwhelmingly the most important independent predictor of rural practice. The findings from their study would appear to suggest that an increase in the number of physicians who have grown up in rural areas is an effective way to increase the number of rural physicians. Studies have also shown that students of rural origin are more likely to choose primary care and rural practice as a career (Brazeau et al., 1990; Kamien & Buttfield, 1990; Kassebaum &

Szenas, 1993; Rabinowitz, 1993; Ernst & Yett, 1984). Stratton et al. (1991) conducted a survey of graduates of the University of North Dakota School of Medicine (UNDSM) and found that students from rural areas were more likely than urban students to practice in rural communities. Head and Harris (1989) observed several characteristics that correlated with intended practice sites of applicants. They included specialty choice, size of community of origin, and degree of interest in activities such as fishing and hunting. Head and Harris (1989) concluded that programs and policies that aim to increase the number of applicants to medical schools from rural areas might be a crucial step in reversing the physician maldistribution problem.

Rolfe, Pearson, O'Connell, and Dickinson (1995) examined the differences between physicians who chose to practice in rural areas and those who chose urban areas after graduation from the University of Newcastle Medical School in Australia. The study findings indicate that respondents who lived in a rural area before medical school were 2.49 times more likely to be working in a rural area than those who had lived in urban areas. The authors conclude that medical school admission criteria should favour rural background in order to increase the number of physicians who work in rural areas (Rolfe, Pearson, O'Connell, & Dickinson, 1995). Xu, Veloski, Hojat, Politzer, Rabinowitz, and Rattner (1997a) examined the relationship between physicians' choice of underserved areas (rural and inner-city locations) and their backgrounds. Growing up in an underserved area was clearly associated with practice in a similar setting. Elam, Rosenbaum, and Johnson (1996) examined which medical students from the University of Kentucky College of Medicine were most likely to return to their geographic origins to practice medicine. A significant percentage of graduates returned to their in-state district of origin to practice.

Students' interest in rural practice, their attitudes towards it, as well as an interest in family medicine, are also important considerations for medical schools. An interest in rural practice has been associated with intentions to specialize in family practice. According to Bowman (1996) the best current predictor of practice location is a combination of rural background plus an interest in family medicine. Several studies have examined the relationship between students' interest in, and attitudes towards, rural practice and their likelihood of practicing in rural areas. Rabinowitz (1999) identified students' attitudes and personal values, as well as initial specialty preference, as characteristics that are predictive of a graduate's choice of a generalist career. According to Rourke (1996) attitudes play a very important role in the decision to locate and stay in rural practice and attitudes are directly linked to background. In medical school, students from a rural background generally have a more favorable attitude towards rural practice as a possible career than students from an urban background (Woloschuk & Tarrant, 2002). Woloschuk and Tarrant (2002) surveyed clinical clerks from 1996-2000 who trained at rural sites as part of their family medicine clerkship with the University of Calgary (n=273). Students from rural backgrounds had a more favourable attitude toward rural practice and were more accepting of the rural training experience. In fact, training in a rural community actually discouraged some students with urban backgrounds from rural practice (Woloschuk & Tarrant, 2002).

Azer, Simmons and Elliott (2001) investigated the relationship between medical students' background and their attitudes towards working in rural practice. A questionnaire was distributed to 100 first-year medical students. A strong relationship was found between rural background and an intention to undertake internship training in a rural hospital. Silagy and Piterman (1991) conducted a study of final-year medical students at two universities in Victoria, Australia to assess their attitudes towards choice of location for postgraduate training, as well as ultimate practice location.

The authors observed a strong relationship between a student's rural background and subsequent intention to remain and work in a rural area. Kearl, Mainous and Harrell (1992) suggest that there is also a relationship between tolerance of ambiguity (TOA) and expected choice of practice location. They surveyed second-year medical students enrolled in the University of Kentucky College of Medicine and concluded that students who displayed a high tolerance of ambiguity also expressed more interest in a rural practice setting.

Rabinowitz (1988a) analyzed US medical schools based on their 1982 selection factors. For schools with selection factors for both a rural background and an interest in a future career in family medicine, 23.7% of their graduates entered family medicine training programs. This was compared with 14.5% of graduates from schools with a preference only for students from a rural background, and 12.4% from all other schools. In a more recent study, Rabinowitz et al. (2001) examined the factors that were independently predictive of rural primary care supply and retention. The study population consisted of the 3,414 physicians who graduated from Jefferson Medical College's Physician Shortage Action Plan (PSAP) between the years 1978 and 1993. Rabinowitz et al. found that growing up in a rural area was an important predictor of rural primary care practice; although graduates with a rural background and freshman-year plans for family practice were more than twice as likely to become rural primary care physicians as those with only one of these factors.

3.3.2 Students from Rural Backgrounds are Under-represented in Medical School

Many studies show that students from rural backgrounds are often under-represented in medical schools (Head & Harris, 1989; Kamien & Buttfield, 1990b; Kassebaum & Szenas, 1993; Hutten-Czapski & Thurber, 2002; Jackson & Jackson, 1991a; Craig, Jackel, & Gerrits, 1993). In Canada, a study by Dhalla et al. (2002) confirms this. Dhalla observed that medical students are less likely than the Canadian population to come from rural areas (10.8% vs.22.4%) ($p< 0.001$). The situation in the United States is comparable. Kassebaum and Szenas (1993) examined the origins of students enrolled in US medical schools during the period 1982 to 1992. The study design involved an examination of the preliminary practice plans of entering students from rural and non-rural backgrounds. These plans were then compared with their practice plans and specialty certification intentions four years later when they were graduating. The study indicates that of the cohort of 1992 graduate respondents, only 17.7% were of rural origin.

Medical schools have been found to admit a large number of students from predominantly urban areas (Rourke, 1996). This does not favor the graduation of physicians who will have positive attitudes towards rural practice. Myers, Thomas, Kaufman and Kindig (1990) believe that there has been a pre-selection bias against students from rural and under-served areas. Fickenscher (1992) concurs stating that one of the reasons why medical education has failed to meet the challenges of rural healthcare is that admissions criteria are often biased against students from disadvantaged backgrounds, including those from rural backgrounds. Medical students are also often discouraged in both subtle and overt ways from entering primary care specialties and from practicing in under-served areas (Young, 1990). Therefore, there may also be a need to modify the value sets, attitudes and behaviors of medical school faculty to prevent rural-oriented students from being dissuaded from entering rural practice.

3.3.3 Selective Admissions Strategies for Recruiting Rural Students

Barer and Stoddart (1999) recommend revising medical school admissions criteria and reserving medical school places for qualified applicants willing to commit to rural practice in order to address physician maldistribution in Canada. According to Rabinowitz (1995) changes in medical school admissions are more effective in increasing and retaining rural physicians and are more cost-effective that isolated changes in curriculum or practice support. Selective medical school admission policies to enhance primary care career choice and rural preference have been shown to increase the number of physicians serving in rural areas (Rabinowitz, 1988b; Rabinowitz, 1993; Brazeau et al., 1990; Verby et al., 1991; Boulger, 1991). Medical schools that selectively recruit from rural areas have been shown to have a higher percentage of graduates who enter rural practice (Brazeau et al., 1990; Boulger, 1991; Rabinowitz, 1988b; Rabinowitz, 1993; Verby, 1988).

Medical educators and policy makers can have the greatest influence on the supply and retention of rural primary care physicians by designing programs that increase the number of qualified students from rural areas with an interest in family medicine (Rabinowitz et al., 2001; Schroeder et al., 1989). Some medical schools have been very successful in producing graduates who will enter rural practice. In the United States, 12 out of 135 medical schools were found to account for one-quarter of graduates entering rural practice (Rosenblatt et al., 1992). The location of a medical school or a decentralized affiliated medical training program in a rural area has been shown to have an effect on recruitment efforts by enhancing the selection of students from rural areas (Magnus & Tollan, 1993; Rosenblatt et al., 1992). Also effective are the establishment of selective admissions policies aimed at increasing the number and quality of applicants to medical school from rural areas.

Several studies recommend the implementation of a selective medical school admissions policy, one that grants some sort of preferential status to rural students (Vaneslow, 1990; Payne, 1993; Bowman, 2003; Hamilton, 1995; Dunbabin & Levitt, 2003; Head & Harris, 1989; Tippets & Westpheling, 1993; Bruce, 1990a). Policies might include admission screening that identifies likely candidates with an interest in rural practice (i.e. those from rural backgrounds) and gives them special consideration (Bowman, 2003; World Organisation of Family Doctors, 1995). Head and Harris (1989) suggest increasing the awareness of admissions committees of the need for greater rural representation in medical school. One way to do this would be to increase the rural membership on admissions committees (Dhalla et al., 2002). Rabinowitz (1999) suggests increasing the number of generalists on admission committees; placing community-based faculty on the admissions committee; and broadening admission criteria to increase the weights for relevant student characteristics, while maintaining high academic standards. Basco (1998) also believes that increasing the number of generalists on admissions committees and implementing preferential admissions policies are both useful strategies.

The University of Minnesota School of Medicine has oriented its admissions policy towards rural applicants (Boulger, 1991; Lampert, 1991). The admission committee favors students from small towns who express a strong interest in practicing as rural family physicians. The program also involves assigning students to rural family preceptors in order to expose them to both rural practice and lifestyle issues. Boulger (1991) conducted a longitudinal study of the graduates of the program between 1976 and 1990 and compared them to a national cohort of graduates. He found that the program has been successful. Fifty-two percent of its graduates have gone on to select family

practice residencies as compared to a national average of 10 to 14% (Boulger, 1991). University of Minnesota graduates also tended to select rural practice more often than the national average. Forty-one percent (41%) and 59.6% of graduates were practicing in communities with populations of less than 20,000 and 50,000 respectively.

A number of programs in the United States have placed an emphasis on the admission of students from rural backgrounds and with an interest in primary care practice (Geyman et al., 2000). The West Virginia School of Osteopathic Medicine (WVSOM) has educated and retained more primary care physicians for practice in rural Appalachia than any other US medical school (Roberts et al., 1993). Its program emphasizes personalized and interactive recruiting, admission, and placement processes aimed at attracting nontraditional, rural students. Another program which focuses on healthcare in rural Appalachia is the Pikeville College School of Osteopathic Medicine in Kentucky. This program preferentially admits applicants from eastern Kentucky, rural Appalachia, and other rural areas (Baldwin, 1999). Michigan's Upper Peninsula Medical Education Program has a weighted admissions procedure that gives preference to Upper Peninsula residents and applicants from a rural background (Kaufman, Werner, Cullen, & Richards, 1980).

Jefferson Medical College in Pennsylvania is well known for its Physician Shortage Area Program (PSAP) (Rabinowitz, 1993; Rabinowitz & Henick 1985; Geyman et al., 2000; Godwin et al., 1996). The PSAP has been very successful in increasing the number of family physicians in rural areas, as well as in retaining them. The program combines a special admissions program with a rural-oriented curriculum designed to increase the supply of rural physicians. PSAP recruits and selectively admits academically qualified students who have grown up or lived in a rural area and have a firm commitment to family medicine (Rabinowitz, 1988b; Rabinowitz et al., 2001; Rabinowitz & Henick 1985). Students who apply to this program are placed in a special applicant pool, but judged by the same parameters as regular applicants (Rabinowitz & Henick 1985). Rabinowitz (1988b) conducted a comparative-cohort study of the program in order to evaluate its success. PSAP graduates were more likely to practice in non-metropolitan areas than their peers (42.2% versus 11.8%) and 28 of 47 PSAP graduates were practicing family medicine. According to Rabinowitz (1988b) PSAP graduates were almost 5 times as likely as non-PSAP graduates to practice family medicine, 3 times as likely to practice in rural areas, and 2 to 4 times as likely to practice in areas where there is a physician shortage.

Ongoing research has confirmed the program's success (Rabinowitz, 1993; Rabinowitz, Diamond, Markham, & Hazelwood, 1999; Rabinowitz et al., 2001). A study by Rabinowitz in 1993 compared all PSAP graduates and their non-PSAP classmates between the years 1978 and 1986. PSAP graduates were 4 times as likely as non-PSAP graduates to practice family medicine (55% versus 13%), to practice in a rural area (39% versus 11%), and to practice in underserved areas (33% versus 8%). They were ten times more likely to combine a career in family medicine with practice in a rural area (26% versus 3%). Overall, 85% of PSAP graduates were either in a primary care practice or were practicing in a rural or small metropolitan area or one with a shortage of physicians. The results were similar six years later (Rabinowitz et al., 1999). This retrospective cohort study examined 206 PSAP graduates from the classes of 1978 to 1991. Overall, PSAP graduates were more likely than their non-PSAP classmates to practice in a rural area of the United States (34% versus 11%), to practice in an underserved area (30% versus 9%), to practice family medicine (52% versus 13%), and to have a family practice in a rural area (21% versus 2%). In 2001 Rabinowitz et al. (2001) conducted another retrospective cohort study of 3,414 Jefferson Medical

College graduates from the classes of 1978 to 1993, including 220 PSAP graduates. Their findings confirm that PSAP has been successful in increasing the percentage of rural family physicians (more than 8 times the success rate of their peers) and retaining rural family physicians over a particular period of time (87.0% retention rate over 5-10 years in practice). PSAP has been successful in increasing the number of family physicians in rural and underserved areas as well as in retaining them. These results suggest that medical schools can have a substantial influence on the distribution of physicians principally through admissions criteria.

Stearns, Glasser, and Fulkerson (1997) describe the Illinois Rural Medical Education (RMED) Program of the University of Illinois College of Medicine. The RMED program is a comprehensive, multifaceted program that combines recruitment, admissions, support, and rural curriculum components across all four years of medical education. While applicants must first meet the college's admission criteria, a secondary screening process evaluates the rural origins of students and their families, evidence of rural community involvement and leadership, understanding of family medicine, and other variables that increase the likelihood of a primary practice career choice. Those accepted into the program must sign a pledge to enter family practice residency and to return to practice in rural Illinois. After six years of operation, RMED had graduated 39 physicians, 69.0% have gone into family practice and a total of 82.0% have selected primary care residencies (Stearns et al., 2000).

In the mid-1990's, an Australian Rural Undergraduate Steering Committee recommended that the selection of students into Australian medical schools should be based on an appropriate mix of academic results, aptitude, and rural interest. This Committee also recommended that mechanisms should be established to increase the number of rural students to match the proportion of rural population in the country (Norington, 1997). According to Rourke and Strasser (1996) some Australian schools had introduced affirmative action programs with a goal of increasing the number of students from rural areas. Strasser (2001) believes it is essential to have some formal affirmative action program built into the selection process in order to achieve the target number of rural students in medical school. A merit-based selection system was introduced in 1994-95 based on uniform national criteria that include a positive weighting of scores for applicants who demonstrated commitment to rural practice. Kamien and Buttfield (1990a) agree that the selection process is one method by which a medical school can influence the geographical location and future specialty choice of its graduates. They suggest that 5 to 15% of seats could be reserved for socially, economically or geographically disadvantaged students. There could also be a special quota for rural students. Hays (2001b) discusses James Cook University's School of Medicine in Queensland, Australia. The mission of the school is to improve the health care of rural and Aboriginal people in the region. Its curriculum is community and problem-based; it focuses on rural practice, Aboriginal issues, and cultural awareness. The school's admissions policy gives preference to rural and Aboriginal students. As an example, there are five seats reserved for Aboriginal students and the admissions committee includes both rural and Aboriginal community representatives.

3.3.4 Summary

An earlier, systematic review of the literature pertaining to the connection between physicians' background characteristics and career choices was conducted by Ernst and Yett (1984). At that time, the authors found that a great deal of empirical evidence had been gathered on the relationship

between physicians' background characteristics and specialty and practice location choices. These studies suggested that general physicians and family practitioners were more likely than other physicians to have been brought up in rural areas. Physicians who enter primary care disciplines and those who choose to become family physicians are more likely to practice in underserved areas than their peers who enter specialty areas. The literature which was examined in this synthesis study also clearly suggested a direct relationship between community of origin and eventual practice location. Medical students raised in rural areas are more likely to return to rural practice. This connection is supported by studies which have surveyed students at opposite ends of the "pipeline" – medical school applicants and graduates. The literature suggests that children raised in a rural environment are more likely to return (Payne, 1993; Kamien, 1995; CGME, 1998). As well, it also shows that many physicians and other healthcare professionals who choose to practice in small towns and rural areas were themselves reared in small communities (Knopke, Northrup, & Hartman, 1986).

Medical students with rural backgrounds are more likely than students with non-rural ties to enter rural practice. There also appears to be overwhelming consensus that one means to increase the number of rural physicians is to increase the number of students admitted to medical school with both a rural background and an interest in rural medicine. However, students from rural backgrounds continue to be under-represented in medical schools. Numerous studies in the literature advocate the need for selective medical school admission policies that give preference to students with rural backgrounds and an interest in family medicine and rural practice. A number of American and Australian schools have implemented such admissions policies. There is clear and systematic evidence from these schools that such policies have been effective in increasing the rural physician workforce. What is not clear, however, is how well students who were preferentially selected because of their rural background performed during medical school and upon graduation.

3.4 Undergraduate Medical Education

The undergraduate medical education category encompasses literature which focuses on the specific role of the curriculum and curriculum-related activities in enhancing the recruitment and retention of rural physicians. Specifically, the literature in this area examines the role of curricular experiences in influencing the career paths of medical students. The category is divided into three themes: the importance and effect of rural learning experiences (e.g., pre-clerkship preceptorships, clerkship rotations, summer placements and electives); the attitudes of medical students towards rural practice; and the role of the curriculum in enhancing attitudes towards rural practice. The content of the undergraduate curriculum and its orientation toward rural health and rural communities are important factors that influence values and attitudes towards rural medicine. The role of decentralized education centres, the influence of faculty role models, and the importance of the quality of learning during rural rotations or preceptorships are other themes that emerged from the literature review.

The search of the literature uncovered 184 studies that focused on issues related to undergraduate medical education. These studies ranged from informed opinion discussions to rigorous cohort comparative studies. The majority of the studies in this category were of an informed opinion nature - 112 (60.9%). Forty-two (22.8%) were descriptive, 2 (1.1%) were quasi-cohort comparative and 28 (15.2%) were cohort-comparative. According to Mennin and Kaufman (2000) the geographic and specialty distribution of medical school graduates rarely matches the needs of communities and populations. Some attribute this to the discrepancy between the goals of academic medicine and the health needs of communities. The literature on recruitment, retention and rural medical education has largely focused on the role of the medical school and the medical curriculum. This literature has offered both positive and negative views on the success of medical education in this regard. On the positive side, a number of innovative and effective initiatives have been reported which demonstrate progress and success in the preparation of medical students for rural practice. A growing number of academic health centers around the world are attempting to shift the focus of their academic mission towards community health needs and to move medical education from hospitals to ambulatory clinics within communities (Mennin & Kaufman, 2000). Studies have shown that medical schools that are decentralized, located in rural areas, have a rural focus, encourage admission of rural students, implement rural-oriented medical curricula, and provide early and repeated undergraduate rural medicine learning experiences are most successful at graduating physicians who will choose rural practice as a career (Rourke, 2002; Rosenblatt, Whitcomb, Cullen, Lishner & Hart, 1992).

On the negative side, the majority of criticism has focused on the failure of medical education to foster positive attitudes among medical students towards rural practice. In this regard, the medical school has been judged as unresponsive to the needs of rural health care. Some of this criticism has been unwarranted, given the key influence which background characteristics as well as system issues play in influencing the recruitment and retention of rural physicians. Nevertheless, medical schools have an important role to play in providing students with the knowledge, skills and attitudes to practice confidently in rural areas. A number of curriculum interventions, outreach programs, and selection and admissions policies are under the control of the medical school. The implementation of many of these initiatives has been studied and shown to have an influence on recruitment and retention efforts. Rhoades, Duffy, Hall and Voth (1995) have suggested that the main ways in which the academic health center can enhance recruitment and retention is by locating

educational experiences away from larger urban centres and introducing a specific curriculum appropriate to rural practice.

Rourke (2002) believes that a stronger rural and northern focus will be required in undergraduate medical education in order to graduate more physicians interested in rural practice. Factors such as the organization, location and mission of medical schools have also been shown to be related to the propensity for graduates to select rural practice (Rosenblatt et al., 1992). Some medical schools have been very successful in producing graduates who enter rural practice. In the United States, Rosenblatt et al. (1992) observed that 12 out of 135 medical schools were found to account for one-quarter of graduates entering rural practice. Bruce (1990a) recommends a number of areas for undergraduate curriculum reform including: use of rural problems in courses and requiring rural research; clinical experiences during the early years of medical school; emphasis on ambulatory settings for learning, preferably in community sites; provision of training in community or population relevant problems; and rural elective program options. The World Organisation of Family Doctors (1995), the WONCA Working Party on Training for Rural Practice (1996) and the Canadian Association of Interns and Residents (1992) have all called for substantial exposure to rural practice in medical undergraduate curricula. As a standard, Norington (1997) suggests that a minimum of 8 weeks should be spent in rural hospitals and in rural general practice during undergraduate training.

Unfortunately, the learning experiences of many medical schools have been largely skewed towards urban tertiary referred practice (Kamien & Buttfield , 1990; Ramsey et al., 2001). This focus has not provided students with a positive view of what primary care practice entails, or encouraged students to consider rural practice as a career. Traditionally, the structure of the curriculum has not accorded much value to rural general practice nor provided students with the opportunity to develop competencies for practice in an isolated clinical setting. In order to introduce students to rural medicine and to provide a counterbalance to the predominant urban experience, many medical schools have introduced short rural practice experiences, usually during the family medicine or community medicine senior clerkship in the final year (Rourke, 1996). According to Kamien (1995) the literature consistently establishes that undergraduate exposure to rural practice is a key factor that influences a medical student to choose a career in rural medicine.

In recent years, the number of candidates for admission to family medicine training among US medical schools has decreased and those students currently enrolled tend to avoid choosing primary-care specialties. Medical educators have suggested that in order to reverse this trend, students must be trained in environments that encourage and foster primary care training. Such training programs should include clerkships in ambulatory settings taught by primary care preceptors in non- urban areas (Brazeau et al., 1990). Garland (1990) believes that medical schools "seduce" motivated and idealistic first-year students away from primary care and into medical specialties of which they were previously unaware. Other forces, such as the academic setting, specialist role models, the prestige factor, evolving peer pressure, the security of a narrow field, and financial considerations are believed to push students towards specialization.

3.4.1 Attitudes

Physicians in rural practice are more likely to be of rural origin than physicians in urban practice. According to Rourke (1996) this is because attitudes play a very important role in the decision to

locate and stay in rural practice. In medical school, students from a rural background generally have a more favourable attitude towards rural practice as a possible career than students from an urban background. Azer, Simmons and Elliott (2001) found a strong relationship between rural background and an intention to undertake internship training in a rural hospital (86.0% of students from a rural background expressed this desire as compared to 30.0% of students from an urban background). The downside is that the experiences of medical school can have a negative influence on attitudes towards rural practice. Rourke (1996) believes that the prolonged urban-oriented social and cultural experiences of medical school can contribute to a shift towards urban values. As well, attitudes towards rural practice by specialist medical school faculty can have a significant impact on an impressionable young practitioner-in-training. Medical students may change their interest in rural practice because of mentorship by urban physicians or other non family medicine specialists as some professors might have a tendency to promote their own specialties.

According to Kamien and Buttfield (1990b) the medical school experience exerts a significant influence on students' ideas and values. Recruitment to rural practice is aided by exposure to positive rural physician role models (Roberts et al., 1993) and early and long-term clinical training in rural sites and hospitals (Connor, Hillson & Kralewski, 1994; Norris & Norris, 1988). Kaufman (1990) believes that students must receive early and sustained exposure to rural communities and to rural physician role models if learning in medical school is to be suitable for rural practice. However, medical students are discouraged in both subtle and overt ways from entering primary care specialties and from practicing in under-served areas (Young, 1990). Some authors have suggested a need to modify the value sets, attitudes and behaviors of medical school faculty to prevent the dissuasion of rural-oriented students from entering rural practice. Efforts to sensitize faculty and staff to rural values and needs should also be undertaken. Over 90% of the teaching conducted in medical schools is by sub-specialists who have never practiced outside the teaching hospital nor had any experience with rural health. These faculty members are usually powerful role models and Kamien & Buttfield report that most of them hold general practice in low esteem.

An adequate undergraduate exposure to rural medicine is a significant factor in attracting doctors to rural areas. Students need opportunities for hands-on learning with skilled general practice preceptors in rural settings. Bruce (1990a) suggests that effective rural physician role models need to be introduced to students early in their undergraduate medical studies and this relationship needs to be maintained over time. Rural preceptors can help generate interest in rural practice among medical students (Fry & Terry, 1995). However, those who choose to teach in rural settings are often disadvantaged because they lack the necessary support for their teaching and supervisory roles (Price, Miflin, Mudge, & Jackson, 1994). There have been some efforts to bring academic supports to rural preceptors. Studies have examined preceptors' attitudes about having students in their offices and have sought to determine if this placement experience resulted in professional growth. A survey was mailed to 101 preceptors recruited to teach in the "Doctoring" course of the University of California, Los Angeles. This course is for all first-year medical students and involves four visits to a family physician's office over the course of a month. More than 75% of the preceptors reported that the medical students had positive effects on their patients' satisfaction with their care.

A number of authors have suggested that negative perceptions of rural practice either exist or are frequently developed or encouraged during undergraduate and postgraduate training (Piterman & Silagy, 1991; Weissman, Campbell, Gokhale, & Blumenthal, 2001; Kamien, Bassiri, & Kamien,

1999). In one study, Kamien, Bassiri, and Kamien (1999) explored the frequency of negative comments ("badmouthing") made by teaching hospital specialists about rural GPs to determine if, and how, they influence medical students' intended career choice. The study design involved a retrospective questionnaire-survey and was administered to senior medical students at the University of Western Australia. The study findings indicate that one or more negative comments were heard about rural GPs by 50% of students. Badmouthing had either 'no' or only a small influence on the attitudes of 88% of students towards urban general practice, 90% toward rural practice, and 93% toward teaching hospital specialization. When asked if badmouthing influenced career decision making, 12% of students claimed to have been influenced against becoming an urban GP, 7% against becoming a rural GP, and 8% against becoming a teaching hospital specialist.

3.4.2 Rural-Based Curriculum

Enhancing the nature and level of exposure to rural medicine in both undergraduate and postgraduate training is one strategy being used to address the shortage of physicians in Canada's rural communities (Barer & Stoddart, 1999). Research suggests that physicians practicing in rural locations after graduation are more likely to have had positive rural experiences as undergraduates (Boulger, 1991; Brazeau et al., 1990; Fryer et al., 1993; Magnus & Tollan, 1993; Rabinowitz, Diamond, Hojat & Hazelwood 1993a; Stratton et al., 1991; Verby, 1988). According to Kaufman (1990) rural training sites are ideal locations for students to confront the array of social, political, and economic forces underlying ill health in our society. A positive rural practice experience during medical school can positively influence students' attitudes towards rural practice and eventual practice location in rural areas (Schroeder, Zones & Showstack 1989; Paulman & Davidson-Stroh, 1993; Fryer et al., 1993; Vaneslow, 1990). Rural practice learning experiences have been associated with higher student satisfaction scores. Irigoyen, Kurth and Schmidt (1999) explored whether primary care specialty or geographic location affected student learning and satisfaction. From 1994 to 1995, 294 third-year medical students were randomly assigned to multiple teaching sites for a required 5-week primary care clerkship. Students at rural sites rated the experience more highly and saw on average 15 more patients per rotation.

It is important that the rural practice experience be spread throughout the medical curriculum, ideally with a component in every year (Kaufman, 1990; Rourke, 1996). The most successful medical schools are those with coordinated, rural-oriented medical education programs that provide early and extensive rural experience (Boulger, 1991; Brazeau et al., 1990; Lampert, 1991; Rabinowitz, 1993; Rosenblatt, 1992). Blau (1992) has suggested that options for summer work and electives in rural practice should also be introduced and made available. Laskowski (1997) explored the impact of a summer rural/underserved preceptorship (the Rural Underserved Opportunities Program) on the residency choices of participants and on the beliefs and attitudes of participating students regarding rural/underserved primary care practices. Laskowski found that program participants were more likely to select primary care than their peers.

The College of Family Physicians of Canada Working Group on Undergraduate Education (2002) recommends that undergraduate curriculum should include an experience in Family Medicine during each year; a longitudinal experience in Family Medicine during the pre-clerkship years; and a clerkship in Family Medicine which provides for community-based experiences (both rural and urban). Lynch and Willis (2000) suggest that relatively brief exposure to rural family medicine during first-year medical school does not influence students' opinions about living and working in

small communities or their plans to live or practice medicine there. Providing rural education training experiences which are more intensive and continuous throughout the curriculum are more meaningful to students. Recently, Woollard et al. (2000) surveyed Canadian medical schools to determine the state of rural medical education initiatives and found that only 8 medical schools offer pre-clerkship electives in Family Medicine. However, fifteen medical schools do offer a compulsory clerkship rotation in family medicine of 4 to 8 weeks duration.

An integrated rural-oriented curriculum appears to be the most successful approach to encouraging medical students to pursue rural practice (Rourke, 1996). Some schools offer a rural training stream that emphasizes early and extensive clinical experience in a rural setting combined with a rural-oriented curriculum (Rourke, 1996). Fryer et al. (1993) examined the practice locations and specialties of graduates from a rural practice, experiential learning program at the University of Colorado Health Sciences Centre. Graduates who had completed rural rotations were found to establish practices in rural counties more frequently than those who had not. These same individuals were also more likely than their counterparts to practice a primary care specialty, particularly family practice (Fryer et al., 1993).

According to Rourke (1996) the key to an effective rural practice experience is that it should provide the student with the opportunity to understand health and illness in the rural context. A rural-medicine curriculum should be needs-driven, evidence-based, learner-centred and outcome-measured (Rourke, 1996). This requires study of the knowledge, skills and attitudes required for rural practice based on the input of rural physicians into the curriculum design and implementation process (Wise et al., 1994). Instruction and experiences related to the realities of rural living need to be enhanced to increase the retention of rural physicians (Stearns et al., 2000). This can be accomplished with a greater curricular emphasis on community health competencies, including community-oriented primary care (COPC). Pathman, Steiner, Williams and Riggins (1998) surveyed 500 primary care physicians and identified four dimensions of community skills and knowledge used by these physicians: familiarity with community health resources; sociocultural awareness in patient care; community participation and assimilation; and identifying and intervening in the community's health problems, or COPC. Physicians who know how to collaborate with community members on health improvement projects have skills that can also facilitate integration and, hence, retention (Stearns et al, 2000).

Mennin, Kalishman, Freidman, Pathak and Snyder (1996) surveyed 140 graduates from the first four classes (1983-1986) of the University of New Mexico School of Medicine's (UNMSOM's) parallel curricular tracks; a conventional track and the Primary Care Curriculum (PCC) - a community-oriented, problem-based track. One hundred students were graduates from the conventional track and 40 were from the Primary Care Curriculum. The purpose of the study was to compare data about graduates' practice patterns, learning behaviours, and satisfaction with the profession of medicine. PCC graduates were more likely than graduates of the conventional program to work in medically under-served areas and to identify patient problems and curiosity as providing motivation for their learning. More PCC graduates also chose careers in family practice and felt better prepared for practice by their undergraduate medical education.

3.4.3 Quality of Rural Learning Experiences

The effect of rural experiences during undergraduate and postgraduate medical training on graduates' subsequent decision to practice in rural communities has been examined (Brazeau, Potts & Hickner, 1990; CMA, 1992; Rourke & Rourke, 1995; Rourke, 1993; Rabinowitz, 1993; Vanselow, 1990; Verby, Newell, Andersen & Swentko, 1991; Fryer, Miyoshi, Stine & Krugman, 1993; Stratton, Geller, Ludtke & Fickenscher, 1991; Kamien, 1995; Rosenthal, McGuigan, Osborne, Holden & Parsons, 1998; WONCA, 1995). Studies have shown that there is an association between characteristics of physicians' training and the length of time that those who choose rural practice actually stay in rural settings (Thorne, 1993; Cullen, Hart, Whitcomb, & Rosenblatt, 1997; Pathman, Konrad, & Ricketts, 1994a; Pathman, Steiner, Jones, & Konrad, 1999). These studies suggest that rural experiences of more than three months are associated with more positive rural practice choices and retention outcomes.

Stearn (1997) indicates that where rural curriculum is taught in all 4 years of a rural medical education program, 69% of their graduates chose to do family medicine. This is much better than the current status in Canada where less than 50% of medical school graduates are choosing to do family medicine. Easterbrook et al. (1999) examined whether exposure to rural practice during undergraduate training was associated with an increased likelihood of practicing in a rural area. The study entailed a cross-sectional survey of 159 physicians who graduated from the Family Medicine Program at Queen's University between 1977 and 1991. Physicians exposed to rural practice during their undergraduate medicine training were 1.7 times more likely to practice in a rural area than those who did not have such exposure. Peach and Bath (2000) conducted a survey of both rural and non-rural students undertaking a voluntary rural placement. Forty-six percent (46%) of the rural students reported the placement had changed their feelings towards rural practice compared with only 24% of the non-rural students.

Norington (1997) has suggested that the quality of learning that students experience during rural preceptorships or rotations can have a significant impact on their satisfaction with the learning experience. Mennin and Kaufman (2000) report that undergraduate students who spend time learning clinical medicine in rural general practice settings experience greater access to patient and clinical learning opportunities than students at urban medical centers. However, there have been concerns raised by some in the medical education community about the quality of the learning environments which students are exposed to when they leave the confines of the medical school. Norris, Coombs and Carline (1996) suggest that better attention to the type of training provided during medical school might help to offset the effects of professional isolation, reduce dissatisfaction reported by rural providers, and in turn, enhance both rural recruitment and retention. They distributed an educational needs assessment questionnaire to 1096 family physicians in the US who had finished residency and entered rural practice within the previous 3 years. The results indicated there were some areas in which respondents noted receiving inadequate preparation, including: allergy; rehabilitation medicine; many forms of counselling; advanced and operative obstetrics; pediatric trauma care; and nutrition.

Worley, Prideaux, Strasser, Silagy and Magarey (2000) found that rural community-based students had twice as many patient encounters and learned three times the number of procedural skills as their city hospital-based counterparts. Other authors have also reported that students on rural medical education rotations perform up to six times the number of relevant procedures as their

urban hospital peers. Cullhane, Kamien and Ward (1993) evaluated the effect of a four-week rural attachment on the knowledge and competency of medical students in basic practical and emergency procedures. Students reported competence in a larger number of procedures as a result of their participation. Irigoyen et al. (1999) examined whether location or specialty of preceptors had any impact on student learning and satisfaction. Third-year medical students (n = 294) at a New York state medical school were randomly assigned to a variety of urban, suburban, and rural locations for their required 5-week primary care clerkship. Rural location was positively related to higher student satisfaction scores.

It is important that the needs of rural preceptors are addressed in order to enhance the quality of the rural teaching experience. Price, Miflin, Mudge and Jackson (1994) surveyed 240 medical undergraduate students in Australia concerning their experiences and perceptions of teaching and learning in rural settings. According to these students, teaching and learning were most effective when teachers were encouraging and able to assist the learner to contextualize knowledge. This contextualization or integration of knowledge occurred through simply observing the rural physician. It also occurred through hands-on learning and solo consultations, provided that these contexts allowed worthwhile interaction with the teacher, especially clear explanations of decisions and/or feedback on performance. The major positive features identified by 90% of students were: being treated as a colleague; being allowed and encouraged to work independently; receiving feedback on one's work; and being given ample hands-on procedural experience and/or teaching.

3.4.4 Decentralized Rural Education Centres

The establishment of academic health centers has been important in supporting health services research (Rosenblatt, 1991). The US has shown significant leadership in the area of medical education decentralization with the establishment of Area Health Education Centres (AHECs). An AHEC is a regional centre for education and training that houses faculty and staff who teach students and residents while providing continuing education, consultation, and technical assistance for rural practices (Mayer, 1990). AHECs cover a specified geographic area, and since 1972, the US federal government has stimulated the development of AHEC activities in over 30 states. AHECs help to improve a rural community's ability to recruit, retain and keep up-to-date primary care physicians and other health professionals. AHECs arrange CME, maintain learning resource centres and work with local communities to strengthen local health care systems (Ramsey et al., 2001).

Fryer, Miyoshi, Stine and Krugman (1993b) examined the effectiveness of the programming of the AHEC affiliated with the University of Colorado Health Sciences Center. This program has sponsored rotations for medical students in rural Colorado since 1980. The practice locations and specialties of 131 graduates of the AHEC program were compared with those of the 153 graduates who had not completed an AHEC rotation. The graduates who had completed rotations established practices in rural counties more frequently (13.7% versus 7.8%), especially in towns with fewer than 5,000 people (9.9% versus 4.0%). They were also more likely than their counterparts to practice a primary care specialty (50.4% versus 34.0%), particularly family practice (26.7% versus 10.5%).

In Australia, academic units located in rural centers, such as University Departments of Rural Health (UDRH), have been established (Lawson, Chew & Van Der Weyden, 2000). These units

undertake activities at all stages of education, from promoting careers in health care in rural high schools through involvement in undergraduate and vocational training, university higher education, continuing education and professional development. The units also emphasize partnerships and linkages with rural health organizations and services, local health-care providers and the community. They are based in rural centers but serve large regions with several subsidiary sites. Their principal aim is to provide education, training and professional support for rural health workers. Another Australian innovation is the Academic Rural General Practice Units (ARGPUs) (Hays, Bridges-Webb, Harris & Bushfield, 1992). The roles of ARGPUs are the same as for any clinical academic unit: teaching, research, advancing the discipline, and providing clinical service. Teaching programs include undergraduate rural attachments, vocational training in clinical practice, continuing education, and graduate and postgraduate degree programs for future rural academic clinicians.

3.4.5 Rural Student Clubs

As we have seen, some medical schools have established rural practice clubs or mentor programs to encourage interest in rural practice (Rourke & Strasser, 1996). Dunbabin and Levitt (2003) report that the establishment of rural health clubs in Australia has become an important initiative to promote rural practice. At the University of Western Australia, the SPINRPHEX Club has raised the profile of rural practice within the medical school (Jackson, Jackson, & James-Wallace, 1993). The SPINRPHEX Club is a rural students' club for students from a rural background, and/or for those who are interested in rural practice. Membership requires attendance at special meetings and guest speakers are often invited to speak to the members on issues of rural interest. According to Kamien (1996b) rural student clubs are intended to nurture students with an interest in rural medicine and to contribute to a rural counterculture within the traditional medical school environment. They may also address the social, emotional and financial support needs of rural students (Norington, 1997). The World Organisation of Family Doctors (1995) has recommended the establishment of rural clubs to encourage students to develop an interest in rural practice.

3.4.6 Undergraduate Medical Education Program Initiatives

The literature also documents numerous curriculum initiatives and program models that have been developed to enhance rural-oriented medical education efforts. Reports from Norway (Magnus & Tollan, 1993), Australia (Jackson & Jackson, 1991; Mckenzie et al. 2000), Illinois (Stearns et al., 2000), Pennsylvania (Rabinowitz, 1993), Michigan (Brazeau et al., 1990; Potts, 1994), Kentucky (Casto, 2001), and Washington State (Ramsey et al., 2001) have been reviewed. In Canada, the Northern Ontario Medical School (NOMS) is based on a collaborative partnership between Laurentian University in Sudbury, Ontario and Lakehead University in Thunder Bay, Ontario (Rourke, 2002). The curriculum of this new medical school will be patient-centred, clinical problem-based, and systems-organized, with a significant health determinant focus, and Aboriginal health content and context (Rourke, 2002).

Stearns et al. (2000) describe the Illinois Rural Medical Education (RMED) Program of the University of Illinois College of Medicine. The RMED program is a comprehensive, multifaceted program that combines recruitment, admissions, and curriculum components and is longitudinal across all four years of medical education. The admissions process admits students who possess traits indicative of success in eventual rural family practice. These traits are then fostered by a

special, rural-oriented curricular track which emphasizes family medicine and service learning. Students are encouraged to participate in rural primary care summer internships. In the second year, there are seminars on family medicine relating to rural healthcare delivery. In the third year, there are seminars focusing on community-oriented primary care (COPC) and in the fourth year, students spend 16 weeks in a rural Illinois community. After six years, RMED has graduated 39 physicians: 69.0% have gone into family practice, and a total of 82.0% have selected primary care residencies (Stearns et al., 2000).

The successes of the Jefferson Medical College in Pennsylvania have been discussed earlier in the report. PSAP was originally set up to identify medical student applicants who would eventually practice family medicine in rural areas in Pennsylvania (Rabinowitz & Henick, 1985). The program recruits and selectively admits academically qualified students who have grown up or lived in a rural area, and have a firm commitment to family medicine (Rabinowitz et al., 2001). The program also includes a number of curricular requirements including junior family medicine rotations in rural areas, a family medicine preceptorship, a three-year family medicine residency, and the practice of family medicine in a physician underserved area.

In Minnesota, the Rural Physician Associate Program (RPAP) includes a third-year, nine-month preceptorship in a rural community (Verby, Newell, Andresen & Swentko, 1991). Of 284 graduates practicing in Minnesota, 88.6% were found to be practicing in primary care, 71% in family practice, and 58.8% in rural areas. The rural medicine program at the University of Minnesota School of Medicine has also been successful in training rural family physicians (Boulger, 1991). Follow-up studies of graduates have indicated that 52.5% selected family practice and 41.0% chose practice in rural or under-served communities. The program encourages students from small communities to apply and exposes them to rural practice in their first two years through a rural preceptorship program. The University of Minnesota program also offers first-year medical students an opportunity to spend a few days with rural family physicians during the week before classes (Seim, 1997).

In West Virginia, the curriculum of the West Virginia School of Osteopathic Medicine is based on the provision of early and repeated clinical training at rural sites (both hospitals and physicians offices) and is also oriented toward teaching primary-care physicians (Roberts et al., 1993). The Upper Peninsula (UP) Medical Education Program in Michigan was established in 1974 to improve physician supply in rural areas by training students in rural, practice-based settings (Brazeau et al., 1990). Brazeau and colleagues surveyed program graduates and non-program graduates concerning practice location, specialty choice, hometown, and medical education and training. UP graduates showed a tendency to choose rural practice and primary care specialties, especially family practice, more often than non-program graduates.

The WWAMI (Wyoming, Washington, Alaska, Montana, and Idaho) program of the University of Washington School of Medicine (UWSOM) is considered the pioneer of the concept 'medical school without walls' (Ramsey et al., 2001). WWAMI is designed to increase the number of generalist physicians throughout rural areas in the Northwest US and is based on a comprehensive regional education model. Students from participating states are trained in several regional locations and during the first year, existing faculties and facilities at state universities are used. During the second year, all students attend courses together at the University of Washington in Seattle. The WWAMI program has placed a strong emphasis on practical, rural medicine learning

experiences. The third and fourth years of medical school are devoted to clinical and community-based training. Clinical units have been established in a number of communities to provide community-based clinical experiences. The Rural/Underserved Opportunities Program (R/UOP) offers medical students an elective summer fellowship between their first and second years. As well, the UW-affiliated Family Practice Residency Network provides residency training in rural areas, and residents can select a rural training track, which provides intensive exposure to rural practice. WWAMI is an excellent example of a comprehensive approach to rural medical education, as it places an emphasis on the continuum of education, from premedical to postgraduate. The program has also established some initiatives to encourage the recruitment, selection and admission of rural students. Premedical recruitment has included programs such as: the Minority Education Program, a six-week enrichment program for under-represented minority college students; the Medical Scholars program which provides rural high school students with a week-long immersion in medicine; and U-DOC, which provides 6-week summer enrichment programs for students from rural areas

The University of New Mexico School of Medicine's (UNSOM's) Primary Care Curriculum (PCC) is an undergraduate curricular track which runs alongside the conventional track (Kaufman, Werner, Cullen & Richards, 1980). The PCC track features problem-based and community-oriented learning and was designed to attract students to careers in primary care in rural and underserved areas. As part of their first year, students relocate to rural, medically underserved areas of New Mexico and work with rural physicians (Kaufman et al., 1989). Students also take part in a 4-to-6 month rural clerkship after their 2nd year. In the final year of their program students return to a rural New Mexico community for a 3-to-6 month rural sub-internship. A comparison of PCC students with those on the conventional track reveals that those who were interested in family medicine at medical school orientation retained this interest at graduation more often than did those students with similar interests who took the conventional program (Kaufman et al., 1989).

The Rural Health Scholars Program (RHSP) of East Carolina University School of Medicine is an enrichment initiative designed to increase the number of students that select to practice primary care in rural, underserved areas (Lynch et al., 2001). It is a longitudinal program that includes a skill-building workshop; a five-week summer preceptorship with community-based preceptors in rural, underserved areas; and opportunities to return to preceptorship sites during third- and fourth-year rotations. Key elements of the program include education about community-based medicine and life in rural, underserved areas; primary care medicine; cultural diversity; interdisciplinary healthcare; and leadership development. Lynch and colleagues were interested in determining whether a difference existed between the RHSP participants and their peers in terms of choice of residency programs. They found that RHSP scholars were significantly more likely that their peers to match into residencies in family medicine.

3.4.7 Summary

The literature suggests that the medical school experience is a very influential factor in fostering or undermining students' interest in rural practice. A rural background combined with an interest in primary care medicine and extensive exposure to rural medicine role models and rural learning experiences would appear to be key factors. Students who encounter rural practice learning are generally very satisfied with the experience and research suggests that it influences choice of rural practice. The studies that were reviewed indicate that medical schools can successfully train

physicians with the appropriate knowledge, skills and attitudes for rural practice. In order to be successful, the curriculum needs to be rural-oriented, and efforts (including appropriate selection processes) need to begin prior to medical school and continue on through undergraduate and postgraduate education to provide positive rural learning experiences (Rourke, 1996).

Pathman (1996) does point out that a shortcoming in some longitudinal studies on the effect of curriculum on career choice and practice location is that there is little or no accounting for pre-existing characteristics, interests and career plans of students and residents. The extent to which positive career outcomes are a consequence of the type of training or of the characteristics of the students is often not established. As an example, Paulman and Davidson-Stroh (1993) were interested in examining whether a medical student rural family practice preceptorship at the University of Nebraska Medical Center (UNMC) (a required 8-week rotation) was a positive influence on students' selection of family practice as a specialty. Senior medical students (N=598) completed pre- and post-rotation questionnaires and 565 students (94.5%) reported that they were uninfluenced by the preceptorship. A large number of these students indicated they had chosen family practice before the preceptorship and planned to follow on with this career choice. In another study, Woloschuk and Tarrant (2002) examined the influence of a rural educational experience on students' likelihood of doing a rural locum or pursuing rural practice and whether student background and gender were related to these practice plans. The study focused on the family medicine clerkship at the University of Calgary, a four-week mandatory rotation in the final year of a three-year medical education program. Compared to their urban peers, students from rural backgrounds reported a significantly greater likelihood of doing a rural locum and practicing in a rural community, irrespective of gender or participation in a rural educational experience.

Nonetheless, a majority of studies do clearly demonstrate that rural-oriented undergraduate medical education curricula that include rural community learning experiences are an important factor in enhancing or even maintaining interest in primary care or rural family medicine practice. The fact that some students may be pre-disposed towards rural practice is an important consideration, but the absence of a rural-oriented curriculum and constant exposure to a tertiary-based care curriculum in an urban centre would offer little exposure to the nature of rural practice. The quality of the rural learning experience is also a key factor. The quality of the learning can also impact on students' satisfaction with the experience and in turn, influence decisions to pursuer a career in rural medical practice. Curricula which are based on principles of COPC appear to be successful in stimulating interest in the nature of rural primary care practice. Preceptors also need to be provided with an adequate level of academic support and development. Rural learning experiences need to provide students with ample opportunities for observing and experiencing the nature of medical practice in a rural community in a practical and experiential manner.

3.5 Postgraduate Medical Education

The postgraduate medical education category encompasses literature focusing on rural family medicine residency programs and advanced procedural skills training. Postgraduate clinical experience in a rural setting is a factor which has been associated with entering rural practice. A number of studies suggest that location of residency is an important factor influencing physician practice location (Kristiansen & Forde, 1992). A number of studies report that residents trained in rural areas are more likely to choose practice in rural areas (Rosenblatt & Hart, 2000; Talley, 1990; (Norris & Norris, 1988; Gray, Steeves & Blackburn et al., 1994; Strasser, 1992a; Costa et al., 1996, Lebel & Hoog, 1993). The World Organisation of Family Doctors (1995) has recommended greater opportunities for postgraduate clinical learning experiences in rural settings. Rural family medicine training tracks are one strategy which have been introduced for preparing family medicine residents for practice in rural communities. These training tracks provide family medicine residents with extensive exposure to rural family practice sites and enable specialized training at regional hospital locations as well. It has been suggested that rural family medicine training and practice is the answer to the plight of rural healthcare. Payne (1993) and Blau (1992) suggest early exposure to rural medicine and practice during residency. Rhoades, Duffy, Hall and Voth (1995) report that these educational experiences must be located as far away from large urban centres as possible, while Bowman (1996) has recommended that longer rural training experiences are needed in residency programs.

Rural medicine has evolved into a distinct discipline with its own unique characteristics, educational experiences, and research and knowledge base. In the past, rural family physicians often entered practice without any special training and with a poor awareness of the skills that were needed. Any procedural skills that were learned resulted from a series of hospital rotations with little relevance to future rural practice. The care of patients in rural areas often requires family physicians to provide hospital medical services such as anesthesia, obstetrics, emergency care and even general surgery; services normally provided by specialists in urban settings. According to Rourke (1996), today's rural physicians require the knowledge and skills of family medicine and the ability to practice in a setting where access to high tech facilities and specialist resources are distant and limited. A main barrier in recruiting family medicine graduates to enter rural practice has been their lack of training in advanced procedural skills. Many graduates are not provided with adequate training to practice in rural sites and are not confident in their skills and abilities to practice in environments that are remote from regional and/or tertiary care centres. A number of family medicine training programs in Canada have added an optional third year of advanced skills training in obstetrics, general surgery and anesthesia.

This literature search and review uncovered 208 studies focusing on specific issues related to postgraduate medical education and advanced procedural skills. These studies ranged from informed opinion discussions to rigorous cohort comparative study designs. The majority of the studies in this category were of an informed opinion design type; 127 (61.1%). Fifty-five (26.4%) were descriptive, 1 (0.5%) was quasi-cohort comparative and 25 (12.0%) were cohort-comparative.

3.5.1 Rural Learning Experiences

A wide range of family medicine training models have been developed and many provide some training within the rural practice setting. These vary from one-month rural experiences to

curriculum models in which all family medicine training is completed within a rural practice setting (Rourke & Rourke, 1995; Fine 1990, Hirsch & Wootton (1990). Most family medicine training programs in Canada have responded to the need for training physicians for rural family practice by incorporating rural experiences (short-term and/or in-depth) into their curriculum. According to Rourke (1988b) the postgraduate educational needs of rural family physicians in Canada could be met by a compact, flexible, integrated training program. It should be possible to integrate most of the training for rural family physicians into a flexible two-year family medicine program with the possible addition of a further six to twelve months of training as needed. Specific training in family medicine should include some time spent in a rural family practice setting, as well as training in emergency medicine and GP anesthesia (e.g., administering epidurals for obstetrics and general anesthesia for elective and emergency operations).

Rourke and Rourke (1995) conducted a survey of all 18 Canadian family medicine programs to examine the status of postgraduate family medicine training in the rural family practice setting. Family medicine training was provided in 18 family medicine training programs as a two-year postgraduate program accredited and leading to certification examination, by the College of Family Physicians of Canada (CFPC). Family medicine training during this two-year program varied from the prescribed minimum of eight months to a maximum of 12 months. Nine of 18 programs offered some family medicine training in a rural practice setting to some or all of their first-year family medicine residents. All programs offered some training in a rural practice to some or all of their second-year residents. In 12 of the 18 programs, a rural family medicine bloc was compulsory and in-depth rural family medicine training blocs ranged from four to 12 months.

In 1999, the College of Family Physicians of Canada (CFPC) reported on the state of postgraduate education for rural practice. Of the approximately 800 residents who graduated from family medicine residency programs in Canada in 1998, about 150 (19%) received training specific to rural practice. The CFPC recommended that all postgraduate programs should include rural and regional community-based rotations and electives. They also suggested that rural family medicine streams should be established and that competency in the knowledge, skills and attitudes for rural family practice should be the goal of rural family medicine training. The key recommendations of the College of Family Physicians of Canada were: to develop rural postgraduate training programs; to provide third-year optional, special and advanced rural family medicine skills training; and to make advanced family medicine skills training competency-based and nationally accredited (Rourke, 2000).

Hutten-Czapski and Thurber (2002) examined the success of Canadian universities in graduating students who enter rural practice. They found that the proportion of Canadian graduates choosing rural practice locations varies among institutions and programs. Significantly associated with rural practice were Memorial University's family practice residency program (46.0%) and the Université Laval family practice program (41.7%). In another study, Gray et al. (1994) reviewed the practice locations of 200 Dalhousie University graduates of primary care residencies between 1987 and 1991. They found that 130 (65.0%) remained in practices in Atlantic Canada, and of these, 57.0% had practices in rural locations. The authors attributed part of this rural practice success to the fact that all first-year trainees were required to spend time in a small community as part of their training. In this study, the site of postgraduate training appeared to be one of the more important factors in the selection of practice locations.

Rosenblatt et al. (2002) examined the extent to which US family practice program directors considered training future rural physicians to be a priority and the location of all scheduled training rotations, including electives. Questionnaires were sent to the 453 civilian family practice residency programs listed in the directory of the American Academy of Family Physicians; 435 of the programs responded, a response rate of 96%. Although 150 (37.2%) of these programs considered training rural physicians to be an important part of their mission, only 2.3% of the training was taking place in rural communities. In total, only 7.5% of family medicine training in the United States was occurring in rural areas, although 22.3% of Americans lived in rural places. Bowman & Penrod (1998) also examined the scope of rural family practice residency programs in the US and assessed the relationship between various program features and the graduation of rural family physicians by different programs. They conducted three annual postal surveys of directors of all US family practice residency programs between 1994 and 1996 and gathered data on programs from the American Academy of Family Physicians. Residencies that graduated the highest percentage of physicians choosing rural practice were those that had more months of required rural and obstetrical training; had a full or partial rural mission; were located in more rural states; emphasized procedural training; had lower proportions of women and or minority students; and provided their own training rather than relying on other specialties.

Family practice residents who train in rural settings often comment on the amount of hands-on time spent in rural hospitals in contrast to the limited exposure available to family medicine residents at large teaching centres (Jong & Beach, 1997). Mugford and Martin (2001) surveyed residents and their GP supervisors concerning the breadth of clinical experience that family medicine residents experienced during rural family practice residencies. The responses suggested that exposure to continuing care was better in the rural sites, the process of acceptance of clinical responsibility was accelerated in the rural environments, and the rural general practice term provided a wider breadth of clinical experience in a well supervised environment. Lebel and Hogg (1993) report that community-based residencies are more likely to produce physicians interested in small-town practice. A questionnaire was mailed to a stratified random sample of all residents training in family medicine in Ontario during 1990-1991. Community trained residents felt they knew the community better, made more house calls, and expected to use allied health professionals more frequently. Residents trained in the community were also more interested in working in smaller communities. In a study of rural physicians in British Columbia, family practice graduates who trained in a rural setting rated themselves 'better prepared' for rural family practice than urban-trained rural physicians (Whiteside & Mathias, 1996).

3.5.2 Rural Family Medicine Training Streams

Contextual learning in the rural family practice setting is a necessary cornerstone of programs for training physicians for rural practice. Rural-based family medicine training programs can provide an excellent contextual learning experience that benefits not only the residents, but the rural teacher and community as well. Recommendations for intensive rural-focused family medicine training programs have been made for some time. Rural family medicine training streams provide the best education for family medicine residents who are planning a career in rural family medicine (Rourke, 1996b). Rourke (1988) recommended that postgraduate training for rural family physicians should include a flexible two-year family medicine program with the addition of 6 to 12 months of training as needed for advanced skills. Hirsch and Wootton (1990) have also advocated the development of

rural training streams that would include more time in rural settings and hospital experience in relevant specialties, such as anesthesia, obstetrics, neonatal intensive care, and intensive care.

Slifkin, Popkin and Dalton (2000) conducted telephone surveys with senior administrators of rural hospitals that offered residency programs in order to assess the importance of medical residents to rural hospitals. The results suggest that rural residency training programs were important to the hospitals and the surrounding community in terms of improvement in recruitment and retention of physicians. Almost 60% of administrators felt that the presence of residents helped to improve staff on-call hours, 72% believed that the residency programs had a positive effect on their hospital's recruitment efforts, and 88% of respondents reported that residents had remained at the hospital as staff physicians after completing their training. The presence of the residency program had also resulted in the recruitment of other staff physicians who had not served as residents, but were attracted by the opportunity to work with residents in the program.

According to Rourke and Rourke (1995), isolation, accommodation and supervision are common problems for rural family medicine residents. Rural training must be facilitative rather than obstructive (Homan, 1994). Accordingly, any social or financial obstacles must be minimized. Rural family medicine training programs must assist trainees with moving expenses, ensure that trainees are fairly remunerated (especially for on-call work), improve access to distance education opportunities, and ensure that reasonable accommodation is available to trainees (Homan, 1994). In Australia, the Faculty of Rural Medicine (FRM), established by the Royal Australian College of General Practitioners (RACGP), is responsible for overseeing and coordinating the development of rural general practice training throughout Australia. It has developed a Rural Training Stream and a detailed curriculum for advanced training which is standard across the country.

Turning to the Unites States, Phillips, Rosenblatt, Schaad and Cullen (1999) examined the rural/urban distribution of the graduates (between 1968 and 1973) of a family physician curricular pathway at the University of Washington. Of the 239 graduates of the family physician pathway, 173 (72.0%) had intended to enter family practice at graduation, and 136 (57.0%) were family physicians two decades later. The proportion of graduates that were in family practice and of graduates serving rural Washington as family physicians was higher than that of a cohort of students who had entered the University of Washington prior to the introduction of the pathway curriculum. Norris & Norris (1988) surveyed 2nd and 3rd year family practice residents (n = 123) who participated in rural rotations offered by the Montana Family Practice Residency Satellite Program. Sixty-six percent of respondents felt their Montana rotation had influenced their choice of practice site and 95% of respondents indicated that their rotation had influenced them to consider rural practice opportunities. Fifty six (56) respondents (69%) were practicing in communities with populations of less than 25,000 and 36 of these 56 were practicing in communities of less than 10,000.

3.5.3 Advanced Skills Training

As we have seen, it is reported that physicians entering rural practice often do not feel prepared in relevant clinical skills and procedures for rural practice, such as anesthesia, obstetrics, surgery, and emergency medicine (World Organisation of Family Doctors 1995; O'Reilly, 1994; Martel, 1995). In 1990, the CFPC conducted a survey of rural family physicians in Canada and one in three respondents reported they did not feel adequately trained for rural practice (Perkin, 1994). Newly

graduating physicians are often choosing not to practice in rural communities because they do not have confidence in their ability to cover rural emergency rooms and offer the required obstetric services (Newbery, 1999). Blackwood and McNab (1991) surveyed active CFPC members living and practicing in rural areas (n=1116). The survey included a number of questions related to respondents' perceptions of how well their postgraduate training had prepared them for rural practice. Approximately thirty-seven percent (37%) felt they were not adequately trained, and at least 20% of physicians felt they were not adequately trained in obstetrics, emergency medicine, anesthesia, and surgery.

In the US, Norris, Coombs and Carline (1996) distributed a needs assessment questionnaire to 1096 family physicians that had finished residency and been in rural practice for at least three years. There were a number of areas in which respondents felt they had received inadequate postgraduate education. These areas included: allergy; rehabilitation medicine; counselling; advanced and operative obstetrics; pediatric trauma care; and nutrition. Tolhurst, McMillan, McInerney and Bernasconi (1999) observed similar results in their survey of the emergency medicine training needs of rural general practitioners (n = 147) in a rural region of Australia. The Australian physicians indicated a number of areas in which further training or 'upskilling' was needed (in order of need):

(1) Pediatric and infant emergencies and procedures;
(2) Airway emergencies and procedures;
(3) Circulatory emergencies and procedures;
(4) Respiratory emergencies and procedures;
(5) Management of neurological emergencies;
(6) Management of drowning and near drowning;
(7) Management of multiple trauma;
(8) Management of toxicological emergencies;
(9) Orthopedic emergencies;
(10) Management of spinal cord injuries.

Rural family practice often encompasses settings in which practice responsibilities may include anesthesia, obstetrics, emergency care, and even surgery (Rourke, 1996). Given the isolation and distance of many rural communities from larger, tertiary-care centres, these hospital-based services are often a necessity. Chiasson and Roy (1995) conducted a study to determine the role of GPs in the delivery of surgical and anesthesia services in rural Western Canada. They found that GPs with limited specialty training were providing the majority of obstetrics, surgical and anesthesia services in rural communities. Henderson, Grzybowski, Thommasen, Berkowitz and Thommasen (2001) also analyzed the procedural skills practiced by British Columbia family physicians/general practitioners and found that 64.0% of general practitioners provided basic obstetrical care to patients. Historically, this has not been an uncommon phenomenon in rural Canada. Iglesias, Strachan, Ko and Jones (1999) used the National Physician Database of the Canadian Institute for Health Information to review both services and demographic information for physicians providing fee-for-service care in rural Canada. In 1995/96, 60.6% of anesthetic services were provided by GP anesthetists, 42.8% of caesarean sections in rural Canada were performed by GP obstetricians, and 35.0% of Canada's rural FPs provided intrapartum maternity care (Iglesias, Strachan, Ko & Jones, 1999).

Physicians with some advanced skills have always provided procedural medical and surgical care in rural communities. Although trained as generalists, many of these rural physicians have supplemented their training to include skill sets from the fields of anesthesia, obstetrics, general surgery and emergency medicine (Kamien & Buttfield, 1990a; Rourke, 1996; Van der Goes, Grzybowski & Thommasen, 1999). How these skill sets have been obtained and how they are to be maintained are areas of particular concern for rural physicians and rural communities. According to Norris (2003) rural physicians who feel more prepared are more likely to remain in their practice sites.

Many rural family physicians are well trained in the knowledge base and the indications for the use of advanced skills. In fact, for many rural physicians, the more procedural nature of rural practice is a source of satisfaction (Watts, 1993; Rourke, 1996). In one study, Iglesias and Thompson (1998) examined patient outcomes in obstetrics, caesarean section, colposcopy, colonoscopy, cardiac stress testing and gastroscopy and observed an identical standard of care for rural generalists and urban specialists. Studies of pregnancies and deliveries in Northern Ontario and Nova Scotia have also reported no difference between perinatal loss rates in rural and urban areas (Joint Working Group, 1998). Woollard and Hays (1993) compared the deliveries conducted by rural GPs with all deliveries conducted in New South Wales and found no evidence that obstetric care was of less-than-acceptable standards. Any concern regarding the provision of high standards of care in advanced procedural skill areas by rural physicians would appear to be unwarranted.

In addition to learning advanced skills in rural family practice office settings, it has been recommended that rural family medicine residents need to experience some small-hospital medicine, including obstetrics, emergency care, anesthesia and surgery (Rourke, 1996). The 2-year family medicine programs in Canada have been criticized for not adequately preparing graduates in the most basic procedures required for rural medicine. Van der Goes et al. (1999) conducted a survey of Canadian family practice residency programs to identify which procedural skills residents were expected to learn. Canadian family practice residency programs were found to have varying expectations of procedural skills for their residents, with obstetric skills listed on fewer than half the lists. O'Connor and Davidson (1992), in a survey of Queen's University graduates, found that at the time of graduation, family medicine residents felt confident in only 6 of 11 emergency medicine procedures. As well, in a survey of family medicine residents at the University of Western Ontario, Speechley, Dickie, Weston and Orr (1993) discovered that self-reported competence in technical skills was lower than that for any other skill measured at the time of graduation. According to Whiteside, Pope and Mathias (1997), family medicine residents in rural training programs in British Columbia also felt under-prepared in several skill areas, including trauma care, fracture care and vacuum extraction.

Rural physicians need to acquire the level of skills, especially in procedural areas, that are necessary for competent, independent practice in rural settings (Craig & Nichols, 1993). The lack of postgraduate and special/advanced skills education has been of particular concern for both practicing and prospective rural doctors. Many practicing family physicians have recognized the need for advanced skills training and have attempted to arrange for it. It is believed that the organization of these programs has been hampered by the extent of cooperation required from specialty training programs (Watts, 1993). Unfortunately, specialty departments and groups have been reluctant to support advanced skills training for family practice residents and to share their skill sets with generalists (Rourke, 1996). It is believed that physician discomfort with certain

procedural skills is one of the reasons why Canada's northern and rural communities are having difficulty attracting and retaining Canadian family practice graduates (Rourke, 1993).

Producing more physicians with the knowledge, skills and attitude for rural family practice will require the collaboration and support of governments, medical schools, medical organizations and rural doctors. According to Iglesias et al. (1998), generalist physicians who provide advanced skills should be trained and assessed to meet national standards. The College of Family Physicians of Canada (1999a) has recommended that all residents entering a postgraduate rural family medicine education stream should have the opportunity to do up to an additional 6 months of training to develop special skills most appropriate to their eventual site of practice. These advanced skills programs should also be accredited, based on both regional and national needs, and include training in general anesthesia, general surgery, and advanced maternity care. The accreditation of such advanced programs requires collaboration between the CFPC and the appropriate specialty committee of the Royal College of Physicians and Surgeons of Canada (RCPSC). Some progress has been made in this regard. In 1982, the CFPC established a certificate of special competence in emergency medicine obtainable by both residency-eligible and practice-eligible routes (Perkin, 1988). Residency-eligible candidates can sit their certification exams after satisfactorily completing one year of emergency medicine training. Practice-eligible candidates are practicing emergency room physicians who have been approved by a committee of the College of Family Physicians of Canada to sit the exams.

The Working Group of the Society of Rural Physicians of Canada (SRPC) in Cooperation with the College of Family Physicians of Canada (CFPC) and the Canadian Anesthesiologists Society (CAS) has recommended that support should be provided for university departments of family medicine and anesthesiology to provide an adequate number of training positions in family practice anesthesiology to meet the needs of rural Canada. Inglis (1995a) has indicated that guidelines proposed by the College of Family Physicians of Canada (CFPC) and the Royal College of Physicians and Surgeons of Canada for training family physicians in resuscitative and surgical techniques have been developed. These guidelines form the basis for surgical training for physicians in rural areas. Similar efforts to develop a curriculum for Advanced Maternity Care skills for rural family practice have also been undertaken by the SRPC, the CFPC and the Society of Obstetricians and Gynecologists of Canada (SOGC) (Klein, 1999). A joint position paper by the SRPC, SOGC and the CFPC has also recommended training for rural practitioners in advanced maternity skills and caesarean section (Iglesias & Hutten-Czapski, 1999). The authors recommend that the disciplines of family medicine and obstetrics and gynecology need to design and deliver formal, accessible training programs for advanced maternity skills, accredited by the CFPC.

The World Organization of Family Doctors (WONCA) produced a policy on rural training in 1995 that called for the development of appropriate training programs in advanced skills. In Australia, training programs for advanced skills have been developed in cooperation with both general practice and specialist colleges (Woollard & Hays, 1993; Hays, 1991). The "Rural Medicine Curriculum Design Project" was established to prepare separate curricula in surgery, anesthesia and obstetrics for use in advanced training within the integrated Rural Training Program of the Faculty of Rural Medicine of the Royal Australian College of General Practitioners (RACGP) (Craig, Nichols & Price, 1993b). This project involved the preparation of comprehensive background papers for each of the three curricula (Price & Prideaux, 1996). Advanced Training Curricula in Surgery, Anaesthetics, and Obstetrics has been introduced and implemented by the RACGP. The

training is based on practical experience, a real-work situation, one-on-one teaching and consultation, and continuous assessment and feedback. The RACGP family medicine program has also formalized a Rural Training Stream to equip graduates with the procedural skills deemed necessary for rural practice. The training stream requires four years of training post-internship, including training in advanced rural skills (Strasser, 1994). During the first two years of training, trainees rotate through hospital terms relevant to their future in rural practice. In the 3rd and 4th years of training the focus is on the acquisition of advanced rural skills (Doolan & Nichols, 1994).

Until recently, there had been no national curriculum standards in Canada for postgraduate education for rural family practice, nor for advanced skills training for rural family medicine (Rourke, 2000). As a result, the CFPC and the SRPC established a Working Group on Postgraduate Education for Rural Family Practice in Canada. Their mandate was to review the current state of postgraduate education for rural practice in Canada and to outline an appropriate curriculum to prepare new family physicians for the challenges of rural practice. The report's recommendations are for competency-based advanced rural family medicine skills training programs, including GP anesthesia, advanced maternity care (including caesarean section), and GP surgery. The length of training for each of these programs is recommended as 6 to 12 months, and they may be accessed as a third year for residents completing their two-year postgraduate rural family medicine education stream, or as re-entry positions for physicians in rural practice.

The performance of procedural skills requires appropriate training and a career-long commitment to critical analysis of performance. What is required is training in procedures that can be performed by rural generalists with good outcomes, and this can only be achieved though appropriate and accredited training programs in a rural setting (Rourke, 1996). Rural family medicine training should also include appropriate hospital rotations to teach hospital skills. Some rural hospitals may lack the case load required for rapid skills acquisition, so a compromise may be necessary for training in secondary level regional hospitals located in larger towns and small cities. This may be of particular interest to such centres. Connor et al. (1994) analyzed the association between rural hospitals' participation in residency training and their subsequent success in physician recruitment and retention. Rural hospitals with residencies were more likely to be successful at recruiting and retaining physicians than were hospitals without residencies.

3.5.4 Postgraduate Medical Education Program Initiatives

Norris (1998) suggests that effective, rural-oriented family medicine education programs have been effective in addressing rural physician shortages through rural training tracks (RTTs) and rural fellowships. This programming format involves the decentralization of the educational process, moving it out of teaching hospitals and into rural family practice sites. Rosenthal et al. (1992) describe a number of residency programs (in Washington, Nebraska, New York, and Kentucky) that have established RTTs in their family practice residencies. The goal of these training programs is to increase the number of residents selecting rural careers. In all of these programs, the RTT site has an established family practice group of at least 4 physicians who serve as primary faculty. In all the programs, the first year of residency takes place in an urban tertiary center and the residents move to their RTT site in the second year. In Washington, each site must also include obstetrics and surgery in its practice and the community site must also have a hospital that maintains obstetric and surgical services, as well as emergency room and critical care services.

Jong and Beach (1997) describe the Northern Family Medicine Education Program (NorFaM) of the Faculty of Medicine of Memorial University of Newfoundland. Based at Melville Hospital in Happy Valley-Goose Bay, Labrador, its mission is to prepare residents in family medicine for rural and northern practice. First-year family medicine residents participate in 28 weeks of NorFaM training, which includes a community family medicine experience in a remote Labrador community. As of 1997, 14 residents had completed the program and 11 were practicing. Of these, six have returned to work in Labrador. The authors suggest that a 3-year rural and northern family medicine program is needed to allow adequate time to acquire the range and depth of knowledge and skills to function competently and confidently as northern family physicians. An additional year would provide more time for training in community development, and additional surgical, obstetrics and gynecology, and anesthesia skills.

The University of Alberta and University of Calgary have also developed a family medicine training program aimed at encouraging residents to take up practice in rural areas (Moores, Woodhead-Lyons & Wilson, 1998). In 1991, the Rural Physician Action Plan (RPAP) was introduced which provided funding for a rural rotation program and third-year special-skills training for family medicine residents. Residents in second year of Family Practice can tailor their training so they spend a majority of the year in rural Alberta. Nine rural sites were also selected and equipped for residency rotations (12 weeks in year one and 20 weeks in year two for each resident). In year three, 24 positions were funded to allow further training in specialties underrepresented in rural Canada (e.g. emergency medicine, general surgery plus obstetrics, psychiatry, geriatrics, palliative care, sports medicine, native health and pediatrics). Much of this training is conducted in regional sites. Rural preceptors are provided with academic appointments, faculty development and financial support. At the University of Alberta the number of family medicine residents doing rural rotations has doubled and the length of experiences in rural practice has increased fourfold (Moores, Woodhead-Lyons & Wilson, 1998). The third-year special skills training for rural practice has also expanded greatly and at least 29 of 49 participants have gone on to enter rural practice. RPAP is coordinated by a committee composed of representatives of the Alberta government, Alberta Medical Association, College of Physicians and Surgeons of Alberta, and the faculties of Medicine at the University of Alberta and the University of Calgary (Chaytors & Spooner, 1998).

Neelands, Geroux, and Maurer (1993) describe the Northwestern Ontario Medical Program (NOMP), a community-based preceptorship program for medical students and residents established in 1972. The goal was to provide medical students and residents with the opportunity to experience health care in a remote setting and in turn, influence the recruitment and retention of physicians to rural and remote communities in Ontario and Canada. Results of the program to date confirm that training in remote settings influences choice of practice location. In 1982, the Department of Family Medicine at the University of British Columbia developed a community-based program that streamed residents into rural, community-based training sites (Whiteside, 1987; Whiteside & Newbery, 1997a). Forty weeks of second-year residency training was organized in a rural setting with community-based faculty members and an additional 10 weeks of elective time was spent in regional hospitals and offices of specialists and family physicians with special skills. Whiteside & Mathias (1996) surveyed graduates from 1982 to 1991 to examine preparedness for rural practice. The survey was also mailed to a random sample of non-program trained rural BC physicians. Rural trained and non-program trained graduates (n=92) were identified for the study. Rural program graduates reported being better prepared in family medicine, community medicine, practice management, and behavioral science. Non-program trained rural physicians considered themselves

better prepared in medical subspecialties such as hematology, nephrology, cardiology, gastroenterology, neurology, and rheumatology. A similar study of graduates between 1981 and 1992 also demonstrated that 50% were practicing in isolated rural locations and an additional 20% in non-metropolitan areas of BC; 90.0% of these graduates felt well prepared to practice in rural locations.

3.5.5 Summary

The literature on postgraduate rural medical education suggests that rural learning experience is a key factor in enhancing the recruitment and retention of physicians in rural family medicine. This parallels the literature in the undergraduate medical education category. Residents experiencing extended exposure to rural practice sites and rural family medicine rotations are more likely to enter, and remain in, rural practice. Residents receiving training experience in rural practice sites have been shown to report a higher level of knowledge and skill in a variety of procedural skill areas than their counterparts who have trained in tertiary sites. Rural training tracks or rural training streams appear to be the most effective formats for exposing students to rural medicine. These programs often encompass extended and continuous training in rural practice sites, and are often combined with training at regional hospitals in various specialty areas related to rural practice. A number of authors have also suggested that advanced procedural skills training programs are also necessary in order to enhance the confidence level of family medicine residents and equip them with the skills to practice in rural communities which are located some distance from tertiary care centres. A number of advanced procedural skills programs have been established in Canada as an optional third-year of training (eg. emergency medicine). Trainees must successfully complete a national examination and are certified by the CFPC for practice in the particular area of training.

3.6 Continuing Medical Education (CME) and Professional Development (PD)

The continuing medical education (CME) and Professional Development (PD) category encompasses literature which focuses on the professional development and CME needs of rural physicians, the challenges and barriers which rural physicians encounter in addressing these needs, and strategies that have been designed to provide outreach and extension programming to rural and remote physicians. The literature suggests that the continuing education and lifelong learning needs of rural physicians are greater than their urban counterparts because of the nature of rural medicine and the demands placed on rural practitioners. Rural family medicine is a demanding and challenging form of medical practice. The rural physician frequently practices in an isolated environment with inadequate resources and limited or distant specialist back-up resources. This isolation necessitates a level of clinical competence beyond that of urban family physicians. As well, the rural physician is often expected to perform a generalist role in every aspect of clinical practice. Because of this, he/she must develop and maintain a special base of knowledge and technical skill in a variety of clinical areas, particularly those related to rural medicine, including: emergency medicine, obstetrics and anesthesia (Rourke, 1988; Woolf, 1991; Kamien & Buttfield, 1990; Gill & Game, 1994).

Several studies have confirmed the existence of the unique and varied CME needs among rural physicians (Rourke, 1988; Woolf, 1991; Kamien & Buttfield, 1990; Gill & Game, 1994). Some studies have also investigated the differences between the rural and urban physician's continuing education needs (Lott, 1995; Rosenthal & Miller, 1982; Woolf, 1991). These studies indicate significant differences in the CME needs of rural and urban medical practitioners. Most of these studies also suggest that these differences are influenced by the nature of medical practice and, in some instances, by the distance of a rural medical practice from major urban areas. The further a rural physician is from an urban area and large urban health care resources, the more knowledgeable and competent he must be in a greater number of clinical areas.

It is no coincidence that rural physicians experience great difficulty participating in, and accessing, continuing medical education. The very factors which characterize rural medicine also present significant barriers for participating in CME activities. Geographic distance contributes to the cost of attending selected CME activities and increases the time required to be away from family and practice. Arranging the necessary locum coverage for their practice and hospital responsibilities also makes “getting away” difficult for rural physicians. These obstacles are of great concern for the rural physician who must maintain his skills in an ever-changing and developing field of medical practice. According to Lott (1996) physicians recognize the need to maintain and enhance professional skills and knowledge, and those who live in isolated geographic areas also realize that they have many obstacles between them and their continuing education goals. These obstacles include distance between themselves and educational resources, time away from practice, and patient coverage concerns. Most rural physicians have less backup and coverage support than their urban counterparts, thus making it more difficult for them to use their time for continuing professional education (Lott, 1996).

A number of authors have suggested that rural physicians perceive their opportunities for participation in traditional CME activity as inadequate (Lott, 1995; Gill & Game, 1994; Rosenthal & Miller, 1982; Woolf, 1991; Rubenstein et al., 1975). As well, Bhatara et al. (1996) have suggested that rural physicians' sense of professional isolation, because of a lack of continuing

education opportunities, contributes to feelings of job dissatisfaction with rural practice. The result of this gap in access to, and participation in, CME is a lack of the peer interaction and educational resources afforded by a large hospital staff and medical school, and an over-dependency on journal review and reading as the main method for addressing many CME needs (Lott, 1995; Rourke, 1988; Woolf, 1991; Gill & Game, 1994).

Our literature search and review uncovered 57 studies that focused on issues related to continuing medical education. The majority of the studies in this category were of an informed opinion design type. Forty-one (71.9%) studies were informed opinion, 15 (26.3%) were descriptive, and 1 (1.8%) was quasi-cohort comparative. None of the studies was of the cohort-comparative study design type.

3.6.1 Continuing Medical Education and Professional Development Needs

In addition to office consultations with patients, house calls, and nursing home visits, many rural physicians are actively involved in obstetric deliveries, emergency department shifts, and anesthesia, to a far greater extent than their urban counterparts. A lack of specialists in rural practice areas also means that rural physicians must often manage more complex and time-consuming patient problems (Rourke, Newbery & Topps, 2000). A number of the studies reviewed in the literature focus on the continuing education needs of rural physicians and how they differ from those of their urban counterparts. According to Strasser (2001) rural practitioners carry a heavier workload, provide a wider range of services, and carry a higher level of clinical responsibility in relative professional isolation as compared to physicians who practice in an urban setting. They practice family medicine, but also provide procedural care, and play an important public health role (Strasser, 2001). Because of this, it has been suggested that they require a more advanced skill set – a specialists' skill set - to meet this level of clinical responsibility (Strasser, 2001; Society of Rural Physicians of Canada, 1999).

A number of authors have recommended greater opportunities for rural physicians to upgrade their skills and if necessary, re-enter training programs to specialize in areas of need for their communities (Barer & Stoddart, 1999). Rural physicians require acute procedural and lifesaving skills, as well as training in key areas such as emergency medicine, obstetrics, anesthesia, surgery, and hospital inpatient management (Rourke, 1988a; Rourke, 1991; Kamien & Buttfield, 1990c; Hoyal, 2000). Rourke (1991) has reported that rural family physicians are, in many instances, involved in the hospital care of their patients and this means that their practice might include working in emergency departments, obstetrics, and administering anesthesia, among other activities. The provision of CME or clinical skills enhancement training that addresses topics such as obstetrics and emergency care is essential for rural physicians who need to acquire or maintain these skills (Kamien & Buttfield, 1990c). They also need special knowledge of aspects of medical care pertinent to their location, which may include aboriginal health care, as well as industrial or agricultural medicine.

The emergency training needs of rural physicians have been examined by several studies. Tolhurst, McMillan, McInerney, and Bernasconi (1999) surveyed 147 general practitioners in New South Wales, Australia to identify their emergency medicine training needs. The key needs identified by the respondents for upskilling included: (1) pediatric and infant emergencies and procedures; (2) airway emergencies and procedures; (3) circulatory emergencies and procedures; (4) respiratory emergencies and procedures; (5) management of neurological emergencies; (6) management of

drowning and near drowning; (7) management of multiple trauma; (8) management of toxicological emergencies; (9) orthopedic emergencies; and (10) management of spinal cord injuries (Tolhurst, McMillan, McInerney, & Bernasconi, 1999). Glazebrook, Chater, and Graham (2001) surveyed rural physicians' needs in the area of radiology and found that chest radiology, film interpretation, and spinal radiology were the highest priority areas for continuing education. Barnabe and Kirk (2002) have also identified palliative care training as being important to rural physicians. They describe the results of a needs assessment which evaluated the educational needs and preferences of physicians practicing in three regional health authorities in southern Manitoba, Canada. Physicians reported their knowledge of symptom management issues as adequate, although for other issues of palliative care such as bereavement, psychosocial aspects of dying, and professional issues, they had less confidence.

In another study from Australia, Wise et al. (1994) identified requirements for vocational training and continuing education programs in rural general practice. The authors suggest that rural physicians should receive basic training in all of the procedural disciplines and skills needed to provide emergency care in communities remote from regional support services. Curran, Hatcher, and Kirby (2000) assessed the differences in the perceived CME clinical learning needs of rural and urban physicians. A needs assessment questionnaire was distributed to all licensed physicians in Newfoundland and Labrador. The study findings indicate that rural physicians had attended a significantly lower number of formal CME programs. Rural physicians also reported a higher need for CME in advanced clinical skills and emergency medicine than urban physicians.

Several studies insist that the continuum of rural practice education and training, previously referred to as a "rural pipeline", should not end after undergraduate or postgraduate training but should continue on to encourage continuing professional development among rural physicians. The Working Party on Training for Rural Practice (1996) recommends the provision of continuing education and professional development programs that meet the identified needs of rural family physicians. Medical schools need to take responsibility for the education of appropriately skilled doctors to meet the needs of their general geographic region, including underserved areas, and should provide regional support for health professionals (Iglesias & Thompson, 1998).

3.6.2 Factors That Influence the Provision of CME and Physician Satisfaction

Unfortunately, there has been an argument that continuing medical education has failed to meet the challenges of rural health care because the current system does not provide adequate academic or peer support for rural physicians (Fickenscher, 1992). Many rural practitioners experience professional isolation from their colleagues because finding opportunities for peer collaboration in rural communities is often difficult (Canadian Association of Interns and Residents, 1992; Kiroff, 1999; Canadian Medical Association, 1992). While CME programs, meetings, and workshops in urban settings are often frequently provided, offerings of similar programs in rural settings are rare or very limited. Rural physicians, many of whom are the sole providers of health care in their communities, simply cannot leave their communities to attend an educational session, regardless of how beneficial it might be to their patients and their practices. Therefore, the time required away from practice to attend urban CME, as well as the travel and associated costs, are significant factors for many physicians (Rourke, 1988a; Rourke, 1994).

Several studies have examined how the concerns and levels of satisfaction of rural physicians are influenced by their access to CME. Blackwood and McNab (1991) surveyed family physicians who were active members of the College of Family Physicians of Canada (CFPC) and who lived and practiced in rural areas (n=1116). There were 582 surveys returned, for a response rate of 78%. Approximately thirty-seven percent (36.8%) of respondents felt they were not adequately trained for rural practice and at least 20% felt they were not adequately trained in obstetrics, emergency medicine, anesthesia, and surgery. Almost forty percent (39.8%) identified CME as an issue of concern and 32.1% felt that local CME initiatives were inadequate. Pathman, Williams, and Konrad (1996) have also found that primary care physicians working in rural areas across the United States were dissatisfied with access to CME.

CME needs to be made more accessible to rural physicians, and a number of strategies have been identified in the literature as ways for medical schools to reach out to communities and facilitate learning experiences for rural physicians. Distance education is a useful method for providing CME to rural physicians (World Organisation of Family Doctors, 1995). It enables them to learn new skills and converse with colleagues via telephone, video, or over the Internet, all without leaving their communities. Kaufman (1990) suggests that it might be useful for medical schools to encourage faculty and residents to provide services and educational outreach to rural communities. This might take the form of expanded community-based CME courses or the provision of consultation services to rural practices. Zollo, Kienzle, Henshaw, Crist, and Wakefield (1999) explore the use of interactive video networks to transmit continuing medical education programming from academic centers to multiple rural hospitals. The delivery of programs via information and communications technologies makes possible the dissemination of new developments; provides current training opportunities for hospital staff and employees; and enhances educational experiences for primary care practitioners through consultations with specialists and virtual attendance at academic grand rounds. The use of such technology has the potential to alleviate some of the isolation felt by rural health care providers and it reduces the costs, travel time, and staff absences associated with distant CME programming (Zollo, Kienzle, Henshaw, Crist, & Wakefield, 1999).

The literature documents several strategies underway in Canada in order to meet the needs of the country's rural physicians. The Rural Advanced Life Support Update Course is designed to improve the knowledge, skills, and confidence of family physicians who manage critically ill and injured patients in rural community hospital emergency departments (Rourke, 1994). The curriculum offers rural family physicians the opportunity to complete several courses including: (1) Advanced Trauma Life Support (ATLS) Update; (2) Pediatric Advanced Life Support (PALS) Update; (3) Advanced Cardiac Life Support (ACLS) Update; and (4) Toxicology Update. The importance of offering courses such as ATLS and ACLS has also been confirmed by other studies (Rourke & Strasser, 1996; Adams, 1998). There is also a Rural Critical Care course that provides training in all the elements required for critical care in rural settings so that rural physicians do not have to take the multiple courses in ACLS, ATLS and PALS. Kingsmill (1997a) describes this initiative and explains that it covers eight hands-on topics including the insertion of chest tubes, paracentesis and peritoneal lavage, pediatric crises, transport, electrocardiography, radiology, central and arterial lines, ventilators and rapid sequence induction.

In 1994, the Department of Family Medicine at UBC established an Enhanced Skills Program for rural doctors. This program was created to meet the needs of primary physicians, especially those

who practice in rural areas, with regards to special skills. Practicing physicians from rural communities are offered the paid opportunity, for up to a year, to train in areas such as psychiatry, anesthesia, surgery, obstetrics, and emergency medicine (Whiteside, 1996; Whiteside & Newbery, 1997a). CME sessions are also offered to isolated communities throughout the province. Each session is one hour long and case-based, and interaction is possible between presenters and participants. Davis and McCracken (2002) highlight a pilot program in Alberta which utilizes videoconferencing for delivering CME. The authors evaluated the use of this methodology as it replaced teleconferences (one hour per week for 22 weeks) and regional conferences for which specialists travel to rural sites. A needs assessment survey was conducted following the pilot program to assess satisfaction and a cost-benefit analysis. The study found that the users preferred videoconferencing to teleconferencing, but preferred the regional conferences to both methodologies.

The Western Australian Center for Rural and Remote Medicine (WACRRM), established in 1990, is attempting to address the inadequate provision of CME for rural physicians (Jackson & Jackson, 1991a). Its initiatives include assisting physicians who want to upgrade their skills by providing them with locums and arranging exchange opportunities between rural and urban physicians. A pilot journal club has also been started with a group of five rural general practitioners. Doolan and Nichols (1994) discuss the establishment of the Directorate of Rural Education and Training. One of its key objectives is the advancement of rural CME, including reskilling opportunities for rural physicians. Another CME initiative taking place in Australia is the Rural Health Education Satellite Network which connects internationally known speakers with a rural GP panel and moderator by satellite link to hundreds of rural hospitals around the country (Rourke & Strasser, 1996).

Rural physicians in the United States have benefited from the establishment of Area Health Education Centres (AHEC) (Whitfield, 1998; Ramsey, Coombs, Hunt, Marshall, Wenrich, 2001; Rhoades, Duffy, Hall, & Voth, 1995). These centres work with the local medical schools to train physicians about ever-changing rural health science trends. They arrange CME courses, maintain learning resource centres and work to strengthen local health care systems in order to further develop the skills of rural physicians. The AHECs and offices of rural health also serve to link communities with health care professionals seeking new locations and advising towns on recruitment. They have also begun exploring how to assist rural physicians by linking them electronically to a videoconferencing system (Ramsey, Coombs, Hunt, Marshall, & Wenrich, 2001).

Rhoades, Duffy, Hall, and Voth (1995) describe some of the CME initiatives of the University of Oklahoma College of Medicine's Office of Continuing Medical Education. Many of its courses are specifically designed to meet the needs of primary care and rural physicians and, when possible, are held outside the state's urban centres. The office is also exploring the use of video and telecommunications technology as another source of programming. Smith, Desch, Simonson, and Kane (1991) describe the Rural Cancer Outreach Program (RCOP) of the Massey Cancer Center Medical College of Virginia. It is a rural cancer education program which provides hands-on training in cancer care and continuing education. The program enables primary care physicians, who practice in rural areas without the support of an oncologist, to acquire enough experience in the management of common cancer-related problems to interact successfully with the urban specialist. This would enable patients to seek and receive care in their own rural communities.
Previous sections have referred to the Minnesota Rural Physician Associate Program (RPAP), an undergraduate program. Verby (1992a) discusses how this undergraduate program also serves as a

form of CME for the state's rural physicians. The RPAP offers undergraduate students the opportunity to study for 9 to 12 months in rural communities. It has been discovered, however, that this program also serves a valuable function for CME. By participating in the program as student mentors, many practicing rural primary care physicians learned new skills and information that either confirmed or updated some of their medical practices and areas of knowledge. They were also able to validate the general quality of medical practice within their communities and to meet their CME requirements. This is a valuable model for CME as it allows rural physicians to obtain onsite, free CME and it eliminates the costs that physicians otherwise incur, by way of fees, income lost, time away from their practices, and inconvenience.

3.6.3 The Impact of CME on Recruitment & Retention

How does the provision of CME influence the recruitment and retention of rural physicians? Rural physicians consistently identify the accessibility of continuing education and professional development opportunities as pertinent to their choice of practice location. The retention of rural physicians is, therefore, related to the development of strategies to meet their personal and professional development needs (Jackson & Jackson, 1991a; Pathman, Williams, & Konrad, 1996). Rourke (1993) discusses the continuous challenge of providing healthcare in underserviced areas. Inaccessible CME, and CME that does not meet their needs, is one of the reasons why physicians leave rural practice. Several factors, therefore, need to be modified to keep physicians in rural communities. They include increased support for CME, such as assistance with reimbursement of travel, accommodation, program costs, provision of locums, and increased time off for study (Rourke, 1993; Adams, 1998). Accessible CME is one way that communities can attract residents to train in and/or experience rural family practice (Blau, 1992).

Several studies suggest that the provision of accessible CME and the provision of locums will help to eliminate, or at least alleviate, the professional isolation of rural physicians and, in turn, will have an impact on recruitment and retention (Anonymous, 1992; Zollo, Kienzle, Henshaw, Crist, & Wakefield, 1999; The Canadian Medical Association, 1992; The Canadian Association of Interns and Residents, 1992). The provision of CME through enhanced telecommunication links shows promise for reducing professional isolation and enhancing lifelong learning opportunities for rural health care providers (Zollo, Kienzle, Henshaw, Crist, & Wakefield, 1999).

3.6.4 Summary

Kamien and Buttfield (1990d) suggests that an important factor in attracting doctors to rural areas and keeping them there is the professional satisfaction they obtain from feeling needed and practicing a highly personalized form of comprehensive care. The level and scope of care provided by rural physicians requires access to ongoing opportunities for knowledge and skill update and enhancement. A main deterrent to rural practice has been identified as professional isolation, including isolation from peers and specialists, as well as from access to opportunities for participation in CME and professional development programs. The scope of practice and the nature of the competencies rural physicians require in order to practice confidently in many rural practice settings necessitates access to opportunities for professional development and CME. In many instances, barriers related to geography, costs, time away form practice and family, travel and lack of locum support present significant challenges. Unfortunately, while the CME literature did suggest that professional isolation, CME and recruitment and retention were related, there was a

paucity of studies which demonstrated an empirical relationship between these factors. Several studies have demonstrated that physicians clearly report a need for CME access and believe that lack of access leads to dissatisfaction with rural practice. Opportunities for CME and advanced procedural skills training and re-training are required. Various programs have established special funding initiatives and arrangements which enable rural physicians to participate in such re-training opportunities without loss of practice income and incurring costs associated with travel and accommodations. It is believed that such programs enhance retention efforts. The use of information and communication technologies to support the CME and professional development needs of rural physicians has also been discussed and presented in the literature as programming options. Several distance learning program initiatives have been successful in enhancing knowledge and skill levels of rural physicians and study findings indicate a high level of satisfaction with such initiatives. Telehealth initiatives that provide opportunities for consultation with peers have also demonstrated some success in addressing professional isolation issues. Further study in all of these areas is required to better understand the impact on rural physician recruitment and retention.

4 Conclusions

This literature review and synthesis clearly demonstrates that the factors influencing the recruitment and retention of physicians for rural practice is complex and multifactorial. The literature also suggests that there is a role for medical education to play in enhancing this recruitment and retention process. Some argue that the medical school has an important commitment to society and rural communities in the preparation of rural physicians. The literature also suggests that this is a commitment that should begin long before students apply, or are admitted, to medical school. The notion of a 'rural pipeline' approach as a strategy for medical schools makes intuitive sense. Unfortunately, there is no specific and clear evidence that supports the idea that the adoption of outreach programs, services and initiatives targeting rural students increases the likelihood that these students will apply or be admitted to medical school or continue on to enter practice in a rural community. Nevertheless, there is clear evidence that students of rural origin with an interest in primary care medicine who are exposed to continuous and systematic experiences in rural primary care settings are more likely to enter rural practice. Therefore, background characteristics, preferences and attitudes towards rural medicine and rural learning experiences would appear to be primary areas in which the medical school may be able to have a clear impact on recruitment and retention efforts.

Rural background has clearly been shown to be an important determinant. Several studies provide evidence that students of rural origin are more likely to enter and stay in rural practice than their urban counterparts. The main challenge however is attracting and encouraging rural students to apply and to pursue a career in medicine. Many rural schools lack access to career counseling, offer fewer options for study in advanced science areas, and provide limited opportunities for extra-curricular activities compared to those of urban schools. The review of the literature highlighted a number of initiatives attempting to foster an interest in medicine among rural students and to increase their chances of succeeding in medical school. However, the majority of the studies were informed opinion or descriptive in nature and, as such, provided little or no evidence of actual impact. Several studies support the need for selective medical school admission policies that give preference to these students. A number of US medical schools have introduced such policies, but absent from the literature are references to any Canadian schools that have established selective admissions policies for rural students. Determining rural background is straightforward, but what about interest in rural practice? There appears to be a need for further research on measures for assessing interest and attitudes towards rural primary care practice.

The effects of rural experiences during undergraduate and postgraduate medical training on graduates' subsequent decision to practice in rural communities have been examined. It has been suggested that exposure to rural medicine curriculum and rural learning experiences are key factors in enhancing recruitment and retention of rural physicians. Some investigators have argued that studies of the relationship between rural-based curriculum and eventual practice location are in fact influenced more by the background characteristics and preferences of the study subjects than by the actual interventions to which they were exposed. Studies have also suggested an association between characteristics of physicians' training and the length of time that those who choose rural practice actually stay in rural settings. Rural learning experiences do appear to have a major role in exposing students to rural practice experiences, enhancing and even countering negative attitudes towards rural medicine. Continuous exposure to such experiences throughout undergraduate and postgraduate education has been suggested. However, there is no clear evidence that demonstrates

what amount or level of rural learning experience is necessary. Opportunities for advanced procedural skills training in the areas of anesthesia, obstetrics, surgery, and emergency medicine are also believed to be important for ensuring rural physicians enter rural practice with the requisite competencies. Various program initiatives in advanced procedural skill training have been introduced in Canada.

A number of countries, governments and universities have introduced special financial initiatives in order to increase physician recruitment. These initiatives are normally available as scholarship, loan forgiveness and bursary programs available for students and residents who wish to pursue rural medical education and rural practice. The National Health Service Corps program in US has been evaluated with mixed results. The program has been successful in recruiting physicians for rural practice, but only with a short-term impact. As soon as their contractual commitment is completed most physicians leave the practice site. Other than these studies, there appears to be little evidence to support the effectiveness of such financial programs in enhancing long-term rural physician recruitment and retention. Crandall, Dwyer and Duncan (1990) have described four conceptual models that underlie physician recruitment and retention programs for rural areas. These include: affinity models, which attempt to recruit rural persons into training or foster interest in rural practice among trainees; economic incentive models, which address reimbursement or payment mechanisms to increase economic rewards for rural practice; practice characteristics models, which address technical, collegial, referral and other structural barriers to rural practice; and indenture models, which recruit temporary providers in exchange for scholarship support, loan forgiveness, or licensure. Of these models, indenture models appear to be the least effective.

A main deterrent to rural practice has been identified as professional isolation, including isolation from peers, specialists, as well as access to opportunities for participation in CME and professional development programs. Unfortunately, while the CME literature does suggest that professional isolation, CME and recruitment and retention were related, there was a paucity of studies demonstrating an empirical relationship between these factors. The use of information and communication technologies to support the CME and professional development needs of rural physicians appears to be a key strategy that was successfully implemented at many sites. There is evidence that distance learning programs in particular are effective in enhancing knowledge and skill levels of rural physicians. There is no evidence reported in the literature reviewed that demonstrated that information and communications technologies, distance education programs or Telehealth initiatives were effective in enhancing recruitment and retention efforts. Further study in all of these areas is required to better understand the impact on rural physician recruitment and retention.

Physician characteristics, training environments, and a rural training curriculum are important factors related to attracting physicians to rural practice locations. Medical education interventions that facilitate rural practice choice include: special admissions programs that select students based on characteristics predictive of rural, primary career choice; medical school curricular efforts such as rural-oriented medical curriculum and rural practice learning experiences; postgraduate rural residency tracks or streams; and advanced procedural skills training programs. Despite the many interventions that have been reported, medical schools on their own cannot solve all of the issues and concerns surrounding the recruitment and retention of rural physicians. The challenges inherent in a sustainable rural healthcare system, including the recruitment and retention of physicians, are complex and multi-factorial. Many of these issues need to be addressed at a broader political level

through measures such as the reform of healthcare, funding assistance and practice arrangements. Nevertheless, the medical school can play a significant role in rural health care by designing and facilitating medical training policies and programs which contribute to recruitment and retention efforts.

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Appendix A:
Study Summaries

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Acosta 2002	Descriptive	Postgraduate Curriculum Interventions	Directors of Family Medicine residency programs in the United States with a rural mission and/or rural track. Response rate was 66%.	Purpose was to review previous studies of the rural practice training being received by Family Medicine residents, as well as some of the strategies being developed to enhance this training. A literature review and survey of American Family Medicine residency programs was conducted. Preliminary results identified 150 programs as having a rural mission; 125 had a rural training track, rural satellite clinic or rural fellowship. While, 64% of the programs provided residents with lectures on rural topics, analysis of the topics covered in curricula indicated limited coverage of many important subjects. In addition, less than ½ of the programs had special library resources.
Adams 1998a	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Focuses on the problems of recruitment and retention in British Columbia and makes some proposals for solutions. Makes several recommendations. (1) Revise undergraduate and postgraduate training, including expanding training in rural locations; (2) Expand graduate training for rural doctors with at least 1 year on procedural skills and mandatory courses in basic life support (ACLS, ATLS, OLS and neonatal resuscitation); (3) Improve quality of life of rural physicians and their families by increasing pay differentials for isolation (40 to 60% instead of the current 5% to 30%, increasing holidays and 3-week skill-study leaves, providing full-time locums; (4) Set a maximum workload of 25 patients/per day.
Adams 1998b	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Purpose was to advocate for more government funding to solve the shortage of rural physicians. Based on the author's experience in a rural hospital in British Columbia. Findings: (1) Advent of urban walk-in clinics and full time emergency physicians has cut into numbers of doctors choosing rural practice; (2) Non-replacement of hard-working older rural physicians; (3) No mandatory training for rural practice exists in Canada, but basis for it in BC exists in the Rural Training Skill Enhancement Program: (4) No basic minimal standards of emergency care exist in many rural hospitals, even basic CPR in many cases; administrators are fixated on utilization management but shockingly indifferent to quality of care issues and training; and (5) Weaknesses of rural hospitals discourages graduating doctors from rural practice.
Al-Turk Susman 1992	Descriptive	Advanced Procedural Skills Training	Mail survey was distributed to 287 family physicians, 22 family practice faculty, and 60 family practice residents in rural and urban Nebraska. The response rate was 45%.	Purpose was to examine what practicing General Practitioners believe to be core procedural skills, how they were trained in them, and their assessment of their own competency in them. Methodology involved a mail survey and 39 procedures were listed. Study findings show that practicing rural physicians were more likely to classify three procedures as essential than their urban counterparts: (1) IUD insertion, (2) endometrial biopsy, (3) and cervical biopsy. Study concludes that educational programs are necessary to address the needs of rural general practitioners.
Anderson, E.A. Bergeron, D. Crouse, B.J. 1994	Descriptive	Other (Practice Location)	31 graduates of family practice residencies in Minnesota, 1990-91 who had chosen non-metropolitan practice locations. 24 consented to be interviewed.	Purpose was to study the factors that influenced family practice residents first practice location. Involved telephone interviews using a combination of closed (asked graduates to rate 13 factors influencing location on a scale of 1-10) open-ended questions. Most residents began looking for sites late in PGY2 or early in PGY3. The number of sites visited: mean = 6.5. Most heard of opportunities first by word of mouth and regarded searches by professional recruiters as a sign of a bad location. Only 3 of 24 were dissatisfied with current practice location and planned to relocate in next 2 years. Factors influencing practice location: quality of partners in practice; call schedule; and opportunities for spouse and children. Salary was not considered important. The study findings show that although large rural communities have seen slightly more physicians choosing them, smaller rural communities are still grossly underserved. This scarcity of physicians is the principal barrier to health care access in small communities. There is a need for services to match residents and practice opportunities.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Anderson Craig 1993	Informed Opinion	CME	N/A	Purpose of the Rural Health Education, Training and Research Network is to support the education and training of rural health practitioners through the optimum use of appropriate information communication technologies. This paper explores the issues and implications of the network for rural health professionals and Australia. A sample of rural health practitioners and stakeholder interest groups were surveyed through workshops, face-to-face interviews and teleconferences to identify the need and requirements for a rural health education, training and research network. The majority of respondents felt the network would be helpful to themselves and their organizations.
Anonymous 2000	Descriptive	Postgraduate Curriculum Interventions	29 programs in the United States that have separately accredited rural tracks in family practice. Response rate: 22 of 29.	Accredited family practice rural training tracks have proved useful in increasing the placement of doctors in rural areas. The study findings show that 136 (76%) of the 179 residents graduated from these programs are practicing in rural communities. The greatest benefit went to the state in which the training occurred (95 of 136 rural practice sites). Findings also show that the impact was felt quickly after a new training program was established, i.e. the rate of rural practice was 88% among programs established within the past 10 years. These results compare favourably to the national average (21%) of family practitioners who are practicing in rural (non-MSA) counties.
Anonymous 1998	Informed Opinion	Advanced Procedural Skills Training	N/A	Detailed summary of May 1998 session of the SRPC focusing on need to train and support rural physicians with advanced skills, especially in obstetrics. Resolutions passed included: (1) that the SRPC commission and publish curriculum papers to define skill sets for anesthesia, general surgery, advanced maternity care and emergency medicine; (2) that the SRPC strike working groups to write these curriculum papers.
Anonymous 1997	Informed Opinion	Other (Recruitment and Retention Factors)	N/A	Purpose was to examine the success and failure of various types of initiatives used to recruit and retain doctors in rural areas and to examine the available evidence supporting their use. This was discussed at a one-day conference of the annual meeting of the Society of Rural Physicians of Canada. The group was unable to come up with any specific recommendations on how to manage and implement a rural health care strategy, but the group did identify several areas that need to be addressed. Concluded that any plan to solve the problem of the recruitment and retention of rural physicians must be comprehensive, flexible, and amenable to implementation according to each province and territory's focus. It must also outline the range of services that will be needed in all areas of rural medicine and address the quality of access to good health care by rural residents. The need for financial recognition, reasonable call schedules, quality education aimed at the needs of rural medicine, and support for rural physicians in both their private and professional lives must be met to solve the chronic problems of recruitment and retention of Canada's rural physicians.
Anonymous-Primary Care Task Force 1992	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Presents an overview of recommendations from the primary care task force related to ways to enhance the recruitment and retention of primary care practitioners in rural and underserved communities in the United States. The recommendations are grouped into a number of thematic areas including: the medical school mission; admissions policies; medical school curriculum; residency training; and the practice environment. Student characteristics that appear to be associated with the choice of a primary care career and the probability of practicing in an underserved area include the size is community where the physicians grew up, age at entry to medical school, and gender. Also associated with choice of primary care specialty are the presence of positive primary care role models, required family practice clerkships, and community-based clinical experiences. Income levels, isolation, as well as inequitable reimbursement are other factors which may also influence retention.
Azer Simmons	Descriptive	Pre-medicine	100 first-year medical students at the University of Melbourne.	Examined the connection between rural background of medical students and their interest in rural practice. Methodology involved the distribution of a survey. Study findings show a strong correlation

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Elliot 2001		Admissions	Response rate: 97%.	between rural background and a desire to do rural internship (86% of rural students vs. 30% urban), as well as between rural background and intention to practice in rural site (100%). There were some interesting differences observed between rural and urban students in their answers on what factors might interfere with acceptance of a rural position. Rural students emphasized spouse's needs and schooling for kids while urban students emphasized personal factors, educational opportunities and social/cultural facilities. Concludes that medical school admissions need to include points for rural background and educational effort. Career information sessions are necessary in rural schools.
Baker Dalton Walker 2003	Descriptive	Undergraduate Curriculum Interventions	- 64 rural GP-preceptors and 76 urban GP-preceptors - 64 final year medical students	This study described a tripartite approach to educational skills development among rural GP-preceptors in Australia. The program, called POPPIES (Preceptor Onsite Preparation Program for Information Education and Support) had three elements: (1) Undergraduate teaching evaluation: Preceptors were assessed by medical students. Overall, the results were positive. On a scale of 1 - 10, the median scores ranged between 9 and 10. These positive comments related to items such as support, teaching, feedback. However, there were also lower scores received for some criteria which means that some students did not receive the proper rural experience from their preceptors. (2) Rural GP-preceptor needs assessment: Approximately half of the preceptors felt their role as a teacher and assessor was undefined. They wanted more academic support and an increased focus in the curriculum to accommodate specific rural health issues. (3) Interdisciplinary workshops for undergraduate preceptors, based on the above research findings.
Baldwin 1999	Descriptive	Admissions Undergraduate Curriculum Interventions	Appalachia, USA	Examines the creation of the Pikeville College School of Osteopathic Medicine (PCSOM), a new medical school in Eastern Kentucky dedicated to producing rural physicians. The school opened in 1997 with 60 students. Curriculum focuses on primary care and gives admission preference to applicants from eastern Kentucky, rural Appalachia and other rural areas. The program (Doctor of Osteopathy) involves 4 years of study and 3 years of residency. All Y1 and Y2 clerkships and 60% of Y3 and Y4 rotations will be with primary care practitioners. Article also discusses the use of visa waivers for foreign physicians and telemedicine.
Baldwin Hart West Norris Gore Schneeweiss 1995	Comparative - Cohort	Postgraduate Curriculum Interventions	597 graduates who completed their residencies in the University of Washington Family Medicine Residency Network between 1973 and 1990. 503 responded to the questionnaire, for a response rate of 84%. However, 13 of these cases were excluded from analysis as 8 were not practicing at the time of the survey and 5 were practicing outside the US. This left 490 surveys for analysis.	Describes how graduates who practice in rural locations differ from their urban counterparts in demographic characteristics, practice organization, practice content, scope of services and satisfaction. The study design involved a 27-item questionnaire. Three mailings were performed within a 7 month period. The study findings show that 27% of graduates nationwide were practicing in rural counties; 73% in urban counties. Nearly all rural graduates were in private practice while urban graduates practiced in a much broader range of practice settings. The patient care workload of those working in rural areas was substantially higher than that of urban graduates and graduates in rural practice personally performed a much broader range of procedures than graduates in urban practice. Implications for residency training programs: (1) should include practice management issues as many rural physicians are in solo practice; (2) adequate training in a broad scope of procedures and inpatient care; (3) continued development of rural training track residencies in which residents enter into partnerships with rural physicians and their community hospitals. Also notes that the lower number of female physicians choosing rural practice is of concern, especially because the proportion of women in medical school is rising. The emphasis on solo practice and the longer hours of rural physicians act as deterrents to many women who seek more flexible practice arrangements. Rural communities and hospitals need to be aware of these issues and develop flexible practice opportunities.
Barer Stoddart 1999	Informed Opinion	Pre-medicine Admissions	N/A	This paper discusses a number of policy recommendations concerning means for addressing physician maldistribution in Canada. Among the recommendations: increased use of non-physician personnel working with regional physician consultants; new training programs for these non-physician personnel improving science programs and counseling in rural area high schools; reserving medical school places

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
		Financial Undergraduate Curriculum Interventions CME Advanced Skills Training		for qualified applicants willing to commit to rural practice; revising medical school admissions criteria enhancing rural exposure in both undergraduate and postgraduate MD training; developing new residency programs to prepare rural regional consultants; introducing or increasing financial incentives of various types; providing clinical decision-making support networks and regular relief; providing amenity packages that include benefits for spouses and children; and encouraging alternative remuneration methods. In terms of the role of medical education the authors identify a number of strategies that might be introduced: (1) focus on recruiting/admitting medical students from rural or remote areas, and from Aboriginal groups; (2) positive promotion rural practice generally within medical schools and curriculum modification to reinforce this; (3) exposure of medical undergraduates to rural/remote practice settings, the challenges and rewards of those settings, and the special needs of rural/remote communities; (4) similar exposures for medical residents, including extended periods of experience with rural/remote preceptors; (5) extended opportunities for practicing physicians for skills upgrading/continuing education appropriate to rural/remote practice; and (6) opportunities for existing physicians to re-enter training to specialize in areas of need in rural/remote areas. The report also discusses policy recommendations surrounding: FMGs, modification of licensure process, and national return-of-service programs.
Barer Stoddart 1992	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	There are serious problems with the geographic distribution of physicians in Canada. Specific concerns include lack of specialty services in rural areas and oversupply of general or family practitioners in many cities. Not only are specialists not close at hand, but residents of smaller communities receive far fewer of their services. Equal population physician ratios for all regions and all types of physicians are not appropriate objectives for physician resource policy because of the spatial distribution of populations and the incidence and prevalence of illnesses requiring the attention of different specialties. Nevertheless, access to necessary clinical services that is equitable or reasonable for all Canadians is an appropriate objective for public policy and more in mind with the spirit foundations of universal medical insurance. Income and specialty are not the only motivating force for establishing practice in a certain community or location. The initial location decision depends on such factors as the students' background, the life experiences of students before entering medical school, influences and exposures during medical education, relative incomes and various lifestyle factors. The influences during medical education include location of training sites, exposure to rural practice during training, generalist curricular content and perceived prestige and promotion of different specialties and practice arrangements within the medical school. The discussion of maldistribution suggests five kinds of causes: sources and selection of medical students, educational exposures and influences, and financial, professional lifestyle and personal lifestyle considerations. A systematic, coordinated initiative aimed at the whole physician lifecycle may be warranted. Aspects of such an initiative might include: science enrichment programs for rural high schools; career counselling for rural high schools students; the reservation of seats in medical school for qualified applicants interested in practicing in rural areas through arrangements for return for service after graduation; the restructuring of medical admissions criteria so that factors other than pure excellence in traditional premedical science courses are given more weight or so that extra weight is given to students from rural areas; the restructuring of undergraduate medical education, particularly in third and fourth years, to inject more exposure to community and ambulatory practice and to cover issues of broader determinants of population health; the provision of more rural clinical sites in family practice programs through the inclusion of more clinical faculty members from rural areas; the enhancement of rural exposure and the development of rotations tailored to rural practice; the development of compulsory rural rotations and more community-based exposure; the development of new residency training programs designed explicitly to prepare generalist specialists to serve as rural regional consultants; income incentives to encourage practice location in non urban settings; various

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				other incentives and initiatives to attract and retain positions in rural areas; academic medical centers as the hub of on-call, clinical decision making support networks and his sources of locum and on-call relief for rural community physicians.
Barnabe Kirk 2002	Descriptive	CME	134 practitioners Response rate: 78 (61.9%).	There is a need to improve the effectiveness of palliative care delivery in rural areas. This paper describes the results of a needs assessment which evaluated the educational needs and preferences of physicians practicing in three regional health authorities in southern Manitoba. Semi-structured interviews with healthcare workers in 7 rural communities were also conducted. A majority of physicians reported palliative care to be important in their practice. Physicians reported adequate knowledge of symptom management issues, although for other issues of palliative care such as bereavement, psychosocial aspects of dying, and professional issues, they have less confidence.
Barry 1995	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	This editorial supports the needs for more advanced skills training for general practitioners in Canada, Funding and opportunities for training in surgery, anesthesia, and obstetrics must be made available to general practitioners to ensure there is a continued supply of physicians prepared to meet the demands of small communities.
Basco et al. 1998	Comparative – Cross-sectional	Admissions	125 medical schools; 95% of unidentified number of students	Purpose was to see if certain features of admissions processes led to admission of more students interested in primary care and rural practice. Study design involved a cross-sectional, secondary analysis of AAMC databases on schools and students. The study findings indicate that the factors increasing level of rural interest among admitted students were: (1) having 25% or more generalists on admissions committee; (2) a preferential admissions policy; (3) premedical recruitment activities; (4) public university rather than private. A multivariate analysis controlling for admission practice and type of status of school, showed that premedical recruitment activity and public ownership were important correlates of interest in primary care and that premedical activity and public ownership were correlated with interest in rural practice.
Baxley Manson Halford Jones 1992	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Purpose was to describe a recently introduced and successful family practice satellite rotation in a South Carolina small town. The program works both for patients who got a new facility with new doctors and for trainees who get to see real rural practice, get mentorship from established physicians and get to learn about various specialized roles such as family counselling interviews.
Beaton 1994	Informed Opinion	Other (Aboriginal Health Issues)	N/A	Aboriginal people and Torres Strait Islanders in Australia have long recognized that the Western approach to health care is not appropriate for their people. The most appropriate way to deliver health care is in the holistic terms familiar to the Aboriginal people themselves. The challenge for the medical profession is to therefore develop a new philosophy of care that allows for an understanding of the politics and cultural issues associated with Aboriginal health issues. There have been some attempts to meet this challenge. In 1971, an Aboriginal community-controlled health service was created. In 1991, at the First National Rural Health Conference in Toowomba a workshop on Aboriginal and Torres Strait Islander health called attention to education and training for Aboriginal and non-Aboriginal professionals. A task force on Aboriginal health was established in 1992.
Birks Green 1999	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural	N/A	Key obstacle to getting graduates to take up rural practice is attitudes of urban surgeons to rural general surgery. Purpose of this paper was to comment on Kiroff (1999) who described the Rural Surgical Training Program at Latrobe, Victoria & Atherton, Queensland. The program has a flexible design to accommodate practice intentions of students. It is an integral part of a broader General

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
		Skills Training CME		Surgical Training Program, with the same exam and a single final Fellowship in general surgery. However, they disagreed with Kiroff who stated that the rural program must be separate.
Blackwood McNab 1991	Descriptive	Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	Active CFPC members living and practicing in rural areas (N=1116). Of this number, 17 surveys were returned address unknown and 279 people replied indicating that they did not define themselves as rural physicians. Response rate: 582 (78%).	Purpose was to gather information on the specific concerns of rural family physicians. The study design involved administering a survey - questionnaire. The study findings indicate that 62.3% felt they were adequately trained for rural practice; 36.8% felt they were not adequately trained. In addition, at least 20% of physicians felt they were not adequately trained in obstetrics, emergency medicine, anesthesia, and surgery. Other findings show that: 63.2% were satisfied with their access to CME; 11.8% were not satisfied. With respect to local CM initiatives, 32.1% felt they were not adequate; 82.3% of physician stated they were satisfied with rural life; only 3.6% were dissatisfied; 64.3% indicated that their spouse had a substantial influence on their decision to practice in a rural area; 52.6% noted that their spouses had been able to find suitable employment; 55.3% felt that the financial rewards of rural practice were adequate; 44.7% did not; Issues of concern for rural physicians included stress (46.9%), practice coverage (45.1%), CME (39.8%), preparation for practice (37.2%).
Blau 1992	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	This article discusses the maldistribution of physicians in rural areas and the rural/remote experiences of trainees. Addresses two questions: (1) What minimal standards must be met to train residents in a given rural or remote site? (2) What other means can be used to attract residents to train in and/or experience rural family practice? Minimal standards identified include: teaching on par with non-rural rotations; evaluation of site and preceptor made available to residents prior to their choice of rotation; resident's option to select a preferred community; the availability of sites which are suitable to partners/families of residents; and reimbursement of travel costs and accommodation. Means to attract residents include: early exposure to rural practice (undergraduate exposure to rural practitioner role models; options for summer work and electives in rural practice; reserved positions for students originating from rural settings); rural recruitment seminars; and accessible CME.
Blondell Norris Coombs 1992	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Rural individuals have more chronic disease, are in poorer health, experience more injuries and perceive themselves to be less healthy than their urban counterparts. Yet, they have fewer health care resources. Rural culture, educational resources, transportation availability and employment opportunities influence the health status of rural populations. To be maximally effective, any strategy to improve health status of rural individuals must consider all of these factors. Between 1972 and 1980 the U.S. federal government invested $126 million in the Area Health Education Centers (AHEC). Overall, it appears that integrated multiple strategies have a better chance of success in attracting and retaining health professionals in rural areas. Potential rural family physicians may be cultivated by nurturing health career interests among rural elementary and secondary school students, and selectively admitting these students to medical school. Decentralized education also appears to be an important strategy to counter the urban and specialty biases of medical school.
Blondell Smith Byrne Higgins 1989	Descriptive	Postgraduate Curriculum Interventions	AHEC project program directors (N=38) and non-military family practice residency program directors (N=370) in the US Response rates: - 293 (79%) of family practice residency program directors - 38 (100%) of AHEC project program directors.	Purpose was to determine the nature and extent of the interaction between the National Area Health Education Center (AHEC) Program and the family practice specialty. Study design involved the mail-out of a one-page questionnaire. Follow-up was done via telephone. Study findings suggest that there were no significant associations of program type or location with program policy regarding rural practice rotations for residents. Programs in AHEC states were no more likely to require rural rotations than programs located in non-AHEC states (30% vs. 35% respectively). Of the 167 residences located in states with active rural AHEC projects only 15 of them made use of AHEC resources for residency rural rotations. Finally, 22 of 38 AHEC projects are active in rural areas. 14 of these (64%) interact with family practice residency programs.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Blue et al. 2001	Descriptive	Undergraduate Curriculum Interventions	N/A	Purpose was to describe Y3 mandatory, 4-week rural clerkship program introduced in 1999 by the Medical University of South Carolina College of Medicine and the University of South Carolina School of Medicine. The program is offered 12 times per year, with approximately 18 students per month. Students assigned to a primary care practice in an underserved rural community with 80% of time devoted to patients, 20% to community oriented primary care activities. All sites are primary care practices with interdisciplinary team of various professions; all have Internet access and adequate number of patients. Preceptors get faculty development program preparation. Clinical activities include office visits, home visits, and an assignment involving at least one patient with a chronic condition not under control. Clerkship ends with a wrap-up evaluation session.
Booth Lawrance 2001	Descriptive	CME	900 Australian rural general practitioners. Response rate: 706 returned	Purpose was to report on a national needs assessment study of rural Australian GPs for CME and Quality Assurance programs conducted for the RACGP (Royal Australian College of General Physicians). Study design involved a postal survey. Sample stratified by gender, size of community, length of experience, and state. This was the fourth stage of the study design. The previous three included networking with stakeholders and a literature review, focus groups, and structured qualitative interviews. The study findings indicate that only 73.4% of respondents considered themselves as rural or remote. Practice management skills were ranked highly, as well as public and community health. Also ranked highly were medical journals and CME around clinical guidelines. Interestingly, subjects of perceived priority for CME emerged in different order in this survey compared to earlier surveys. i.e. low rating of advanced procedural skills. It was not possible to identify a nation-wide set of preferences for contents and methods. Rather, preferences in topics and delivery methods need clarification at local level.
Boulger 1991	Comparative - Cohort	Admissions Undergraduate Curriculum Interventions	9 year study of graduates of University of Minnesota (Deluth), 1976-1990.	Purpose was to review the success of the University of Minnesota (Duluth) program for training family practitioners. Program provides Y1 and Y2 training. Students then transfer to University of Minnesota (Minneapolis). Y1 involves assignment of each student to a Family Practice Preceptor who practices within 30 miles of Duluth. They have 10 meetings per year and focus on personal interaction, re: the human aspects of family practice. The Y2 program involves 13-day visit per quarter to a rural family physicians with whom student lives for maximum exposure to lifestyle and practice patterns. The program also involves 4 small-group evaluation meetings with program director plus workshops for preceptors. Preceptors are offered clinical appointments in faculty; all services and accommodations are donated by preceptors. Study design involved comparing graduates to their national cohorts. The study findings show that the program is very successful. An average 52% of its graduates have gone on to select family practice residencies, as compared to the national averages of 10-14% over an 18 year period. In addition, graduates also tend to select rural practices more often than the national average (41% in communities under 20,000 and 59.6% under 50,000).
Bowman 2003	Informed Opinion	Pre-Medicine Financial Admissions Undergraduate Curriculum Interventions	N/A	Paper arose from a legislative effort to document the expenditures of the state regarding health education. The authors describe how its content can help others assess the state of health education in their areas and identify areas of strength and weakness. Some suggestion for how to improve upon the state of medical education: (1) Consider all levels of preparation and training (i.e. pre-med, undergraduate, postgraduate, etc.). Successful interventions should be continuous, concurrent, and coordinated. It is important to target trainees at each year of training to keep them in the "rural pipeline"; (2) Better admission screening to identify likely candidates with an interest in rural practice (i.e. those who come from rural backgrounds); and (3) Do not ignore the personal influences (i.e. family, spouse) on career choice.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
		Postgraduate Curriculum Interventions		
Bowman 1996	Informed Opinion	Pre-medicine Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Having a specific rural mission is key. The best current predictor of practice location is combination of rural background plus a family medicine interest. Rural experience during undergrad or grad studies important determinant but too few FP residencies have required rural rotation and those that exist or often too short, too generalized and too late in curriculum. The most successful programs emphasize continuous approach, beginning early in pre-medicine and continuing through to financial incentives at end. Procedural skills training are important. In addition, communities and health organizations need to adapt schedules to family requirements of doctors, especially female. Recommendations include producing a strategy in collaboration with governments and med schools and community organizations; longer rural training experiences need in residency programs; and encouraging the creation of residency programs in smaller towns
Bowman Penrod 1998	Descriptive	Postgraduate Curriculum Interventions	353 US family practice residency programs	Purpose was to examine current scope of rural family practice residency programs and to assess relationship between various features and the graduation of rural family physicians by different programs. Study design involved the distribution of 3 annual postal surveys to directors of all US family practice residency programs, 1994-96; plus data gathering on programs from American Academy of Family Physicians and census data. The study findings showed that residencies that graduate the highest percentage of physicians choosing rural practice sites are those that: had more months of required rural and obstetrical training; had a full or partial rural mission; were located in more rural states; emphasized procedural training; designated their program director as the rural contact; had lower % of women or minority students; and did their own training rather than relying on other specialties. There is a recent decrease in number of graduates choosing rural practice locations despite increasing number of students doing rural residencies suggest content of programs needs attention. The strong explanatory influence of length of rural training suggests longer rural stays are important.
Brazeau Potts Hickner 1990	Comparative - Cohort	Undergraduate Curriculum Interventions	28 study group 57 control group	Michigan State University established the Upper Peninsula (UP) medical education program in 1974 to improve physician supply in rural areas of Michigan by training students in rural, practice-based settings. 28 graduates of the UP program were surveyed by mail and their responses compared to a random sample of non UP program graduates with regards to practice location, specialty choice, hometown, and medical education and training. UP graduates showed a tendency to rural origin and chose rural practice and primary-care specialties, especially family practice, more often than their non UP colleagues. In recent years, the number of candidates for admission to US medical schools has decreased and those students currently enrolled tend to avoid choosing primary-care specialties. Medical educators have suggested that to reverse this trend, students must be trained in environments which encourage and foster primary care training. Such training programs should include clerkships in the ambulatory setting taught by primary care preceptors in non urban areas. Many studies regarding physician practice location have concluded that the size of the community of origin in childhood has significant bearing on the type of community which a physician chooses to practice. The practice of preferentially admitting students from rural areas to UP program remains an important factor in inducing graduates to return to rural areas.
Bridges	Descriptive	Postgraduate Curriculum	2nd year residents in Psychiatry	Describes a psychiatric residency training program developed through collaboration between a rural

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
1994		Interventions	at the University of North Carolina School of Medicine. Between 3 to 5 residents participated each year in the program.	four-county area mental health program, a medical school dept. of psychiatry and a state agency. Residents spent one day a week, for one year, at the training site. A preliminary assessment of the primary mission of the program (to increase the number of psychiatrists choosing to work in community sites) was completed. Key findings: 7 of 10 residents who participated in the program between 1984 and 1991 have spent or are spending significant amounts of time in public-sector work. 6 of these residents work in sites that serve at least a partly rural population; the program has not been successful in attracting psychiatrists to reside in rural communities. In that regard, the author speculated that psychiatrists who have been introduced to practice in rural areas during training may be more readily enticed by incentives to commute.
Britt Miles Bridges-Webb Neary Charles Traynor 1993	Descriptive	Other (Characteristics of Rural Practice)	231 general practitioners (177 country, 54 metropolitan).	The purpose of this study was to provide a description of country general practice in Australia and to determine the extent to which they differ in terms of the characteristics of the practitioners, the morbidity managed, the treatments provided, and the availability of support services. The study design involved the use of a survey which required the sample of GPs to record the details of all direct and indirect patients encounters on encounter forms. Each GP recorded for two one-week periods separated by an interval of 6 months, recorded between October 1990 and October 1991. The study findings indicate that: country GPs were less likely to be female; GPs in small (<5000) and medium country towns (5000-15000) were more likely than those in large towns (>15,000) to report performing procedural work, the largest difference being in the area of emergency surgery; and that country GPs reported significantly more encounters per week than metropolitan GPs (153 compared with 116). There is no one entity that is "country general practice". Its characteristics can vary greatly depending on the size and remoteness of the population that its GP serves. GPs working in large country towns in some ways, for example, have more in common with metropolitan GPs than with their counterparts in small and medium country towns. Similarities can be seen in terms of proximity to large hospitals and the availability of the services of medical specialists. On the other hand, GPs in large country towns differ from metropolitan GPS in that they recorded more encounters per week for example.
Brooks 1994	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Inadequate training is seen as the main reason for the maldistribution of physicians in Australia. Australian medical schools produce well-trained graduates, but they lack the special training, skills and confidence to undertake rural practice. The National Rural Health Strategy (NRHS) was developed to relieve this shortage by improving medical training. NRHS says medical schools need to recruit more students from rural areas, teach more about rural medicine in undergraduate and postgraduate courses, and provide more training time with rural practitioners. Rural doctors need broader skills under urban colleagues. Communities also have to find ways to better integrate doctors and their families. Fellowship schemes to allow rural doctors to update and extend their skills are also needed.
Brooks 1991	Descriptive	Other (Career Choice)	165 graduating students Response rate: 105 (63.6%) responded to both surveys.	Examines the influences of medical school clinical experiences on student career preferences, as well as the type of practice setting and type of community in which they might practice, and likelihood of practicing in a medically underserved area. The study design involved the analysis of students' pre- and post-clerkship questionnaires. The study findings show significant changes in career plans; away from primary care and towards the surgical specialties and away from small communities in favour of larger centres.
Brooks et al. 2002	Comparative – Systematic Review	Pre-medicine Undergraduate Curriculum Interventions	N/A	Purpose was to review 21 quantitative studies (1990-2000). Studies were classified by whether they assesses factors related to pre-medicine, medicine or residency; studies scored formally out of 60 on six criteria (study design, study population, response rate, years studied, data source and stats methods). The findings indicate that the factors most strongly correlated with recruitment were pre-med factors such as rural upbringing and specialty preference. The factors most strongly associated

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
		Postgraduate Curriculum Interventions		with retention were training factors such as commitment to rural curricula and rotations, especially during residency. Both nature (i.e. selecting the right students) and nurture (i.e. giving them the right experiences during training) are important.
Brown Schradie Bader 1990	Descriptive	Undergraduate Curriculum Interventions	N/A	This article describes the Rural Health Elective at the Duke University School of Medicine. Students participate in 3 activities: 1. The group of students is responsible for scheduling students and preceptors, orient and train other student volunteers, record laboratory work each month and communicate the results to patients, follow-up any needed patient referrals, and inventory and restock the needed medical supplies. 2. The seminar series to learn more about the history and social demographics of rural North Carolina, to understand the health barriers to health care and introduce the concept of community organization. 3. Each student plans and implements a rural health project. At this early stage it was not possible to measure the impact of this project in addressing the health problems in North Carolina's rural areas and the influence on medical education.
Bruce 1990a	Informed Opinion	Undergraduate Curriculum Interventions	N/A	This paper identifies a number of policy recommendations about selective recruitment, early professional socialization, curricular reform, and the types of technical assistance that academic centers might provide to rural practitioners. Some of the options to improve recruitment of individuals with rural backgrounds include: (1) develop special affiliations with colleges that tend to have large numbers of rural students; (2) work with rural alumni in setting up junior and middle school health career clubs; (3) organize a special admissions track (rural affirmative action); (4) give special attention to rural disadvantaged student candidates; (5) work toward a large number of primary care/rural practice scholarships and loans. Another key to success is providing effective role models with students early in educational programming and maintaining that relationship over time. Options include: (1) sensitize faculty and staff to rural values and needs; (2) appoint the best primary care teachers (without rural bias) to lead freshman courses in introductory medicine; (3) orient students themselves to the school's rural interest/goals; (4) develop early rural preceptorship experiences; (5) provide environmental reminders such as rural recruitment fears, rural practice exhibits, invited rural speakers; (6) organize student primary care clubs; (7) assist students to volunteer time to provide rural or other needed health services. Ideas for curricular reform include: (1) use rural problems and clinical experiences during the early medical school; (2) modify the physical diagnosis class to include health risk as part of every clinical assessment; (3) develop a primary care clinical track; (4) emphasize an ambulatory setting for learning, preferably in community sites; (5) provide training in community or population relevant problems with some meaningful experiences early in the medical school years; (6) provide options or develop requirements for rural research; (7) organize rural elective program options; (8) expand the number of primary care residency programs with a connection to rural health care (9) develop joint programs of primary care with such schools as nursing and pharmacy.
Bruce 1990b	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Review of recent efforts to orient medical students away from choice of sub-specialization towards primary care. The study design involved a literature review. The findings indicate that various approaches work somewhat; key is admitting students predisposed to choose primary and rural care and then to give them early encouragement and training.
Buske Yager Adams Marcus Lefebvre	Informed Opinion	Other (Recruitment and Retention Factors)	N/A	Discusses the development of a national framework of rurality, developed on the basis of feedback from rural Canadian physicians to the January 1999 "Canadian Medical Association Survey on Rural Medical Practice in Canada". Consists of factors that most define a community as rural/remote, as selected by survey respondents. This framework may be useful for physician recruitment and retention initiatives.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
1999				
Canadian Association of Interns and Residents 1992	Informed Opinion	Financial Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Purpose was to discuss the recruitment and retention of physicians to rural areas. The traditional government response to the lack of physicians in rural areas has focused mainly on financial incentives/disincentives and the restrictions on physicians to practice in certain locations. This, however, does not deal adequately with the problem. The approach to maldistribution of physicians in rural areas must be multi-dimensional and broadly based and address issues such as training and education (i.e. admissions policies that consider features of applicants who have a greater likelihood of entering remote practice; teaching staff with training in rural practice), professional isolation (i.e. provision of more CME), family issues (i.e. enhance opportunities for spouses), and financial incentives (i.e. provide some compensation for the many problems related to isolation which are difficult to solve).
Canadian Medical Association 1992	Informed Opinion	Pre-medicine Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Purpose was to outline the nature and extent of deficiencies in the provision of medical services in under services regions in Canada, the factors that contribute to these deficiencies, and possible strategies to help resolve them. Deficiencies include: shortages of both primary care physicians and specialists in rural areas; problem, at least for family physicians, relates more to retention rather than recruitment; lack of exposure to rural practice during postgraduate training for specialty disciplines; and professional isolation. Some possible strategies: (1) Incentive programs. Continue programs already in place to entice physicians to rural areas, but extend them for retaining physicians in these areas; (2) medical schools need to provide more training in rural practice; (3) creation of regional groupings of physicians to provide services and professional support. Communities need to plan ahead and consider retention issues in advance and must be involved in the recruitment of physicians.
Canadian Medical Association 1989	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	The 1988 CMA report on anesthesia training for general practitioners/family physicians outlined recommendations about the provision of anesthesia services, the educational process for the family practitioner anesthetist, including educational objectives, as well as comments on continued medical education and maintenance of competence. Family practitioner and anesthesia training should take place in university programs and facilities accredited by RCPSC. The training program for the family practitioner anesthetist should include a minimum of 12 months of core anesthesia related training.
Carlton Weston 1997	Descriptive	Undergraduate Curriculum Interventions	N/A	Purpose was to describe the changes which have been made to the education of students in medicine, nursing, pharmacy, and dentistry in the University System of West Virginia. A primary-care, community-based academic system was established which involves the 7 health professional schools, 13 consortia of communities located in the 42 counties designated Underserved Health Professions Service Areas, and 5 additional rural counties, more than 100 rural primary care centers and other small rural hospitals, health and social agencies. In addition, all professions students are required to complete a rural rotation in 12 weeks. Community practitioners were designated in medicine, nursing, pharmacy and dentistry as field professors.
Carter 1987a	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Presents evidence to support the need for the development of special programs for students intent on rural practice. This involves selecting the right kind of students to train for rural practice; emphasizing the teaching of skills appropriate to rural practice; and teaching these skills in an environment that will foster confidence interest in location in rural practice. Surgery, anesthesia, and obstetrics are important skills for rural practice. As much of this training as possible should be located in a rural setting.
Carter	Descriptive	Other (Practice Location)	562 physicians survey	Purpose was to assess the effect of personal characteristics on practice location. A questionnaire

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
1987b				survey of 562 physicians in Manitoba who had graduated from the University Manitoba including physicians practicing in and outside Winnipeg. Survey questions focused on background of their spouses, place of residence during schooling and the University at which the premedical education was obtained. The choice of non-urban practice location was significantly more like if physicians and their spouses had non-urban backgrounds and if the physician had a non-urban preceptorship during undergraduate medical education. Practitioners who were male and whose fathers were farmers or other health-care professionals were also more likely to practice in non-urban areas. Non-urban background appeared to be the most important variable in choosing a non-urban practice location. Recruitment of students from non-urban areas should be emphasized and non-urban preceptorships should be encouraged. Findings confirm the results of studies in the United States concerning practice locations. These studies indicate that variables related to choosing non-urban locations include growing up in non-urban community, exposure to non-urban practice during training, marriage to a person from a non-urban area, and training in family medicine rather than other specialties.
Casson Lee 1988	Descriptive	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	31 University of Toronto trainees; 59 University of Western Ontario trainees Response rate: University of Toronto – 22 (72%) University of Western Ontario - 46 (78%)	Describes two programs for training of family physicians anesthetists (at the University of Toronto and the University of Western Ontario) reports on the survey of trainees who have completed the programs. Questionnaires were sent to all physicians who had completed the programs. They were designed to gather information on patterns of practice and their assessment of the training in relation to their current practice. The study findings show that there was a consensus among trainees that the training had been useful and there was consistent support of continuation of such training programs. Suggests that content of such programs and the evaluation of trainees should be standardized.
Casto 2001	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Discusses the Pikeville College School of Osteopathic Medicine (PCSOM) in eastern Kentucky. Its mission is to train primary care physicians for practice in rural communities and in May 2001, the school graduated its first class of doctors. Its course of medical study takes a hands-on approach to medical training with early clinical involvement.
Catalano 2000	Informed Opinion	Financial Postgraduate Curriculum Interventions	N/A	Presents the experiences of an isolated rural region on southwestern New York state that has employed several strategies to recruit and retain physicians. These strategies include providing economic incentives, immigration status, professional and technical support to physicians, as well as establishing rural training tracks in family practice residency programs.
Caudle Clapp Stockton Neutens 1995	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Historically, most obstetrical care in rural areas has been provided by the family physician. There is therefore a need for family physicians to receive better training in obstetrical care. Training programs for obstetrics must be well-structured and provide both surgical and non-surgical experiences. It is also essential to provide training to rural physicians in neo-natal medicine as they often have to provide emergency newborn care as well.
CFPC Working Group on Undergraduate Education 2002	Informed Opinion	Financial Undergraduate Curriculum Interventions	N/A	Report presents some of the key recommendations of the CFPC Working Group for undergraduate education with regards to family medicine and rural medical education are as follows: (1) medical schools should consider the establishment of a Family Medicine heath care subcommittee in the undergraduate curriculum; (2) medical schools should undertake research which attempts to evaluate and determine whether regional variations in career choice are related to admissions policies; (3) undergraduate curriculum should include an experience in family medicine during each year, a longitudinal experience in Family Medicine during the pre-clerkship years, and a clerkship in Family Medicine which provides for community-based experiences (both rural and urban); and (4) the creation

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				of incentives for family physicians to practice in urban and rural areas.
Chambers Campbell 1996	Descriptive	Other (Personal Characteristics)	Survey of 896 GPs in Staffordshire, UK, response rate of 69%	Purpose was to measure anxiety and depression levels in GPs and identify any associations with personal and practice characteristics. The study design involved a mail survey on self-assessed health status of GPs using the Hospital Anxiety and Depression Scale along with ten questions on personal and practice characteristics. The study findings indicate that the factors associated with high levels of anxiety and depression included: no involvement in training; lack of time off; high on-call; living alone; and working solo rather than in a partnership.
Chan Barer 2000	Informed Opinion	Financial Other (Recruitment and Retention Factors; Definition of Rural)		Presents a broad overview of the physician workforce in underserved areas. Reviews the definition of underservicing and different methods for measuring it. Explores trends in the movement of physicians to and from underserviced Canadian regions, and the characteristics of physicians in underserviced areas. Describes initiatives to encourage the redistribution of physician resources in Canada.
Chance Campbell 1992	Descriptive	Financial Advanced Procedural Skills Training	The executive directors of all Ontario hospitals with fewer than 750 births annually (N=100). There were two mailings of the questionnaire. 82 questionnaires were returned.	Purpose was to assess the situation in regard to obstetric care, especially obstetric emergencies, in rural Ontario communities and to detail findings about medical staffing patterns. The questionnaire was designed to gather information on current medical staffing patterns and anticipated changes, the availability of certain paramedical staff, and the ability to respond to obstetric emergencies. The study findings indicate that interestingly, although approximately 10% of family physicians practicing obstetrics in these small community hospitals planned to discontinue within 2 years, the number appointed with obstetric privileges has managed to counter-act this effect. This was an unexpected finding. According to the authors, the trend away from obstetric practice in rural Ontario communities might have been halted, perhaps as a consequence of recent attention given to it. With regards to obstetric emergencies, the study findings indicate a worsening shortage of general practice anasthetists and specialists. Some solutions are to offer training in operative obstetric procedures for GP obstetricians in rural communities. Financial incentives also need to be made available for those taking additional training in anesthesia and surgical obstetrics to practice in small communities.
Chaytors Spooner 1998	Descriptive	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Purpose was to describe initiatives which take place through, or are supported by the Alberta Rural Physician Action Plan (RPAP) in 1990. There were nine rural sites selected and equipped for blocktime residency rotations (12 weeks in Y1 and 20 weeks in Y2 for each resident). There is an annual rural faculty development workshop, including visiting faculty expertise. In Y3, 24 positions are funded to allow further training in specialties underrepresented in rural Canada (emergency medicine; general surgery plus obstetrics; psychiatry, geriatrics, palliative care, sports medicine, native health, pediatrics) much of the training done in regional centres.
Chiasson Roy 1995	Descriptive	Advanced Procedural Skills Training	Administrators of 148 rural hospitals (defined as 51 beds or less in a community under 15,000). Responses were received from 121, representing 101 institutions.	Purpose was to assess the extent to which GPS still provide surgical and anesthetic services. The study design involved the distribution of a survey. The study findings indicate that GPs still provide a considerable proportion of these services in rural Western Canada (i.e. 56 of 101 rural hospitals provided surgical services; in 45 these were provided by GPs; in 33, by GPs with only limited additional surgical training; in 15, these GPs were the only providers). Anesthetic services were provided by GPs with only limited additional training in 45 of the 56 hospitals; at 36, these were the only providers. The implications for medical training - important to provide some survival fellowships for GPs practicing in rural areas; this is especially important given new immigration restrictions, the elimination of rotating internships and the new relationship between board certification and licensure.
Chiasson Roy	Descriptive	Postgraduate Curriculum Interventions	All Canadian general surgery residents (N=379). A second	Purpose was to determine the future career plans of Canadian general surgery residents and to delineate which factors most influence their career choices. The study findings suggest that 53% of

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Smith-Chiasson 1995		Advanced Procedural Skills raining	mail-out was conducted with non-respondents. 305 residents (81%) completed and returned the questionnaire. 3 questionnaires were excluded from analysis because the residents indicated plans to pursue a non-general surgery specialty.	residents intend to pursue a career as a "subspecialty" general surgeon (typically work in academic tertiary-care hospitals and limit their practices to a particular area of interest). The most significant factors influencing career choice for this group were interest in academic medicine and postgraduate training opportunities. 19% plan to pursue a career as a "standard" general surgeon (provide surgical services alongside a complement of non-general surgery specialists in the urban community hospital or non-urban regional hospital). The most significant factors influencing career choice for this group were job availability, technical back-up needs, children's educational opportunities, and recreational opportunities. 12% are planning a career as a generalist general surgeon (provide a broad range of surgical services, usually in remote communities). The most significant factors influencing career choice were recreational opportunities and children's educational opportunities.
College of Family Physicians of Canada 1999a	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Outlines the current state of postgraduate education for rural practice in Canada. Of the approximately 800 residents who graduated from the 16 family medicine residency programs in Canada in 1998, about 150 of them (19%) received training specific to rural practice. Queen's and Memorial promote themselves as rural training programs; others, such as the University of Alberta, have a great variety of rural-oriented electives. Medical education is viewed as a continuum from undergraduate education to CME. Therefore, recommendations for core postgraduate education for rural family practice must consider this. They include: (1) all undergraduate programs should include core rural family medicine rotations and interested medical students should have the opportunity to pursue additional rural education; (2) all postgraduate programs should include rural regional community-based rotations and electives; (3) rural family medicine streams should be established; (4) competency in the knowledge, skills and attitudes for rural family practice should be the goal for rural family medicine training; (5) universities should support rural physician teachers as integral faculty members; and (6) with regards to advanced skills, all residents entering a postgraduate rural family medicine education stream should have the opportunity to do up to an additional 6 months to develop special skills most appropriate to their eventual site of practice. Such Advanced skills programs should also be accredited. This training should be developed based on both regional and national needs and should include training in general anaesthesia, general surgery, advanced maternity care, etc.
College of Family Physicians of Canada 1999b	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Purpose was to outline a proposed curriculum for advanced skills and maternity care for family physicians. The disciplines of family medicine and obstetrics and gynecology should design and deliver formal, accessible training programs for advanced maternity skills. This will involve cooperation and coordination with academic departments to organize programs, the CFPC to coordinate, and the provincial licensing authority and health ministries to provide funding. Among the recommendations: training in advanced maternity skills as a key responsibility of the university departments of family medicine and obstetrics and gynecology; departments of family medicine to negotiate these training programs with their obstetrical colleagues, universities, provincial licensing authorities, and funding authorities; these training programs should be accredited by the CFPC; and training should be accessible to 3rd year family medicine residents and to re-entry physicians
Commonwealth Department of Human Services and Health 1994	Informed Opinion	Pre-medicine Admissions	N/A	This is a report of the Rural Undergraduate Steering Committee (RUSC) of Australia, established in 1993 to provide advice on innovative strategies for increased recruitment of medical students to rural practice. This is the final report from the Committee and includes a number of recommendations for changes which needed to made through medical schools and to ensure that medical education was more relevant to rural practice. Three main areas were identified for change: selection of students; curriculum content and student placement; and staff and student support systems. The report suggests there is a need for a greater understanding of the culture of rural areas. It also suggests that a need exists for fostering a more positive image of rural general practice in medical schools. The provision of real experiences should be encouraged by longer, carefully selected rural attachments. There is a

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				need for greater input by rural general practitioners in the preparation, teaching and assessment of course components and the provision of appropriate recognition support for this role.
Conte Imershein Magill 1992	Descriptive	Financial	20 physicians	Interviews were conducted with physicians practicing in a rural county of Florida, as well as with physicians who had left the same rural county during the previous 10 years after practicing through a National Health Service Corps obligation or in private practice. A total of 20 physicians were interviewed. The purpose of the interviews was to identify issues related to physicians' decisions to practice in this rural county or to leave in favor of another location. The majority of physicians interviewed (70%) had been exposed to some type of rural practice during medical school or residency. The majority of physicians interviewed (65%) said that having a referral medical center nearby and the need for physicians in the community were both very important factors in their location choice. The school system and workload were key issues for 20%. Half of those interviewed (50%) commented either directly or indirectly indicating a lack of community support for doctors.
Coombs Miller Leeper 1995	Comparative (cross-sectional)	Other (Practice Location)	489 medical students	Purpose was to survey and compare University of Alabama medical students practice location and specialty preferences in 1981 with actual practice locations in specialties in 1991. The data was collected from a 1991 Medical Alumni Association of Alabama directory on the actual practice specialty and location choices of 489 members of the cohort of 524 medical students. Large city practice locations showed an increase in 1991 and this suggests that the shift of primary care physicians to larger cities reflects concerns about the financial viability of small town practice. Small towns are most likely to be chosen by family or general practitioners.
Cordes Rea 1993	Informed Opinion	Postgraduate Curriculum Interventions	N/A	This editorial describes efforts at the University of Arizona to create new elective training rotations dealing with elements of rural public health.
Costa Labuda-Schrop McCord Gillanders 1996	Descriptive	Other (Practice Location)	1,012 of 2,390 (42% response rate)	Purpose was to examine the factors which influence U.S. third-year family practice residents' choice of location of the first practice. A survey was developed to assess the influence of factors related to family, education, geography, finances, the medical community, and others on the selection of practice location. Family related items seem to have the most influence on choice of practice location and are more important to married people. More than 50% of residents wanted to practice in the same size community in which they grew up. Residents for whom economic factors were more important were more likely to leave the area of their residency. A variety of factors including growing up in small towns, participating in rural preceptorships during residency, the location of the medical school from which a resident graduated, and expected income may be important in determining location of first practice after residency graduation.
Council on Graduate Medical Education 1998	Informed Opinion	Pre-medicine Financial Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	The Council on Graduate Medical Education (COGME) was authorized by Congress in 1986 to provide ongoing assessment of physician workforce trends and to recommend appropriate federal and private sector efforts to address identified needs. The geographic maldistribution of health-care providers and services is one of the most persistent characteristics of the American health-care system. Many rural communities struggle to attract an adequate number of health professionals to provide high-quality care. Physicians who enter into primary care disciplines and those who choose to become family physicians are much more likely to practice in underserved areas than their peers who enter specialty areas. Women are much less likely than men to settle in rural areas. IMGs have established themselves as key providers in selected underserved rural areas. This report summarizes the extent of the physician maldistribution problem in the United States and discusses the effect of an impending physician oversupply on location patterns of physicians, and proposes concrete recommendations to

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				improve the geographic distribution of physicians in the United States. One of the most powerful ways to address the problems of rural geographic maldistribution is to change the medical education system so that it selects, trains, and employs more health-care workers who choose to practice in rural areas. The key seems to be the creation of a pipeline that reaches out to rural communities to encourage the selection and success of rural students, gives them opportunities throughout medical school and residency to work in rural settings, and supports them in practice after they do settle in rural areas. This coupled with a medical school and residency training environment that values generalism, community-responsive practice, and rural life is a recipe for improving the flow of medical practitioners to underserved rural areas.
Craig 1995	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Rural Australians comprise nearly 30% of the population yet they are served by only 20% of general practitioners and 10% of medical specialists. The factors contributing to the shortage of rural doctors include inappropriate education, training and unsustainable conditions of employment. Medical schools must assume responsibility for addressing the maldistribution of the Australian medical workforce. Medical schools produce undifferentiated graduates who are educated in tertiary referral hospitals in metropolitan areas. In these academic medical centers students are taught by role models with little or no experience in rural practice.
Craig Nichols Price 1993a	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	The need for additional training for rural general practice is a long-standing one. Anesthesia has been identified as one of the key areas for additional training. This paper outlines the curriculum for advanced training in the area of anesthesia for rural general practice.
Craig Nichols Price 1993b	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	The rural general practitioner must be equipped with the skills and resources to provide access to certain specialists' services. It is in the procedural disciplines of surgery, and aesthetics and obstetrics that vocational training for rural practitioners requires augmentation. The Rural Medicine Curriculum Design Project was initiated in 1992 to establish and developed a consultative infrastructure to facilitate the design, development and evaluation of training curricula for rural general practice. The final products were curriculum statements for studies in surgery, obstetrics and anesthesia. The RACGP Faculty of Rural Medicine believes that general practitioners intending to enter rural practice should acquire the level of skills, especially in procedural areas, that are necessary for competent, independent practice in a rural setting. This article provides an overview of the curriculum statement for a major in obstetric studies in the rural training program of the Faculty of Rural Medicine, Royal Australian College of General Practitioners.
Craig Jackel Gerrits 1993	Quasi-comparative	Admissions	N/A	The purpose of this study was to compare the community of origin of medical students entering the 1992 first-year medicine class at the University of Queensland, Australia with those in 1980. The results suggest that students with rural backgrounds were still significantly underrepresented, while metropolitan students were significantly overrepresented in the first-year medicine class. There was no improvement in the representation of rural students since the release of a national reports a decade before recommending that preference be given to the admission of rural students. The selection of medical students, the socialization and training of both undergraduates and graduates, and the support provided to graduates and continuing education affect the eventual practice location of general practitioners.
Crampton Wilkinson	Informed Opinion	CME	N/A	This article describes the professional development program (PDP) of the Australian College of Rural and Remote medicine which has been developed for its fellows. The PDP enables doctors to participate in a range of continuing education activities that enhance clinical management and

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
2002				professional skills. Participation is mandatory but the program is designed to be flexible and responsive to the range of styles of rural and remote medical practice in Australia. It provides a record of ongoing education activities and provides formal documentation for rural and remote doctors to demonstrate to participation in professional development activities.
Crandall Coggan 1994	Informed Opinion	CME	N/A	A geographically isolated rural setting may translate itself into professional and social isolation as a result of the frustratingly distance from secondary and tertiary care and limited opportunities for continuing education. The perception that physicians in rural practice are isolated from sources of information and support is frequently cited as a barrier to recruitment of adequate numbers of physicians to practice in areas remote from the academic centers. The perception of professional isolation of rural physicians is correlated with the decline in interest physicians into primary care practice. Emerging information technologies offer great potential to ameliorate some of the sources of personal and professional isolation by providing access to information needed for clinical training, continuing education, professional growth, and consultation. This article discusses the interrelationship of new information technologies, the information needs for primary care training and continuing education in rural settings, assesses recent efforts to implement electronic information technologies in rural settings, and describes current technologies that have the potential to improve the education and training opportunities in rural areas.
Crandall Dwyer Duncan 1990	Descriptive	Other (Recruitment and Retention Factors)	N/A	Purpose was to categorize approaches to recruitment and retention of rural physicians under four categories (affinity models recruiting rural individuals or offering rural experience during training; economic incentive models; practice characteristic models; indenture models); to examine the impact of recent structural and economic changes in the profession and rural society on each category and to recommend a mixed model for optimal success. Suggests that the most useful aspects of all 4 programs should be adopted. Suggests: encouraging rural high schools and health care providers to identify and motivate top rural science students; providing summer jobs in rural community health centres, as well as scholarship programs, orientation and premed support programs on campus; ensuring that training programs encourage these students to pick rural practice rather than discourage them; providing primary care tracks and rural externships; modifying unpleasant aspects of rural practice, especially salary and benefit packages in salaried positions and marketing positive aspects of rural practice
Crittenden Myers 1997	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Purpose was to advocate policy changes in US Medicare system to facilitate graduate training in rural areas and, thus, rural practice choice by physicians. The study findings indicate that location of training has strong influence on location of practice choice but % of Medicare GME spending that occurs in rural areas is very small. Existing Medicare rules are biased towards urban specialty programs, going exclusively to teaching hospitals which are mainly urban (95%) and focusing on subspecialty training not primary care recent (1996-7) policy changes will have mixed impact with capping of total expenditures at Dec. 96 levels hurting but several conditions favouring rural areas making it possible to establish new rural training programs. Other changes needed to help promote rural training, recruitment and retention are as follows: removal of cap in number of residents for existing rural programs; GME funds going to managed care companies should be taxed to fund rural programs; Medicare should tighten its requirement that HMOs serve rural areas; criteria to qualify for GMNE funding should be loosened to include non-hospital entities; and continued use of visas for foreign doctors for underserved areas.
Crouse 1995	Comparative	Other (Recruitment and Retention Factors)	Family physicians who graduated from University of Minnesota (Duluth) Family Practice Residency Program	Purpose was to examine the reasons given by physicians as influencing their recruitment and retention. The study design involved surveying a cohort of family physicians after one year of practice and once after 3 years. The findings indicate that the greatest factors that influenced recruitment were: spouse's preference; recreation opportunities; community acceptance of family practice; hospital quality,

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
			(N=50). There were 46 surveys returned.	existence of group practice; size of community; lifestyle of children. The greatest factors that influenced retention at the 3-year point included: community acceptance of family practice; hospital quality; children's lifestyle, recreation, spouse's preference. There were very few gender-related differences. With regards to relocation, 37% of respondents relocated during three year period; 47% to community of similar size 29% to smaller and 24% to larger. All of those who relocated experienced a change in marital status and relocation was most predicted by: children's educational opportunities; income, presence of children in family, proximity to extended family and gender.
Crump Bersch 1999	Descriptive	Postgraduate Curriculum Interventions	N/A	Purpose was to assess effectiveness and cost of a rural fellowship (post residency) in rural family practice/maternity care entirely for one physician based in a single rural location in Jasper, Texas (pop. 10,000). The study design involved observation and interviews with participants and teachers.
Crump Fricker Moore Coakley 2002	Descriptive	Pre-medicine	20 high school students across 5 rural counties in Kentucky.	Summarized the second year of a program (the High School Rural Scholars Program) that placed high school seniors in shadowing opportunities with health professionals in their hometowns while providing preparation for the ACT exam in a virtual classroom environment. It was a five week program during which a survey was distributed which measured existing awareness of community health issues and current interest in rural health careers (both at the beginning and end of the program). In addition, prior ACT scores were requested. The study findings indicate that student composite ACT scores increased by 5.7%. Students increased their knowledge of the strengths and weaknesses of health care in their towns as well as their understanding of how various health professionals function.
Crump McCall Phebus England 2001	Informed Opinion	Pre-medicine	N/A	This paper describes the Professional Education Preparation Program (PEPP) of Kentucky state. The purpose of this program is to provide high school students with an opportunity to shadow a health-care professional in or near their home community after their junior year.
Cullen Hart Whitcomb Rosenblatt 1997	Descriptive	Financial Other (Retention)	NHSC Scholarship recipients who graduated from US medical schools from 1975 through 1983 and were initially assigned to non-metropolitan counties (N=2903).	Purpose was to explore some of the issues involved in retention in rural areas. The study design involved using the American Medical Association Masterfile to determine the percentage of National Health Service Corps (NHSC) scholarship recipients who were still practicing in their initial county of assignment. The study findings indicate that 20% of the sample study was still located in their initial county of assignment while another 20% had moved from their original county of assignment, but were still practicing in a rural area. Retention was substantially higher for family physicians than other specialty areas. Retention rates were higher for those with longer periods of service.
Cullhane Kamien Ward 1993	Comparative – Pre-Post Test	Undergraduate Curriculum Interventions	85 final year medical students	Assessed the effect of a 4-week rural attachment on the knowledge and competency of medical students in basic practical and emergency procedures. A pre and post survey of self-reported competency in 72 basic, emergency, diagnostic and therapeutic procedural skills was undertaken. Results suggest that students reported competence in a larger number of procedures after the attachment compared with the previous self-reported procedures. A higher priority needs be paid to the undergraduate teaching of procedural skills. Rural attachments are important in training medical school students in practical skills.
Curran Hatcher Kirby	Descriptive	CME	All licensed physicians in Newfoundland and Labrador (N=867). There were 339 returned.	Purpose was to assess the differences in perceived CME clinical learning needs of rural and urban physicians. The study design involved the distribution of a needs assessment questionnaire. Information was collected on demographics, specialty, location of practice, learning patterns, level of CME participation, learning needs, perception of availability of CME, learning method preferences.

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2000				The findings show that rural physicians reported spending less time per week on informal learning activities. They reported a significantly lower number of formal CME programs in past 12 months. Rural physicians reported a higher need for CME in advanced clinical skills and emergency medicine than urban physicians, whereas urban physicians reported higher need for CME in geriatrics, pharmacology, therapeutics and pediatrics. Special needs and preferences of rural GPs suggest need for targeted advertising and more distance ed. programs, plus half-day weekend and evening sessions.
Damos et al. 1998	Descriptive	Postgraduate Curriculum Interventions	N/A	Purpose was to describe the process used to set up the first rural training track at the University of Wisconsin-Madison Family Practice Program. The establishment of program has had a positive impact on the core residency program which has developed new modules for all residents ain nearby rural locations in rural emergency medicine and rural general surgery, among other fields.
Davidson 2002	Descriptive	Undergraduate Curriculum Interventions	61 students surveyed; 51 returned	Purpose was to examine the impact of the "Community Health Scholars Program" which involves 8-week clinical and research placements for Y1 students in underserved areas, both rural and urban. The study design focused on five specific projects plus a mail survey of all student participants in Y4. The findings indicate that 72% of summer projects were in rural settings. In addition, most students felt the placement had affected their career choice.
Davies 1994	Descriptive	Postgraduate Curriculum Interventions	A survey was forwarded to 211 RACGP trainee doctors in Australia and was completed by 154 doctors, a response rate of 86.7%.	The purpose of this study was to obtain demographic data about Royal Australian College of General Practice (RACGP) trainees, and identify differences between rural and non-rural RACGP trainees. A survey was forwarded to 211 RACGP trainee doctors in Australia and was completed by 154 doctors, a response rate of 86.7%. Most trainees who planned to settle into rural area were raised in a capital city. Trainees with a rural background were no more likely to enter rural practice than trainees with urban background. Urban general practice was the most popular preferred destination of all trainees, irrespective of background. Data from the survey did not support the belief that trainees from rural backgrounds are more likely to enter rural practice. However, it may be that trainees raised in very small rural communities (population less than 5000) are more likely to enter rural practice. The proportion of rural trainees who have a rural background is much smaller than that noted overseas. These findings suggest that efforts to recruit rural GPs should be directed at all graduating doctors rather than selective t recruitment of doctors with a rural background.
Davis McCracken 2002	Descriptive	CME	N/A	Purpose was to pilot and evaluate the use of videoconferencing in Alberta instead of current teleconferences (1-hour per week for 22 weeks) and regional conferences (6 specialists travel to rural sites. The study design involved distribution of a needs assessment survey followed by pilot program of 8 monthly videoconferences at 14 sites followed by survey to assess satisfaction and a cost-benefit analysis. The findings show that users preferred video to tele-conferencing but preferred the regional conferences to both. Nonetheless, cost advantages of videoconferencing over regional conferences have persuaded authors to recommend phased replacement of teleconferences by video and reducing scope of regional conferences to larger regional centres.
Delaney et al. 2001	Descriptive	Undergraduate Curriculum Interventions	N/A	Purpose was to describe an innovative undergraduate program in New South Wales, Australia—the Greater Murray Clinical School in which med students spend Y4-Y6. Its key innovation is student-patient linkage so that student follows patient rather than following doctors. Program uses web-based education and telemedicine used to supplement local resources
DeWitt Migeon LeBlond Carline	Descriptive	Postgraduate Curriculum Interventions	N=3	For over 25 years the University of Washington School of Medicine has provided elective WWAMI (Washington, Wyoming, Alaska, Montana, Idaho) one and two-month elective rural residency rotations are offered to second and third year residents. This study identifies the characteristics of outstanding rural residency rotations. Preceptors from selected rural residency sites were interviewed

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Francis Irby 2001				about their experiences, teaching strategies, and opinions about curriculum. The preceptors believed that outstanding rotations were led by enthusiastic preceptors who served as role models, provided residents with meaningful responsibilities and emphasized independent decision making based on history and physical examination. They stressed supervised independent and self-directed learning with frequent feedback. They emphasize treating each resident as a colleague and believe that residents must not observe, but having meaningful responsibility for the direct care of patients. The preceptors taught conscious medicine, encouraging residents to continually reflect on the meaning and implications of each diagnostic treatment decision. The preceptors also stressed the importance of safe disagreement, immediate feedback, and deliberately selecting patient problems for residents.
Dhalla et al. 2002	Descriptive	Pre-medicine Financial Undergraduate Curriculum Interventions	1223 students Response Rate: 981 (80.2%)	Purpose was to examine the hypothesis that medical students differ from the general population in various ways, especially socio-economic background. The study design involved an internet questionnaire sent to all Y1 med students in Canada outside Quebec; comparison done with age-adjusted data from 1996 census. Findings show that Y1 medical students (Y1MS) differed from Canadian population in significant ways: (1) less rural (10.8% from rural area codes at time of HS graduation cf. 22.4% with p 0.001); (2) more visible minorities than general population, although blacks and aboriginals underrepresented and Chinese and South Asians overrepresented; and (3) much higher SES than general population. These differences have persisted largely unchanged since mid-60s; e.g. rurality has improved only very slightly since 1965-66 study which found 8.4% rural, although some significant changes e.g., in gender and ethnic diversity. Suggestions to increase intake of rural students includes: increasing information to rural high school students; lowering costs; changing curricula to allow summer work on family farm; increasing rural membership on admissions committees; and providing special rural school enriched programs.
Dickinson Hickner Radford 1995	Descriptive	Other (Characteristics of Rural Physicians)	454 Australian rural general practitioners were surveyed and 296 responded for a 65% response rate.	Purpose was to gain a better understanding of the characteristics of rural physicians in Australia. 454 Australian rural general practitioners were surveyed and 296 responded for a 65% response rate. The results indicate that women remain underrepresented in rural practice, a large number of those under 40 were intending to leave, young doctors provided a number of procedural services to their patients including aesthetics and obstetrics, and doctors with a rural upbringing were no more likely than those with a rural background to practice in more rural areas. Australian rural general practitioners are relatively young and providing a broad range of services to their patients.
Dobie Craline Laskowski 1997	Comparative - Cohort	Undergraduate Curriculum Interventions	For data set #1: Graduating students in 1993 and 1994 from the University of Washington School of Medicine. - 86 students who were program participants in 1989-91 - 234 graduates who did not participate in the program For data set #2: - 63 program participants in 1993. 62 returned the pre-experience questionnaire, but 4 were incomplete and 10 students had indicated a nonprimary care specialty as their first choice. These surveys were excluded,	Purpose was to explore the impact of a summer/rural/underserved preceptorship (the Rural Underserved Opportunities Program) on the residency choices of participants and on the beliefs and attitudes of participating students about rural underserved primary care practices. The study design involved the use of two data sets. (1) Matriculation and residency selection information is analyzed to compare program participants with non-participants. Survey data was collected at entry into medical school and choice of residency. The study findings indicate that all students had similar academic records at the time of entry into medical school. When asked how inclined they might be to live in a community of a certain size, program participants gave higher mean scores to the smallest communities, from <1000 to 25,000. When the primary care specialties are combined and compared with other residency choices combined, program participants were more likely to select primary care than their peers. 63% of program participants chose a primary care residency as compared to 47% of nonparticipants. Participation in the program was found to be significantly related to residency choice (P=0.029). Size of the community where one was raised was not found to be associated with residency choice. (2) A survey eliciting beliefs and attitudes about various career choices was given to participants

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			meaning 48 were included for further analysis. Of these 48, 41 post-experience questionnaires were returned. - 40 nonparticipants in 1993. 23 questionnaires were returned from this group, for a response rate of 57.5%.	before and after the experience and to a sample of nonparticipating classmates matched for age, race, and ethnicity. A survey was administered to program participants in the spring of 1993 and a control group of nonparticipants in the same class. A post-experience survey was given to program participants in the fall of 1993. The study findings indicate that both before and after the program participants believed there would be many differences between practicing in rural areas and practicing in urban areas. They believed that rural practice would have a higher likelihood of less income, high on-call hours, and long-term continuous care of patients. They also thought that rural physicians were less likely to stay abreast of current medical knowledge, but this belief was given in the post-test. The control group (nonparticipants) believed that close personal relationships with patients were more likely in rural communities than cities.
Doolan Nichols 1994	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Discusses the current situation of training for rural medical practice in Australia. Some initiatives implemented were: (1) Advanced Training Curricula in Surgery, Anaesthetics, and Obstetrics. Implemented by the Royal Australian College of General Practitioners (RACGP), this training was developed on practical experience, a real-work situation, one-on-one teaching and consultation and continuous assessment and feedback. According to the author, a longitudinal study is in place to chart the progress and destinations of the graduating doctors and their contribution to procedural services in rural practice; (2) Rural Training Stream provides rural trainees with (in addition to their general practice education and training opportunities) 4 year training for rural practice, 12 months in Advanced Rural Skills Posts, and specific educational activities/events focused on rural general practice. (3) Directorate of Rural Education and Training was established to facilitate rural medical training at all levels; and (4) Rural Health Training Units. Regional units that facilitate contact between rural trainees, educators, patients, and service providers. Focuses on health care in a rural context and enables collaboration between other educational institutions such as universities and colleges.
Dorner Burr Tucker 1991	Descriptive	Postgraduate Curriculum Interventions	Random sample of 701 residency programs in the United States Response rate: 58.5% provided useable responses that identified 2612 first practice locations.	Examines one of the factors that contribute to the distribution of physicians – how far they move from their residency sites to establish their first practices. Survey-questionnaires were distributed to the residency program directors of each program sampled. The study findings showed that the primary care physicians demonstrated a propensity to locate their practices closer to where they had completed their residencies than did physicians in most other specialties.
Dunbabin Levitt 2003	Informed Opinion	Financial Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Explores how the relationship between rural origin and rural exposure during undergraduate and postgraduate training and the choice of practice location has underpinned initiatives in medical education in Australia between 1998 and 2003. These initiatives include: (1) implementing admissions criteria which target rural students; (2) revising/changing the curriculum (i.e. exposing students to clinical instruction earlier, establishing clinical schools in rural and remote Australia); (3) establishing rural health clubs which promote rural practice and nurture students with an interest in it; (4) and establishing scholarship programs (i.e. The John Flynn Scholarships; The Rural Australia Medical Undergraduate Scholarship; The Higher Education Contribution Scheme Reimbursement; and the Commonwealth Medical Rural Bonded Scholarship Scheme).
Duttera Blumenthal Dever Lawley 2000	Comparative - Cohort	Financial	(1) 647 students who received scholarships only (1952-1979). (2) 438 students who received a scholarship + attended the medical fair (1980-89). (3) 32 students who received	Purpose was to describe and evaluate an annual medical fair in Georgia, which was designed to introduce medical students and residents to representatives of rural communities. Most of the students who attend are recipients of scholarships that require a period of rural practice after completion of their training. The fair was developed as a link to the scholarship programs. One year of practice is required for each year of scholarship support. This evaluation is intended to provide policy makers with an assessment of how well this initiative influences the recruitment and retention of rural physicians. The

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
			scholarships + attended the medical fair + are governed under the triple-indemnity provision (1990-92). In this group, those who do not fulfill their practice obligations are required to pay back three times the amount of their scholarship.	study design involved the comparison of three different groups in the history of the scholarship/fair program. Compared the number and percentage of those entering practicing (ie. honouring their commitment) from: (1) Scholarship alone (1952-1979); (2) Scholarship + medical fair (1980-89); and (3) Scholarship + medical fair + triple-indemnity provision (1990-92). Those who do not fulfill their practice obligations are required to pay back three times the amount of their scholarship. Also considered retention rates between scholarship and non-scholarship recipients. The study findings indicate that 44.5% of those who received scholarships repaid their obligation through practice. The remainder repaid in cash. 56.8% of those who received scholarships and attended the fair honoured their rural practice commitment. Of those affected by the triple-indemnity, 84.3% entered rural practice. Retention of physicians is positive. 65% of scholarship recipients who entered practice in 1978-82 were still in their practice sites 10 to 15 years later. Of those who entered practice between 1983 and 1987, 60% were still in their initial practice locations. Retention among scholarship recipients was as high as it was among non-scholarship recipients who attended the medical fair.
Easterbrook et al. 1999	Comparative – Cross-sectional	Postgraduate Curriculum Interventions	Graduates of Queens University Family Medicine program 1977-1979 (N=159).	Purpose was to determine the factors that affect a family practice residents' choice of practice location. The study design involved a mail survey. The study findings show that physicians raised in small towns were 2.3 times as likely to choose rural practice after residency, and 2.5 times as likely to remain in rural practice. Exposure to rural practice during training had no explanatory effect. However, authors admitted the possible limitations of study - small sample; self-selection of students based on Queen's reputation for rural training may explain lack of impact of rural training.
Ebbesson 1988	Descriptive	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N = 42	The University of Alaska entered into a partnership with the University of Washington, Washington State University, Montana State University, and the University of Idaho to form the WAMI program. During their first year, Alaskan students have the opportunity to take two preceptorships as electives, each composed of spending half-a-day a week for six weeks with carefully selected practitioners. In the spring semester students have another elective in rural health which includes a 7 – 9 day field trip to rural Alaska. This paper describes an analysis of the distribution and specialty chosen by Alaskan alumni and the factors that contributed to their decisions about specialty choice and practice location. A questionnaire was completed by 42 graduates of the program who had completed their residency training (a 91% response rate). 52% were practicing in small towns, and of those, 91% were in family practice. The extensive exposure to medical practice in rural Alaska played an important role in decisions about specialty choice and practice location.
Elam Rosenbaum Johnson 1996	Descriptive	Pre-medicine Admissions	1093 physicians who graduated from the University of Kentucky between 1974 and 1985.	The purpose of this study was to examine which medical students from the University of Kentucky College of Medicine were most likely to return to their geographic origins to practice medicine. The study was based on statistical analysis of longitudinal data of graduates (1974 to 1985) and data was available for 1093 physicians and practices. A significant percentage of graduates returned to their in-state district of origin to practice. Significant predictors of practice location were gender, undergraduate institution, and residence at admission. Admissions officers seeking to improve the ratio of graduates practicing in rural areas should consider measures to assess applicants' attraction to rural medical practice and small town life.
Ernst Yett 1984	Comparative – Systematic Review	Pre-medicine Financial Admissions Undergraduate Curriculum	N/A	This review article provides an extensive review of the literature pertaining to physicians' background characteristics and career choices. The authors note that a great deal of empirical evidence has been gathered on the relationship between physicians' background characteristics and specialty and practice location choices. Most of the evidence is descriptive. Medical school performance was associated with career choice, with the lowest ranking graduates choosing general practice. Studies which have examined relationships between age and specialty choice have found that general practitioners are older than other physicians when they graduate from medical school. Women choose specialties for

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
		Interventions Postgraduate Curriculum Interventions		which training requirements and working conditions interfere less with their actual or planned commitments to marriage and the raising of children. Women are more likely that men to choose practice settings where working hours are regular and conditions permit part-time or interrupted employment. Women are more likely than men to choose institutional practice settings such as hospitals and to choose institutional careers such as teaching, research, or administration. Women are also more likely to withdraw temporarily or permanently from practice than men. Family socioeconomic status tends to distinguish general practitioners from other physicians. The evidence indicates that physicians of low family socioeconomic status are more likely to enter general practice. Many studies have reported that a disproportionate percentage of general practitioners' parents come from the lowest educational, occupational, and income classes. General and family practitioners are more likely than other physicians to have been brought up in rural areas. Physicians raised in rural areas are two to three times more likely to select general or family practice than physicians raised in urban areas. Strong relationships have been observed between the geographic location of physicians' practice and the geographic location of their upbringing and educational experience.
Faris 1997	Informed Opinion	Postgraduate Curriculum Interventions	N/A	It is possible to influence the output of rural doctors by the selection policies of universities. There is evidence from both Australia and overseas that medical students from rural areas are more likely to return there after graduation. Experience in rural practice is an important part of the education of all undergraduates. There is a need for more advanced surgical training which should encompass the general surgery disciplines of orthopedic surgery, plastic surgery, urology, vascular surgery, pediatric surgery and thoracic surgery. General surgery training for all trainees should be the same as accredited training for advanced trainees in general surgery. There should also be opportunities for experience in specialty practice in teaching hospitals.
Fickenscher 1992	Informed Opinion	Pre-Medicine Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	This article discusses the role of primary care physicians in rural medicine and illustrates how fulfillment of this role has not been realized. It focuses on medical education and its responsibility to rural practice. The recruitment and retention of physicians are affected by a variety of factors such as geographic origin, location of residency training, personal and professional needs of spouse, special considerations such as National Health Service Corps obligations, specialty training and long-term goals. Reasons why medical education has failed to meet the challenges of rural health care: (1) Selection - Admissions criteria are often biased against students from disadvantaged backgrounds, including those from rural backgrounds. There is often a lack of the appropriate courses in high school, and a lack of adequate counselling regarding careers in the health professions. Medical schools must support initiatives that identify and encourage rural students. (2) Training - There needs to be movement away from the urban medical center as the only training ground. There are also inadequate support personnel trained for rural areas. The success of rural health care delivery would benefit from a coordinated effort among all training programs to prepare students for rural and interdisciplinary practice. (3) Support - The current system does not provide adequate support for rural physicians. This includes a lack of financial and academic support, as well as a lack of peer support.
Field 1995	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Purpose was to discuss rural surgery in the United States and to seek new ways to train more general surgeons for rural practice. However, most residency training programs do not prepare surgeons to practice in rural areas. Suggests a track for residents to follow if they wish to practice surgery in a rural environment: (1) A rotating or flexible internship – an opportunity to rotate through and experience various specialties; (2) Rotating 3 years of general surgery following their first year; (3) A fifth year as a senior resident rotating through the different specialties such as obstetrics and orthopedics; (4) Spend time with a well-trained surgeon in a rural practice, experiencing both the practice and lifestyle.
Fine	Descriptive	Postgraduate Curriculum	N/A	Purpose was to describe a PGY2 full-year rural community-based family practice residency at the

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
1990		Interventions		University of British Columbia using rural GPs as preceptors.
Finnemore 1988	Informed Opinion	Other (Characteristics or Rural Practice)	N/A	Focuses on some of the unique features which exist for medical residents who spend some of their elective time in remote rural settings. These features include: lack of technological support; temporarily becoming a member of a cultural minority; cross-cultural communication problems; and adverse climatic conditions. Some of the rewards of such an experience are also described.
Florizone 1997	Descriptive	Other (Recruitment and Retention Factors)	Physicians practicing in rural Saskatchewan communities with populations of <10,000 (N=215). Response rate: 127 (59%).	Purpose was to analyze attitudes, preferences and plans of rural doctors in order to guide formulation of new policies aimed at retention and recruitment in a situation of declining numbers, increasing turnover and increasing recruitment difficulties. Study design involved distribution of a mail survey. Study findings indicate that the most highly rated factors with regards to choosing rural practice included the broad spectrum of practice and financial considerations. Sources of satisfaction cited included professional freedom, professional satisfaction, and the availability of housing. Sources of dissatisfaction cited were the inability to take time off work and long hours.
Foley 1994	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Purpose was to present an experimental program for encouraging family practice residents to choose rural practice. It involved the moonlighting of residents to cover absences of rural family physicians in nearby rural sites. Experiment devised at St. Elizabeth Medical Centre in Dayton, Ohio, location of a FP residency program at Wright State U.; program doesn't include rural training.
Foreman 1994	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Academic medical centers need to take an active role in training professionals committed to serving isolated and poor communities. To do this, the way physicians are being educated needs to change. This means providing real-life rural community experienced to undergraduate students in medical school. It means exposing these students to the social, environmental, and cultural influences that affect health and disease. Refers to some undergraduate programs which have been successfully preparing students for practice in underserved areas, such as the University of Minnesota. These experiences need to be built on in the postgraduate curriculum. Training should be provided in rural setting where residents can come to know patients as members of the community and have the opportunity to work with physicians who have devoted their careers to inner city or rural practice. What they experience in medical school and in residency is more important than their background.
Forti et al. 1996	Descriptive	CME	398 selected family physicians in rural counties plus 7 medical directors of community health centres.	Purpose was to describe the problems of rural practice and describe the results of a survey assessing Pennsylvania rural physicians' needs for continuing education and practice support in order to help guide the development of a new program called Practice Support Outreach Program. The study findings explore the actual use of educational resources by physicians. There is heavy use of the local medical library, but low use of computer databases, extension services and the Pennsylvania Office of Rural Health Services. There very low interest in video linkage conference referral and consultation The dominant reasons cited for non-use were lack of time and lack of equipment. Results confirmed a strong interest in CME, though surprisingly low interest in communications-based approaches seen as disappointing and requiring further study. Subjects eliciting greatest interest for CME are practice management and updates on federal regulations and these should receive priority.
Forti Martin Jones Herman 1995	Descriptive	Other (Physician Satisfaction; Retention)	Convenience sample of family physicians (N=398) practicing in 39 counties in Pennsylvania. 229 responded, for a response rate of 58%.	Purpose was to assess factors related to satisfaction and retention of family physicians in order to develop and implement a Practice Support Outreach Program (PSOP) in rural areas of Pennsylvania. The study design involved a mail survey. Sample was drawn from the current membership list of the Pennsylvania Academy of Family Physicians and medical directors of community health centers. The study findings indicate that 89% of respondents reported being satisfied with rural practice. Positive comments included lifestyle factors, getting to know patients and families personally, getting to see a

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				full range of medical conditions. Negative comments about medical practice included lower rural reimbursement rates, low income potential, lack of time for self, family, and CME, work overload, and professional isolation. Approximately 20% of respondents indicated they were considering leaving rural practice. Many of the reasons cited were similar to the negative comments above. Barriers to rural practice cited by respondents included lower reimbursements; professional isolation; lack of cultural amenities; lack of equipment, technology and trained personnel; low economic return. The author concludes that support strategies are needed to influence factors such as professional isolation. However, government policy efforts are also necessary to address reimbursement issues and minimize the financial and management burdens of rural physicians.
Fry Terry 1995	Descriptive	Undergraduate Curriculum Interventions	N = 164	Describes an analysis of required evaluation items completed by 164 medical students at the end of three-month rotations at South Florida sites from 1990 through 1994. Stepwise multiple regression showed that three items predicted increased student interest: presentation of medical knowledge that was meaningful and relevant; instructors recommending textbooks and literature resources to enrich learning experiences; and instruction in clinical procedures. Collectively, the three items claimed 42% of the variance in student interest. One way for medical schools to generate interest in rural practices is to pay more attention to their rotations, especially the quality of rural preceptors.
Fryer Stine Krugman Myoshi 1994	Comparative	Undergraduate Curriculum Interventions	286 graduates of the 1980-85 classes who did at least one rotation in a rural area and 366 who did not	Purpose was to evaluate the impact of decentralized education in a Colorado program (AHEC-SEARCH) on the practice location of its graduates. The program provides four years of voluntary rotations for undergraduates. This includes one week of observation in Y1, summer community health experience in Y2, required clerkship in Y3 in obstetrics/gynecology, psychology, medicine or pediatrics, and an elective Y4 preceptorship. The study findings show that participation in at least one non-urban rotation in the SEARCH program had significant impact on type and location of practice site. Also impacted on preceptors as those who were involved in the program as preceptors remained in rural communities more than others did (77.8% vs. 62.1%).
Fryer Stine Krugman Myoshi 1993a	Quasi-comparative	Undergraduate Curriculum Interventions	N = 286	Since 1971, the US Bureau of Health Professions has provided funding to establish Area Health Education Center (AHEC) programs that address inaccessibility to primary medical care services, particularly by Americans residing in rural areas. This article describes an evaluation of the SEARCH/AHEC program of the University of Colorado Health Sciences Center. This program has sponsored rotations for medical students in rural Colorado since 1980. The evaluation included a review of the current community of practice for each University of Colorado School of Medicine graduate in the classes of 1980 to 1985. Of the 131 graduates who had taken part in AHEC-sponsored rotations, 7 (5.3%) had practices in towns with fewer than 2,500 people, and 18 (13.7%) had practices in rural communities. 13.6% (21 of 155) of the former participants in other states were practicing in communities with fewer than 2,500 people and 29 (18.7%) were practicing in rural communities.
Fryer Miyoshi Stine Krugman 1993b	Comparative - Cohort	Undergraduate Curriculum Interventions	N = 284	The practice locations and specialties of 131 graduates of the Area Health Education Center (AHEC) program of the University of Colorado Health Sciences Center were compared with those of the 153 graduates who had not completed a SEARCH rotation. The graduates who had completed SEARCH rotations established practices in rural counties more frequently (13.7% versus 7.8%), especially in towns with fewer than 5,000 people (9.9% versus 4.0%, P = .04). They were also more likely than their counterparts to practice a primary care specialty (50.4% versus 34.0%, P = .01), particularly family practice (26.7% versus 10.5%, P<.01).
Fryer Stine Vojir	Descriptive	Other (Practice Location)	A total of 986 family physicians and general practitioners completed questionnaire, a	The purpose of this study was to identify predictors of rural practice location and the practice profiles of rural vs. urban family physicians and general practitioners. The Colorado Board of Medical Examiners mailed a questionnaire to all licensed Colorado physicians. A total of 986 family

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Miller 1997			response rate of 70% (986/1262).	physicians and general practitioners completed questionnaire, a response rate of 70% (986/1262). Having been raised in rural Colorado was the most powerful predictor of rural practice location in the state (p<.01). Family physicians and general practitioners serving rural populations spent much more time weekly providing direct patient care. There was a significant difference between the percentage of female family physicians/general practitioners located in rural vs. urban practice sites (p<.01).
Gabhainn Murphy Kelleher 2001	Descriptive	Other (Characteristics of Rural Practice)	Questionnaires were returned from 2093 GPs (86% response rate).	Purpose was to describe the characteristics of rural general practices and compare these with city and town general practices in Ireland. Rural practices reported fewer private patients and more socio-economically deprived patients than city GPs. The mean number of total scheduled hours per average week per GPs was 77.95 for city practices, 80.6 for town and 103.6 for rural. Rural practices also reported more contact with members of the primary care team such as public health nurses and the quality of these contacts is described more positively.
Garland 1990	Informed Opinion	Financial Undergraduate Curriculum Interventions	N/A	Article discusses primary care in underserved areas and how the shortage of physicians in rural areas is seems to be given little consideration at the medical school level. According to the author, medical schools "seduce" motivated and idealistic first-year students away from primary care and into medical specialties of which they were previously unaware. Other forces - academic setting, role models provided by specialists, the prestige factor, evolving peer pressure, the security of a narrow field, financial considerations - all push students towards specialization. Medical schools need to recognize and counter these forces by: (1) offering mandatory and elective courses which encourage students to be aware of the social, political, and economic issues in medicine; (2) encouraging clerkships in underserved areas; and (3) offering loan forgiveness or scholarships instead of loans to those willing to commit themselves to primary care.
Geyman et al. 2000	Informed Opinion	Pre-medicine Financial Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Purpose was to review the literature on innovations in medical education and government policy for rural practice with an emphasis on 'small rural' communities under 10,000. The study findings show a comprehensive, thematically organized review of large body of largely American literature, including tabular presentation of best US models and of factors predicting successful rural recruitment and retention; note emphasis on gender and on influence of spouse on choice of first practice location
Gill Tonks 1996	Informed Opinion	Pre-medicine Undergraduate Curriculum Interventions	N/A	Purpose was to describe the successes of a set of programs in South Australia organized by the Rural Practice Training Unit, Modbury. The findings show that the efforts to target rural high school students through principals and guidance counsellors pay off (note that Australians enter medical school straight from high school); so, too, did the establishment of rural clubs in medical schools.
Glasser Stearns Stearns Londo 2000	Informed Opinion	Admissions	N/A	This article describes a screening instrument developed by the Rural Medical Education (RMED) program of the University of Illinois College of Medicine. The screening criteria can be categorized into four major areas: academic performance, indicators of rural background, indicators of family medicine preference, and demographics.
Glazebrook	Descriptive	CME	N = 756	A self-administered postal questionnaire was distributed to rural and remote general practitioners to

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Chater Graham 2001			287 surveys returned (47.8% response rate)	determine their educational and quality assurance needs. The questionnaire was sent all rural and general practitioners holding a remote radiology exemption. The three areas in which the general practitioners were least confident included chest, cervical spine, and skull radiology. Their highest priority areas of need for education were chest radiology, film interpretation, and spinal radiology.
Godwin et al. 1998	Comparative - Cohort	Postgraduate Curriculum Interventions	303 graduates of Queen's University family medicine residency program from 1977 to 1991	Purpose was to examine the choice of practice made by family medicine residents during their first two post-residency years and how these choices have changed over 15 years. The study findings show that residents graduating before 1985 more likely to go into FT practice immediately after residency and more likely to be in FT practice within 2 years.
Godwin Lailey Miller Moores Parsons 1996	Informed Opinion	Pre-medicine Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Educational institutions are potentially able to foster the interests of prospective rural physicians from the time they are in high school until they establish their practices. Exposure to the challenges and opportunities of rural practice can greatly affect the 'pre-disposed' student. Refers to Jefferson Medical College's Physician Shortage Area Program (PSAP) which preferentially admits medical school applicants from rural backgrounds who intend to return to practice in rural areas. Refers to some of the undergraduate programs, such as WAMI and the Upper Peninsula Program at Michigan State University that promote rural practice to students. Also refer to the availability of postgraduate training opportunities in rural medicine.
Goertzen et al.	Descriptive	Undergraduate Curriculum Interventions	Students (N=25) and preceptors (N=41) of University of Manitoba Department of Family Medicine during Y4 clerkships (8 weeks) in spring of 1991	Purpose was to describe effective teaching behaviours of rural family medicine preceptors to provide basis for planning faculty development programs in order to staff rural clinical programs. The methodology involved the use of a critical incident technique using collection of behavioural data from respondents via phone interviews focusing on specific incidents. Interviews were done at mid-point and at end asking subject to recall an incident of effective teaching and one of less effective teaching in past three weeks. The findings identified over 800 teaching behaviours from 275 recalled incidents. The factors identified as good teaching behaviour included: student involvement; good interpersonal relations with student; emphasis on problem solving; balancing clinical and teaching responsibilities; demonstrating clinical and professional competence to the student; an organized approach; and provision of ongoing feedback.
Goldsmith 1993	Informed Opinion	Financial Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	The number of rural primary care physicians can be increased by: (1) placing a high priority on recruiting more students to primary care; (2) improving the attractiveness of rural practice; and (3) improving the long-term financial viability of rural primary care. This can be done by changing medical school admissions to recruit more students interested in primary care, especially those interested in rural practice. This can also be accomplished by providing pre-clinical and clinical training in rural settings, and reducing the financial burdens on students.
Gower Simkin 2000	Descriptive	Undergraduate Curriculum Interventions	N/A	Purpose was to describe a study of a recent student-led initiative at Queen's University – the Queen's Rural Medicine Initiative – which involved rural 'observerships', a lecture series, and rural electives for Y1 and Y2 students.
Gray 1997	Descriptive	Postgraduate Curriculum Interventions	N/A	Description of the Northern Family Education Program at Memorial University of Newfoundland. It involves a special 7-month rotation for family medicine residents including various northern activities such as summer and winter camping retreats. The program has a 90% success rate and cites strong

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				community support as an important factor, especially the support received from the regional board.
Gray Steeves Blackburn 1994	Descriptive	Postgraduate Curriculum Interventions	200 graduates of primary care residencies between 1987 and 1991 who were licensed to practice in one of the Atlantic provinces. 371 graduates of other specialty residencies between 1981 and 1991, regardless of practice location, but including those programs with more than 10 graduates.	Purpose was to determine the practice locations of those individuals who had received primary care residency training at Dalhousie University and had entered general or family practice in order to determine the influence of their training locations on practice locations. The postgraduate training programs require training in rural communities. The family medicine training program requires at least 12 weeks with a community family physician in a rural setting. The specialty training programs have encouraged (not required) senior residents to spend 3 to 6 months of their final year of training under the supervision of a specialists practicing in a rural community. The authors note that many residents have taken advantage of this opportunity. The study design involved a review of the practice locations of the study sample. The study findings indicate that of the 200 primary care graduates, 65% remained in practice in Atlantic Canada, while 57% had practices in rural locations. Of the 371 specialty graduates, 50% or more of those with practices in the Atlantic provinces practiced in rural locations in general surgery, internal medicine, ophthalmology, and otolaryngology.
Gutkin 1998	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Purpose was to advocate improvements in the core curriculum of family practice programs to provide required skills to rural doctors. The College of Family Physicians of Canada has set up a Working Group on Rural Family Medicine Curriculum.
Hamilton 1995	Informed Opinion	Pre-medicine Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Describes the problems faced by rural physicians in Canada. It also describes how some rural physicians are beginning to come together to present a united front and address these problems. The stress faced by rural physicians has been especially noted as a problem that needs to be addressed. Such issues have prompted rural physicians to come together, in Nova Scotia for example, and to form a group that best represents their needs. To address the problems faced by rural physicians some of the reforms necessary include: (1) medical schools making changes in their selection criteria for students, as well as changes in their training programs, to better prepare physicians for rural practice; (2) rural physicians becoming mentors to encourage young people who grew up in rural areas to go to medical school and medical schools should set aside places for these students; and (3) better training for rural physicians at all levels, including CME.
Hart Salsberg Phillips Lishner 2002	Informed Opinion	Pre-medicine Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Summarizes some of the challenges of rural health research and policy regarding health provider supply. These challenges include the increasing number of female physicians. Women are less likely to locate in rural areas than males so as the percentage of female physicians increases, the shortage of physicians in rural areas might worsen. There is also the challenge of following the "pipeline". The production of rural generalist physicians is a process which occurs from pre-med through practice support in rural areas. There needs to be encouragement of rural students, admission of students from rural backgrounds and with rural interests, undergraduate and postgraduate programs which focus on training in rural areas and advanced skills training for rural areas.
Harvey Sandhu Strasser 1995	Descriptive	Other (Rural Health Issues)	317 health practitioners	This study encompassed a survey of health practitioners with an interest in health in rural and remote Australia. The most important unresolved issues in rural health were service delivery problems, difficulties experienced with attracting and retaining staff, continuing education, aboriginal health and shortage of finances.

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Hays 2003	Informed Opinion	Other (Role of Rural Medical Education)	N/A	Discusses whether or not rural medical education should be considered in a different context from medical education. There are currently numerous medical education initiatives underway which are intended to address rural workforce shortages. There are initiatives underway in Australia, Canada, and in the UK. Notes that one challenge to the concept of rural medical education lies in the definition of the term "rural", as it is used differently in many parts of the world.
Hays 2002	Descriptive	Admissions Undergraduate Curriculum Interventions	N/A	Purpose was to describe the role of the new School of Medicine at James Cook University in Queensland, Australia and its efforts to improve the health care of local aboriginal peoples. The mission of the school is improving health care of aboriginal peoples in region similar to aboriginal focus of many other parts of this university. Aboriginals are given seats on committees selecting students, staff, curriculum and research. Staff selection includes criterion of understanding of aboriginals; student selection includes statement about attitudes to aboriginals. Curriculum has heavy focus from Y1 on aboriginal issues, plus cultural awareness programs
Hays 2001a	Informed Opinion	Undergraduate Curriculum Interventions	N/A	This editorial letter provides an update on initiatives which have been implemented by medical schools in Australia since the Rural Undergraduate Steering Committee report was delivered in 1994. More students from rural backgrounds are entering medical school; medical school curricula is providing more positive exposure to rural practice; and rural student clubs are fostering peer support for those interested in a rural career.
Hays 2001b	Descriptive	Admissions Undergraduate Curriculum Interventions	N/A	Purpose was to describe the establishment of a new Australian medical school in 1992. Admissions focuses on rural students and in addition, reserves five spots for aboriginals. The program focuses on rural practice; curriculum is community and problem-based and includes aboriginal issues.
Hays 1992	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes the Rural Careers Project, a program to promote awareness of rural careers among undergraduate health discipline students as the University of Sydney. Activities include regular meetings where rural issues are discussed and provision of financial support for student attachments with rural practitioners during vacations. The article describes how this program took 62 students for a weekend in Mudgee, a small community about 4 hours west of Sydney. Students toured the hospital and local practices and met with local health professionals. After the visit, many students expressed an interest in rural practice. Students were positive about the variety of work and professional independence offered by rural practice, but they were also aware of the difficulties rural practice posed for spouse's careers, the education of children, and the lack of anonymity. Program demonstrates that even at one of Australia's most metropolitan universities there are students interested in rural careers.
Hays 1991	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Discusses how lack of training in procedural disciplines such as obstetrics has emerged as a priority issue. It is possible under the present system in Australia for recent graduates to enter rural practice with minimal obstetric experience. In Australia, the R. A.C. G. P. family medicine program is therefore formalizing a rural training stream to equip graduates with the necessary skills. The author makes some suggestions to ensure that future diploma holders will be competent for rural practice. First, training posts should ensure the trainees actually achieve competence in the necessary skills. Second, part of the training time should take place away from Metropolitan and major urban training hospitals. Third, applicants to the diploma program should also be screened to ensure that intended rural practitioners are given priority.
Hays	Informed Opinion	Postgraduate Curriculum Interventions	N/A	This paper describes the rural vocational training program conducted by the family medicine program in North Queensland, Australia. The program combines educational support, professional support and

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1990				mentorship with a medical educator experienced in rural practice. The program encompasses ongoing telephone teleconferences between rural trainees, regional workshops and seminars in which trainees from remote areas are brought in for small group discussions on a variety of topics, and traineeships for rural practitioners to update knowledge and gain experience in procedural skills.
Hays Gupta 2003	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Purpose was to assess the challenges of designing curriculum for rural medical education as exemplified by new Australian medical school at James Cook University. Designing problem cases that realistically present rural issues is difficult. Cases should therefore be developed using standard techniques by multidisciplinary teams and can be used either as teaching cases or as assessment cases. Cases must also be written by teams that include rural physicians in order to ensure an accurate reflection of rural practice. In addition, the inclusion of indigenous cases requires particular attention to cultural specificities and the participation of local experts in case writing.
Hays Gupta Arlett 1994	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Discusses the development of the clinical school of the Faculty of Medicine of the University of Queensland in Brisbane, Australia. The clinical school links with the facilities in the region. The unit supports in-house research and facilitates research by individual general practitioners and divisions. The mission of the general practice unit is to make graduates aware of the nature of general practice in northern Australia, and produce general and rural practitioners confident in practice in the region. Medical students are exposed more frequently to general practice. Learning activities are community oriented and problem based.
Hays Veitch Langan 1996	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Reports on an evaluation of the new assessment procedure that was developed at the University of Queensland for the 2-week final year rural placement. During this time, students have little contact with the academic staff so much of the evaluation is conducted by the rural GP preceptors. Materials developed include: learning objectives; assessment guidelines for the students and rural GP preceptors; an assessment form that aims to measure student performance against the learning objectives; and a negotiated set of objectives (negotiated by students and preceptors) to match local opportunities and rate performance. Students and preceptors were surveyed to determine how this assessment model was working. Overall, the new procedure was supported by all involved.
Hays Bridges-Webb Harris Bushfield 1992	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes Academic Rural General Practice Units (ARGPUs) which have been established in Australia. The roles of ARGPUs are the same as for any clinical academic unit: teaching, research, advancing the discipline, and providing clinical service. There is a vertical integration of roles, with undergraduate, vocational and continuing education programs conducted within the unit; and a horizontal integration with ARGPUs collaborating with rural training programs for other health workers. Teaching programs include undergraduate rural attachments, vocational training clinical practice, continuing education, and graduate and postgraduate degree programs for future rural academic clinicians. ARGPUs should be centers for researching the needs of rural practitioners, methods of delivering education programs, and how healthcare is provided to rural Australians. ARGPUs could also be extended to develop multidisciplinary academic rural units. Combining academic nursing and other health professional staff with academic general practice would produce even larger groups of academic staff which would allow for conjoint teaching and demonstrate the importance of a multidisciplinary approach to healthcare in smaller communities. The development of ARGPUs is essential to the future of rural medical practice. They provide an opportunity to develop rural resource centers with expertise in teaching, research and clinical practice.
Hays Acklin Chan	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes the activities of the University of Sydney Rural Careers Project, which was established to increase the opportunities for undergraduate students in the health professions to learn more about what is like to live and work within a rural community. Students are provided with opportunities to

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Davis McAllister Murphy et al. 1993				learn about rural professional life through rural community-based attachments. The project also provides financial and logistic support for students wishing to spend a minimum of two weeks during vacations with a rural professional.
Head Harris 1989	Descriptive	Pre-medicine Admissions	246 applicants to the University of Utah School of Medicine. A copy of the survey was mailed to each applicant. Two weeks after the initial mail-out a follow-up letter was sent. 190 surveys were returned for a response rate of 77%.	Purpose was to examine the medical school applicant pool to determine: the applicant characteristics that correlate with an intent to practice in rural areas; whether applicants from rural areas or those who plan to practice in rural areas are proportionally represented in the applicant pool; where there are factors that might suggest a relationship between intent to practice in rural areas and acceptance to medical school. The study findings suggested several characteristics which were found to be correlated with intended practice sites. These included specialty choice; size of community of origin; degree of interest in fishing, hunting, theatre, ballet, and symphony. The study findings also suggest a tendency to prefer non-rural areas as practice sites exists before applicants start medical school. It also indicates that students from rural areas are underrepresented in the medical student body. Programs and policies which aim to increase the number of applicants to medical schools from rural areas might be crucial in reversing the physician maldistribution problem. To do this it might be necessary to increase awareness on the part of Admissions Committees for the need for greater rural representation in the student body.
Henderson et al. 2001	Quasi - Comparative	Advanced Procedural Skills Training	314 physicians in 39 communities, of these, 154 were from NIA (northern and isolation allowance) communities	Purpose was to study procedural skills practiced by BC family physicians in order to examine two hypotheses: (1) that lack of comfort in important procedural skills is a factor in the recruitment and retention problems of northern communities and (2) that foreign-trained doctors are less reluctant to work in the north because they are more comfortable with these procedures. The study design involved a review of a 132-item procedural skills form that had been completed as part of a credentialing process. Both hyotheses were confirmed in the study findings. Canadian-trained FP's tend not to perform a number of important obstetric, surgical, anaesthetic and orthopedic procedures; foreign-trained doctors perform these more frequently; so do, Canadians with CCFP training.
Hickner 1991	Descriptive	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N = 10	The purpose of this study was to survey the heads of departments of community medicine/general practice of Australia's 10 medical schools and the state directors of the family medicine program to document present efforts to train doctors for rural general practice. Rural Electives were available at all schools on request. Four schools regularly offered rural experience outside of the general practice curriculum. The majority of general practice departments offered at least one seminar discussing the pros and cons of rural practice. Challenges included: lack of affirmative action admissions policies to recruit rural students; insufficient curricular time for teaching the principles of general practice; students' lack of confidence in the procedural aspects of rural practice; lack of appropriate training posts in anesthetics; lack of appropriate general practice training posts at regional hospitals; and lack of financial resources. Recommendations include: assess students applying to medical school to determine interest in general practice in rural areas; decentralization of hospital training with development of high-quality programs at regional hospital; specific evaluation of rural programs to determine if they really encourage students and trainees toward rural practice; the family medicine program should attract a percentage of graduates to establish practice in rural areas; develop bridges with sympathetic specialists to obtain their support for rural training.
Hicks 1990	Informed Opinion	Financial	N/A	This paper discusses issues surrounding the problem of the maldistribution of physicians in the United States. It also discusses means for defining medically underserved areas, as well as the influence of the National Health Service Corps established in 1971 by the United States federal government. The

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				purpose of the National Health Service Corps was to improve the delivery of health services to persons living in communities and areas of other United States where health personnel, facilities, or services were inadequate to meet health needs of the residents. The author suggests that research needs to be undertaken to determine the specific, appropriate mix of services to meet specific medical problems in different rural areas. An improved understanding of practice styles and patterns in different rural communities is also critical to developing an efficient and effective rural health-care system.
Higgins Szafran 1990	Descriptive	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	552 rural Alberta physicians Response rate: 370 (67%)	A questionnaire was distributed to rural Alberta physicians to determine the demographic profile of practicing rural physicians, to identify factors that attracted and retained physicians in rural practice, and to identify the skills that newly trained general practitioners require for rural practice. The study findings show some of the factors that attracted physicians to rural medicine as: opportunity for a variety of medical experiences; lifestyle and personal/family reasons; and having lived in a rural community most of their lives. The primary reason for leaving was retirement, followed by career advancement, limited challenge, and heavy workloads. With regards to rural practice skills, respondents placed emphasis on the need for skills in obstetrics, gynecology, anesthesia, general surgery, pediatrics, orthopedics, long-term care and geriatrics, and coronary care. Although the need for more skills in emergency medicine was not cited, unlike several other studies, the authors note that they failed to include this skill as an area on the questionnaire.
Higgins et al.	Descriptive	Financial Admissions Undergraduate Curriculum Interventions	822 allopathic and osteopathic medical students in West Virginia (3 medical schools) from all years. Response rate: 51.8%	Purpose was to find student intentions concerning practice location and to discover the factors that they say would influence their decision about staying in primary care in West Virginia. The study design involved the distribution of a postal survey. The study findings indicate the students' intentions as follows: primary care (54.8% yes, 32.6% maybe, 12.6% no); remain in West Virginia (36% yes, 49.8% maybe, 14.2% no); and primary care in West Virginia (25.8% yes). Intentions to stay in West Virginia and practice primary care decline as students get further into their training. There were no significant differences among the three schools or significant gender differences. Most important factors that could influence choice were financial with lifestyle factors second and educational factors in their medical training ranking lowest.
Hirsh Wootton 1990	Informed Opinion	Undergraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Purpose was to examine the problem of rural recruitment and retention and examine the experience of the McGill rural program.
Holub Williams 1996	Informed Opinion	Financial Advanced Procedural Skills Training	N/A	Purpose was to provide an overview of the General Rural Practice Incentives Program (GRPIP) which was introduced in 1992. GRPIP involved a number of initiatives, both long-term and short-term measures, to address recruitment and retention issues. It specifically aimed at addressing a range of disincentives of rural practice. The specific aspects of the GRPIP included: (1) support with establishment costs (relocation grants); (2) training opportunities, for example in procedural skills (training grants); (3) integrating GPs with other practitioners; (4) providing ongoing support to relocate GPs and their families; (5) supported access to locums and continued medical education (continued medical education/locum grants); (6) student selection and awareness of and exposure to rural practice and rural lifestyle (undergraduate support grants); and (7) improved remuneration (remote area grants).
Homan 1994	Informed Opinion	Financial Undergraduate Curriculum Interventions	N/A	Discusses rural training from the trainee's perspective in Australia. Outlines the author's own path into rural training. This included training in one-doctor towns and Aboriginal settlements. The author comments he was unsure of his career path before graduation and took a diversity of training posts in order to make a decision. The author comment's that his wife also shares his appreciation of the rural

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		Postgraduate Curriculum Interventions		lifestyle and has been supportive. He states this was critical. When comparing his path into rural training with the literature's view of who is likely to enter rural practice, the author notes that while he is not from a rural background, he did have early rural exposure (both personal and professional). He also notes that he chose a training location because of the quality of training available and it offered career options for his wife. The author discusses what he feels are some important issues for rural trainees: (1) streamlining rural training programs to combine the College's high standard of general practice with the rural focus of the rural training units; (2) minimizing the social, educational, and financial disincentives of rural training; (3) exposing rural trainees to as many of the innate attractions of rural medicine as possible; and (4) considering the spouse and family of the rural trainee.
Howe Lehnherr Katterhagen 1994	Quasi - Comparative	CME	N/A	Describes feedback received from a rural physician intervention program to promote state-or-the-art breast cancer diagnosis and treatment in rural areas. Rural physicians were sent information about seminars designed to provide feedback on management of breast cancer patients in the area. 86 physicians attended. Previously compiled data was used to develop the educational seminars. Chart audits revealed changes in physician behaviour - changes in the practices of tumor staging and bilateral diagnostic mammography.
Hoyal 2000	Descriptive	CME	Rural physicians in Australia (N=1050) Response rate: 525 (50%)	Describes a method for assessing the needs of rural doctors for educational topics and skills upgrades. The instrument (a questionnaire) was distributed to rural physicians in Australia and sought to determine the priorities of rural practitioners for education support in the areas of skills development and clinical knowledge. Rural doctors selected lifesaving skills as priority. Acute procedural skills were also demonstrated to be of importance to rural general practitioners.
Hoyal 1999	Descriptive	CME	N/A	Reports the findings of a national needs assessment of the continuing professional educational needs of Australian rural medical practitioners. A questionnaire was distributed by mail to general practitioners and Australia (response rate was 15%). A major component of the study was to determine which modes of CME delivery rural doctors currently use and which they would prefer to use. The preferred mode to see me delivery continue to be directly attractive and face-to-face nature. Internet-based World Wide Web and hybrid CD methodologies received a general lack of priority.
Humphreys Nichols 1995	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Outlines a national framework that identifies the role of Rural Health Training Units (RHTUs) within the broader State and Commonwealth context of Australia. The purpose of these units is to play a leading role in insuring appropriate undergraduate, postgraduate and continuing education and training for all rural health workers by: undertaking research into the training needs and understanding competencies required; developing and evaluating suitable curricula; developing suitable orientation programs and distance delivery of continuing education; and coordinating education and training activities relevant to rural areas. Rural Health Training Units have been established across Australia as a means of developing and coordinating education and training programs to meet the particular needs of rural and remote area practice.
Hunt Norris Ballweg 1995	Informed Opinion	Pre-medicine Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Describes aspects of the University of Washington WAMI Program. The program promotes the "pipeline" idea – education before medical school. Enrichment programs for rural and minority students were established at the high school and college level to help them maintain interest and remain competitive for medical school admission. A decentralized medical school curriculum repeatedly exposes students to community-based training. This includes early undergraduate electives and required rotations in rural areas. Offers specialized training of residents for rural settings and special support programs to help small rural hospitals to remain financially viable.
Hutten-Czapski	Comparative -	Undergraduate Curriculum	8200 physicians	Purpose was to examine the hypothesis that location of medical training is correlated with rural/urban

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2002	Cohort	Interventions Postgraduate Curriculum Interventions		practice location two years after graduation. The study design involved matching records of physicians graduating from family practice programs and specialty programs with CMA databases for practice location. The study findings show that location of training does make a significant difference with some schools - i.e Memorial University and Laval (46% and 41.7% of graduates practicing in rural areas respectively) as compared to University of Toronto (4.6% practicing in rural areas).
Hutten-Czapski 2001	Informed Opinion	Other (Recruitment and Retention Factors)	N/A	Discusses the extent of the problem of rural recruitment and retention and the need to integrate doctors more effectively into rural communities. Indicates that financial incentives are not enough. The key is to recruit students who are from rural areas.
Hutten-Czapski 1998a	Informed Opinion	Advanced Procedural Skills Training	N/A	Purpose was to endorse the 'Joint Position Paper on Rural Maternity Care' advocating better obstetrics training for rural GPs. Recommends better obstetrics training such as newly developed 'Advanced Life Support in Obstetrics' now being given through CFPC.
Hutten-Czapski 1998b	Informed Opinion	Financial Other (Recruitment and Retention Factors)	N/A	Purpose was to advocate a greater effort by Canadian provinces to design incentives to attract and retain GPs for rural practice. Compares provincial incentive schemes. Finds that all provinces have experienced significant attrition of rural doctors but Manitoba and Quebec have done the best. Their multi-pronged approaches, including some educational innovations, are praised.
Iglesias 1999	Informed Opinion	Advanced Procedural Skills Training	N/A	Informed opinion article arguing the urgency of continuing to train Canadian GPs in advanced skills.
Iglesias Hutten-Czapski 1999	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	This is a joint position paper by SRPC, SOGC and CFPC on training for rural practitioners in advanced maternity skills and caesarean section. The disciplines of family medicine and obstetrics and gynecology need to design and deliver formal, accessible training programs for advanced maternity skills. CFPC will have to accredit the programs. The training and privileges for these advanced maternity skills are advocated for rural physicians, hospitals and communities only and should not be considered transferable to settings where there is an adequate number of specialist obstetricians. Paper reviews the literature, discusses the potential benefits to rural women and their infants, scope of practice, training, maintenance of competence, and makes 18 recommendations.
Iglesias Thompson 1998	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Purpose was to advocate a new approach to training and accrediting and organizing rural physicians with advanced skills. Reviewed the literature on outcomes of advanced skills by GPs as compared to specialists in various areas. The findings suggest that properly trained family physicians can provide high standards of care in advanced skills. However, the current system for training and CME is improvised and inadequate. New approach to training and certification is required based on shared skill sets with identical standards of care on model of obstetrics.
Iglesias Jones 2002	Descriptive	Advanced Procedural Skills Training	N/A	Determines the type of physicians that provide surgical services in rural Western Canada. This was accomplished through questionnaires sent to all rural hospitals in Western Canada that provided either caesarean section or appendectomy services. The authors identified 76 rural surgical programs staffed by 22 Canadian-certified general surgeons, 128 GP surgeons, and 174 family practice anesthesiologists. The opinion is that it would be possible to staff every reasonable rural surgical site with certified specialist surgeon and there would be a continuing need for GP surgeons.
Iglesias Strachan	Descriptive	Advanced Procedural Skills Training	All rural family physicians in Canada 1995-96 (N= 4866)	Purpose was to document the role of rural family physicians in providing advance skills services. The study design involved an examination of CIHI's National Physician Database (NPDP) on services and

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Ko Jones 1999				billings. The findings show that a surprisingly large number of family physicians perform anaesthetic, surgical and obstetric services especially in Western Canada.
Inglis 1995a	Informed Opinion	Advanced Procedural Skills Training CME	N/A	Discusses the provision of surgical services in rural Western Canada. There is a lack of general surgeons available in rural communities. Most rural GPs confine themselves to a number of basic procedures in which they feel competent, but some are forced by community or peer pressure to attempt procedures for which they have inadequate training or experience. Suitable guidelines would help them be judicious in the interventions they attempt. There have been guidelines proposed by the College of Family Physicians of Canada and the Royal College of Physicians and Surgeons of Canada for training family physicians in resuscitative and surgical techniques. They form the basis for surgical training for physicians in rural areas but as of this article's date of publication, no formal training programs have developed from these guidelines. This needs to be addressed.
Inglis 1995b	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	The practice of general surgery in rural communities in Canada requires a broad scope of training. The Royal College of Physicians and Surgeons of Canada have introduced training requirements to meet the needs of these communities. Family physicians need to acquire additional skills to manage surgical problems. The skills required are specific to a particular area and might vary from region to region and province to province. The teaching of these additional surgical skills to family physicians should be undertaken by certified surgeons with interest, experience, and credentials as teachers and the learning environment should include both the academic and community setting.
Irigoyen et al. 1999	Comparative - Cohort	Undergraduate Curriculum Interventions	294 Y3 students at one New York medical school randomly assigned over two academic years to one of four primary care specialties in a variety of urban, suburban, or rural locations (total of 17) for their required 5-week primary care clerkship. Of the sites, 11 were urban, four suburban and 2 rural.	Purpose was to determine whether location or specialty of preceptor have any impact on student learning and satisfaction. Satisfaction rated by 20-item end of clerkship questionnaire; student competence was measured by clerkship grades based on preceptor evaluation, a paper, an oral presentation and a final exam. Finds that rural location was positively related to higher student satisfaction, but specialty of primary care mentor was not. Learning results, as measured by test scores, did not differ significantly among sites or specializations of mentor; effect of location was independent of patient volume.
Irvine 1988	Informed Opinion	Other (Recruitment and Retention Factors)	N/A	Describes the involvement of the University of Saskatchewan to address the problems of recruitment and retention of family physicians in northern Saskatchewan. The involvement consists of the provision of resident family physician services, visiting consultant services, family practice resident training, research and the consulting role of the Medical Health Officer.
Jackson Jackson 1991a	Informed Opinion	Pre-medicine Admissions Undergraduate Curriculum Interventions CME	N/A	Discusses the function of the Western Australian Center for Rural and Remote Medicine (WACRRM), formed in 1990. The following considerations are important influences on the Centre's activities: (1) The recruitment of physicians for rural and remote practice demands action from secondary school through the undergraduate and postgraduate years; (2) the option of a career in medicine must be presented to rural high school students, who are currently underrepresented in applications and admissions to medical school; (3) students of rural inclination must be identified and nurtured from the undergraduate years; and (4) retention of rural physicians involves the development of another set of strategies to meet their personal and professional needs. A Rural Students' Club was formed to meet some of these considerations. The club is made up of medical undergraduates from all levels that share a desire to enter rural practice. There are monthly meetings with guest lecturers and activities. Prizes

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				(i.e. a weekend duty run with the Flying Doctor Services) are raffled with the aim to enhance rural interest and life experience. Rural Teaching Centres have also been established.
Jackson Jackson 1991b	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Surgeons do not wish to teach non-specialists how to cope with emergency surgical situations, anesthetists have espoused the same philosophy, and radiologists have not accepted that general practitioners in remote situations need to take and interpret x-rays. It is important for the whole profession, secondary and tertiary hospitals, for all with some responsibility for the health and well-being of rural Australians, to accept the need to train those who are prepared to take service in rural areas.
Jackson Jackson James-Wallace 1993	Informed Opinion	Pre-medicine Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses the SPINRPHEX Club, an initiative that has raised the profile of rural practice within the University of Western Australia. This acronym refers to "students and practitioners interested in rural practice, health, education, excetera (sic)". It is a rural students' club for students from a rural background, and/or for those who are interested in rural practice. Membership requires attendance at only 3 meetings. Guest speakers are often invited to speak to the members and great care is taken to ensure that all have a bias of rural interest. Topics addressed have included flying doctor or nurse, Aboriginal belief systems, and rural counselling. Club members have also been making visits to rural high schools to try and foster a change of attitude about medical education.
Jensen DeWitt 2002	Comparative – Cross-sectional	Postgraduate Curriculum Interventions	70% (N=58) of internal medicine residents who completed rural electives and 61% (N=51) of matched internal medicine residents who did not do rural electives.	Purpose was to examine how rural electives affects internal medicine residents' opinions about rural practice and which factors encourage or discourage choice of rural practice. The methodology involved the completion of questionnaires by residents who did a 1-2 month rural elective and a matched group of randomly selected residents who did not do a rural elective. The study found that residents who did rural electives reported more interest in rural practice before (p=0.01) and after the rural elective (p=0.02) than participants in urban practice. Rural elective participants were more likely to see the breadth of practice (p=0.02), continuity of care (p=0.009), quality of life in rural areas (p=0.009) and experiences with mentors as encouraging rural practice (p=0.05). Elective participation did not demonstrably increase rural career choice. Elective participants suggested that electives may be more effective if they occurred earlier in their training (p=0.03), lasted for longer periods of time, and address the needs of spouses and partners (p=0.02).
Jones McGhee 1995	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Purpose was to describe the Rural Primary Care Clerkship (RPCC), a required rotation for medical students in the Morehouse School of Medicine. The clerkship moves the education of medical students from the urban hospital and institutional setting into rural communities and into the first most frequent point of service, the doctor's office. The clerkship is required for medical students, either in the third or fourth year after completing at least one clinical rotation. The goal of this training experience is to provide direct experience in rendering comprehensive, nonhospital-based primary care to rural populations, analyzing rural health problems, and evaluating outcomes.
Jones Oster Pederson Davis Blumenthal 2000	Comparative – Pre-Post test	Undergraduate Curriculum Interventions	90.4% (N=291) Morehouse School of Medicine graduates completed the questionnaires. Nationally 122,416 responded to the questionnaires. These were for the period 1988 to 1997.	Purpose was to examine the relationship of rural clerkship to medical students' interest in establishing careers in rural communities. Questionnaires completed by Morehouse's graduates were compared to the data retrieved through the Association of American Medical Colleges Medical school graduation questionnaire to examine student demographics, medical school experiences and career plans. Following a transition period of two years, MSM students showed a statistically insignificant increased preference for future career in a rural community (p= 0.094). A smaller upward trend in the national data was observed.
Jong Beach	Descriptive	Postgraduate Curriculum Interventions	14 family medicine residents	Purpose was to describe the NorFam program of Memorial University of Newfoundland which trains family medicine residents in Labrador, northern Canada and relate this training to location of practice

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1997				of its graduates. Following the 28 weeks family medicine rotation in the second year of residency, 91% (n=10) who completed training were practicing in rural areas. 3 of the 14 residents who did NorFam were undertaking further postgraduate training. 60% (n=6) returned to work in Labrador. 86% (n=12) evaluated the program as excellent overall. All residents felt that NorFam training encouraged them to work in rural practice. An additional 3rd year was recommended for additional skills training in community development, surgery, obstetric and gynecology and anesthesia.
Kamien 1996a	Comparative - Cohort	Undergraduate Curriculum Interventions	5th year students who volunteered for their specialty rotation in a rural area (N=28). They allotted 3 consecutive weeks from one of their 8-week rotations for this initiative. 28 students who remained in the city hospitals.	Purpose was to compare the rural specialty experience of students with those who remained in the city hospitals in order to determine if rural students are being disadvantaged by their experiences. The study design involved pairing a student from each group together. Each pair of students was asked to record their experiences (i.e. the patients' problems, the procedures they observed, took part in, etc.) and then compare their learning experiences. They were then interviewed by the author. The study findings indicate that rural students saw more patients and medical conditions that their pairs in the metropolitan teaching hospitals. Rural students encountered medical emergencies more than twice the time of their urban counterparts. They also performed more procedures in internal medicine. With regards to obstetrics, however, there was little difference between the rural and metropolitan students with regard to labour and neonatal care experiences. The rural students actually saw fewer neonatal complications. Students stated they would strongly recommend the rural term to other students.
Kamien 1996b	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Describes rural student clubs and their role in reminding medical schools of the need to fulfill their social responsibility to the population of rural Australia. Rural student clubs were set up to nurture students with an interest in rural medicine and to be part of a rural counterculture within the traditional medical school environment. Rural students clubs can help contribute to curriculum reform. Its members are able to prioritize many of the issues important to rural communities. Its members can get themselves together, generate lists of problems in the existing curriculum, identify common themes, and suggest solutions to these problems which may be course-specific or across the curriculum.
Kamien 1995	Informed Opinion	Pre-medicine Financial Undergraduate Curriculum Interventions	N/A	Describes the establishment of the Rural incentives Program (RIP) by the Australian Government in 1992 to help improve rural Australian's access to general practice services. One of the goals of the program was to assist Australian medical schools in setting up programs that would challenge and encourage medical students to pursue a career in rural practice. The literature consistently identifies two key factors that influence a medical student to choose a career in rural medicine: (1) growing up in a rural community; and (2) undergraduate exposure to rural practice. However, rural high school students are often disadvantaged by limited school subject choices, a lack of peer pressure for academic achievement, and young inexperienced teachers. It is recommended that medical students spend a minimum of 8 weeks in rural practice and that financial supports be extended to all students.
Kamien Buttfield 1990a	Informed Opinion	Admissions	N/A	The authors believe that the proportion of country students in medical schools can be increased through promotion and by advertising in rural schools, gaining support of science teachers and school career counselors, and having country general practitioners talk to the senior students. Rural students should also be given help with examination preparation to enable them to compete more successfully with urban students. The medical school admission process also has a major influence on practice location. The selection process could be made more equitable for rural students with marginal matriculation racks. Five to 15 percent of places could be reserved for socially, economically or geographically disadvantaged students. There could also be a special quota of rural students. The selection process is one method by which a medical school can influence the geographical location and future specialty choice of its graduates.
Kamien	Informed	Undergraduate Curriculum	N/A	The medical school is the major influence shaping students ideas values and knowledge. Over 90

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Buttfield 1990b	Opinion	Interventions		percent of the teaching in medical schools is done by sub-specialists who view the world through the highly magnified lenses of their own specialized experience and have never practiced outside the teaching hospital or had firsthand experience of rural health needs. Sub-specialists are usually powerful role models, the significant others from whom most medical students acquire their philosophies, attitudes, and behaviours. Most of them hold general practice in low esteem. Students need to see that high-quality medicine can be practiced in small centers. There is considerable evidence that an adequate undergraduate exposure to rural medicine is a significant factor in attracting doctors to rural areas. Students also need opportunities for hands-on learning with skilled general practice preceptors. These rural role models are potentially more powerful teachers than can be provided in the medical school. At present, student experience is heavily skewed towards urban-tertiary preferred practice. This educational process does not accord much value to rural general practice or inspire future doctors to serve rural communities. It also fails to give students the confidence to practice independent medicine in isolated areas.
Kamien Buttfield 1990c	Informed Opinion	CME	N/A	Rural doctors require special skills in emergency medicine, hospital inpatient management, obstetrics, anesthetics and surgery. They also need a special knowledge of aspects of medical care pertinent to their location, which may include aboriginal health care, as well as industrial or agricultural medicine. In Western South Australia, 80% of rural general practitioners practice obstetrics and around 60% practice anesthesia. These skills are regarded as necessary and integral parts of country general practice.
Kamien Buttfield 1990d	Informed Opinion	CME Other (Recruitment and Retention Factors)	N/A	A major factor in attracting doctors to rural areas and keeping them there is the professional satisfaction they obtain from feeling needed and practicing a highly personalized form of comprehensive care. The very nature of rural practice creates a special continuing medical education needs. Education doesn't always have to flow from the center to the periphery. Teaching centers should have programs where rural doctors can give their perspectives to tertiary-based academic colleagues. This should help improve the understanding of special problems of country practice. Rural doctors have to know more about everything than any other doctor in the health-care system. Their task is usually harder than the doctor working in a well equipped and staffed hospital. One of the major factors in recruiting and in particular retaining a doctor in the country is a liking for the rural lifestyle. The greatest social problems faced by rural doctors and their families are the education of their children, a relative absence of privacy and lack of time off duty and off call. The shortfall of doctors in rural and isolated areas of Australia is due to a complex mix of factors which extend from the under-representation of students from rural areas in medical schools, through the socialization process of undergraduate and postgraduate medical education, to the difficulties experience by rural doctors in achieving a good income with sufficient and undisturbed leisure time to enjoy a quality of family life.
Kamien Bassiri Kamien 1999	Descriptive	Other (Career Choice)	5th year (N=116) and 6th year (N=107) medical students from the University of Western Australia. 93 of the 5th year students returned the questionnaire, for a response rate of 80%. 77 of the 6th year students returned the questionnaire, for a response rate of 72%.	Purpose was to study the frequency of negative comments (badmouthing) made by teaching hospital specialists about metropolitan and rural GPs and by GPs about hospital specialists, and to study the impact of these comments on medical students' intended career choice. The study design involved a retrospective questionnaire-survey. It was a modified version of one developed by medical educators at the University of Washington School of Medicine. The questionnaire was administered to 5th year students after a class lecture. They were completed and collected on the same day. The 6th year students received questionnaires by mail with a reply paid envelope. Reminder questionnaires were sent after 4 weeks. The study findings indicate that when allowed to select one or more career choices, 36% expressed an interest in city general practice, 39% in rural general practice, 70% in specialization. One or more negative comments were heard about urban GPs by 67% of students; rural GPs by 50% of students; and teaching hospital specialists by 59% of students. Badmouthing had either no or only a small influence on the attitudes of 88% of students towards urban general practice, 90% toward rural

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				practice, and 93% toward teaching hospital specialization. When asked if badmouthing influenced that against seeking a career, 12% of students claimed to have been influenced against becoming an urban GP, 7% against becoming a rural GP, and 8% against becoming a teaching hospital specialist.
Kassebaum Szenas 1993	Comparative - Cohort	Admissions	5387 students who could be linked to all three questionnaires.	Purpose was to describe the contribution of students from rural origins to the enrolment of US medical schools between 1982 and 1992. The study design involved an examination of the preliminary practice plans of entering students with rural and non-rural backgrounds. These plans were then compared with their practice plans and specialty certification intentions four years later when they were graduating. The data used were from the AAMC's 1988 Matriculating Student Questionnaire (MSQ) and the 1992 Medical School Graduation Questionnaire (GQ). Data on students' hometown sizes was obtained from the AAMC Premedical Student Questionnaire (PSQ). The study findings indicate that the numbers of total matriculants and maticulants with rural backgrounds remained constant throughout the study period. While medical students with rural backgrounds were 4 times more likely than students with non-rural ties to plan rural practice at matriculation and at graduation, 74.6% of those with rural ties and 70.3% of those with non-rural backgrounds of the 1992 graduating class planned to seek certification in a generalist specialty. However, this entire group only makes up 3.7% of the entire study population. The study therefore concludes that the contribution of students with rural backgrounds in improving the shortage of rural physicians is somewhat limited. The findings show that medical schools' output of rural physicians is dependent on nurturing generalism and rural practice on both rural and non-rural students. More will be gained by sustaining the interest of all entering students in rural practice.
Kaufman 1990	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Discusses how students must receive early and sustained exposure to rural communities and to rural physician role models if learning in medical school is to be suitable for rural practice. Medical schools can reach out to the community and facilitate the rural learning experience for students by: (1) sensitizing faculty and residents to community health needs via in-service training on community health topics; (2) encouraging faculty and residents to provide services and education outreach to rural communities. This might take the form of expanded community-based CME courses. It might also involve providing consultation services to rural practices; and (3) promoting rural health research.
Kaufman et al. 1989	Descriptive	Undergraduate Curriculum Interventions	N/A	Purpose was to describe the development and outcomes of the Primary Care Curriculum (PCC) - an educational curricular track which runs parallel to the conventional curriculum at the University of New Mexico School of Medicine. The curricular track features problem-based and community-oriented learning and was designed to attract students to careers in primary care in rural and underserved areas. As part of their program in the first year, students relocate to rural, medically underserved areas of New Mexico and work with rural physicians. To decrease professional isolation special arrangements are made by the medical center library to support the information needs of the students and their preceptors. A comparison of PCC students with those on the conventional track reveals that those who were interested in family medicine at medical school orientation retained this interest at graduation more often than did those students in the conventional group.
Kaufman Werner Cullen Richards 1980	Informed Opinion	Admissions Undergraduate Curriculum Interventions	N/A	This article discusses three unique medical education programs which strive for more rural graduates – (1) the New Mexico Primary Care Curriculum, (2) the Upper Peninsula Medical Education Program, (3) and the WAMI Program. The New Mexico Primary Care Curriculum is an experimental undergraduate curricular track established alongside the conventional track. Students can only be admitted to this program after being accepted into the medical school. Students take part in a 4-6 month rural clerkship after their 2nd year. The final year of their program differs from the conventional track in that students return to a rural New Mexico community from a 3-6 month rural sub-internship. The Upper Peninsula Medical Education Program is a 4 year alternative campus and program of the

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				College of Human Medicine of Michigan State University. A weighted admissions procedure gives preference to Upper Peninsula residents and applicants from a rural background. Finally, as part of the WAMI Program (Washington, Alaska, Montana, Idaho), the four universities in the region which do not have medical schools provide the 1st year of medical school curriculum to medical students. This has allowed expansion of the entering class from all states. Students then go to Washington for years 2 and 3. Students also have the opportunity to participate in the community phases of the program. They can spend 6 weeks in community clinical units working with private physicians in rural communities.
Kazanjian Pagliccia Apland Cavalier Wood	Informed Opinion	Other – physician recruitment and retention	21.2% of the province's 6,459 non-postgraduate physicians 608 spouses 290 interns and residents	Studies the problems surrounding rural physician recruitment and retention in British Columbia. Examines why physicians leave rural areas, as well as attempts to identify those who stay and their reasons for doing so. Three surveys were distributed: (1) analyzed the practice location decisions of BC physicians and the professional, community, and personal/family factors related to these decisions; (2) surveyed interns residents in order to be able to describe current post-graduate physicians and their career plans; and (3) surveyed spouses of practicing physicians.
Kearl Mainous Harrell 1992	Descriptive	Other (Practice Location)	Surveyed 2nd year medical students enrolled in the University of Kentucky College of Medicine in 1990-1991 (N=88). 75 students completed the questionnaire regarding their future career plans, for a response rate of 85%.	Purpose was to investigate the relationship between tolerance of ambiguity and expected choice of practice location. Rural medical practice might be expected to be associated high levels of ambiguity as rural physicians typically have limited access to sophisticated diagnostic equipment and to consulting specialists. The study findings indicate that 48% expressed positive opinions about the quality of rural life while 11% reported plans to practice in rural areas after completing their training. High tolerance of ambiguity was correlated with the students' willingness to consider rural practice setting (P=.04). The strongest predictor of the students' interest in rural practice locations was a positive opinion of the quality of rural life and the high tolerance for ambiguity.
Kelly 1997	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes a practical approach to training family medicine residents in Sioux Lookout. The program involves contracting, teaching, monitoring, feedback and evaluation.
Kelley Rourke 2002	Descriptive	Undergraduate Curriculum Interventions	N/A	Purpose was to evaluate an innovative program of rural research electives for undergraduates undertaken by 7 rural family physicians in the Northwest Ontario Medical Program. Six to eight week research electives offered to medical students in summers at a full-scope practice. Finds that the key to success is planning, careful choice and design of projects. The program was deemed successful in terms of research output and student satisfaction.
Kermode-Scott 1999	Informed Opinion	Other (Physician Shortage)	N/A	Describes the status of the shortage of family physicians in all the provinces. Besides citing the Janus report, most of the content is based from opinions of the presidents of the provincial chapters of the College of Family Physicians of Canada. 'Many Canadians would not have a family doctor at all if it were not for medical graduates, especially from South Africa.' 'Rural doctors' plight is worse now than it was a year ago.' 'Canadian family medicine graduates are increasingly unwilling to enter solo practice.' ' More and more are giving up obstetrics, hospital care, house calls and nursing home visits.' 'Fewer family physicians are available to provide broad spectrum care.'
Kindig 1990	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Educational initiatives are critical in preparing physicians and other health practitioners with the desire and skills for careers in underserved areas. If students have not been exposed in a positive way to rural practice settings early in their medical education, the chance of their making such career choices greatly diminishes. This paper identifies the need to identify strategies that are most appropriate and cost effective for different regions, situations and needs for enhancing recruitment and retention of

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				rural physicians. It is suggested that without special reform of payment systems favouring rural and primary care, educational reform will have marginal effectiveness and remain at a demonstration level.
Kingsmill 1997a	Informed Opinion	CME	N/A	Describes Rural Critical Care course and how it meets the learning needs of rural doctors who do not have the time to do ACLS, ATLS and others life support courses. The course covers 8 hands-on topics including the insertion of chest tubes, paracentesis and peritoneal lavage, pediatric crises, transport, electrocardiography, radiology, central and arterial lines, ventilators and rapid sequence induction. The aim is to make this a national course.
Kingsmill 1997b	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Key informants were interviewed. Several themes emerged: SRPC feels no true and lasting progress will be made until rural medicine is considered a discipline; rural doctors carry a high level of clinical responsibility and provide a broad range of services in an isolated area; rural practice requires skill not usually needed in urban practice; rural medicine is a matter of perspective, point-of-view and focus; rural physicians want it as a discipline to gain professional, public, political attention and support; and there is similarity between rural and emergency medicine. Both have been around a long time, are defined by overall practice, are specialties of breadth, cover a full range of human illness and injury.
Kiroff 1999	Informed Opinion	Advanced Procedural Skills Training CME	N/A	Purpose was to assess the problem of training, retraining, and retaining rural general surgeons in Australia where there is a maldistribution of surgical manpower. Training for a rural practice is impossible in a generic sense and preparation of surgeons for this role must complement the breadth of general surgery and fit the individual to the likely practice location. Suggests a Fellowship in General Surgery which incorporates rotations to country hospitals, and then adds modules which suit the ultimate practice location. Adequate retraining to meet changing needs is essential. So too is the availability of locums so that rural surgeons can get away for professional development. To retain surgeons, one suggestion is to reduce professional isolation by bringing rural surgeons into a network relationship with city institutions. This would give them opportunities for continuing professional development, access to locums, and ongoing contact with students.
Klein 1999	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Throughout rural Canada, many community hospitals have given up maternity services. In consequence, women from rural communities must travel to receive care from well-meaning people who do not know them and their families. These women and their families are undergoing serious disruptions. This paper discusses the launch of a curriculum for Advanced Maternity Care skills for rural family practice. This is an effort of the Society of Rural Physicians of Canada (SRPC), the College of Family Physicians of Canada (CFPC), and the Society of Obstetricians and Gynecologists of Canada (SOGC).
Knopke Northrup Hartman 1986	Comparative - Cohort	Pre-medicine	3 groups: (1) Pilot Group - approximately 114 students who are taking part in the BioPrep program . (2) Internal Control Group - 1 group selected for each project school. sample of students 1 year ahead of pilot group and who were receiving the school's traditional curriculum.	It has been shown that more physicians and other health professionals who choose to practice in small towns and rural areas were themselves reared in small communities. However, many disadvantaged high school students, which includes those who live in rural areas without adequate resources, do not receive the academic preparation or guidance they need. This paper describes an intervention program conducted by the University of Alabama in 5 rural high schools (BioPrep). Objective of the program is to develop the academic and social competencies needed to succeed or attain a health career; to influence students' desire to return to practice in a rural area. Comparison of all 3 groups at the beginning of the project showed no significant differences in GPA or CAT (California Achievement Test) index scores. After 4 years of the program the differences between the BioPrep group and the students who followed the traditional curriculum is as follows: (1) When asked what career they had chosen to pursue 37% of project students selected medicine, dentistry, nursing or other health professions, as compared to 15% of the students who followed the traditional curriculum. (2) When given college entrance exams the scores of the BioPrep students exceeded national and Alabama

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
			(3) External Control Group - each project school was matched with a rural school in another school system. Also followed the traditional curriculum.	norms. There were also statistically significant differences between the scores of the BioPrep students and the students in the control groups. For example, in Mathematics - national norm mean score = 17.3, Alabama norm mean score = 15.7, BioPrep students mean score = 19.28, Internal control group mean score = 13.17, external control group mean score = 15.27. Part of the program's success is due to the fact that it provides standardized curricula and exams, equipment for labs, additional training for teachers, etc. All of this means improved resources for students.
Kristiansen Forde 1992	Descriptive	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	322 Norwegian medical specialists	Explores the influence of location of internship and residency on later choice practice location. Randomly sampled one physician on every four pages of text in "Doctors in Norway 1984". The study findings suggest an association between residency and current place of work. For example, of the 153 doctors trained in the Eastern region, 132 986.3%) were currently working in this region. 65.8% of the doctors chose to work in the region where they had been trained as specialists. The study findings also show that doctors often worked in the region where their spouse was born (P<0.0001). For example, of the 109 doctors with a spouse from the Eastern region, 88 (80.7%) worked there too. Where the spouse was reared seems to be more important than the doctor's own geographical origin. This suggests that doctors take the wishes of their spouse into consideration when deciding upon their career.
Lahaie 1991	Informed Opinion	Other (Characteristics of Rural Life/Practice)	N/A	Discusses the attractions of rural life and rural practice, summarizes concerns about rural medicine, and focuses on a systematic approach to assessing a rural community and its medical practice needs. Attractions to rural life and practice include: quality of physician-patient relationships; variety and challenge of medical problems; having come from a rural community or having a spouse with a rural background; amenities and career opportunities that will address a spouse's needs; financial incentives that help offset cost of education and relocation expenses; financial support in setting up medical practice; lower cost of living; and communities with environmental appeal. Rural practice concerns include: spouse's integration into the community; solo practice; proximity, or lack thereof, to a medical center; and lack of opportunities for professional growth and limited access to continuing education programs. This article offers some suggestions as to how prospective rural physicians can assess a community and its medical needs. They include: asking for a community and health facility profile; asking about group practice opportunities; asking about medical practice supports which exist in the community; finding out if the community is willing to offer any financial incentives; and visiting the community, its health facility, and talking with an established physician if possible.
Lampert 1991	Informed Opinion	Admissions Undergraduate Curriculum Interventions	N/A	Purpose was to find the reasons for the success of the University of Minnesota (Duluth) in getting its students to choose family practice (52.5%) and rural locations (60% and 40% in towns of 20,000 or less). The study design involved interviewing the deans of the medical school. Finds two important factors: careful articulation of mission; and an admissions committee that embraces the mission and nurturing of student interest in family practice. Another key feature is the Rural Physician Associate Program that pairs each med student with a rural primary care doctor
Langlois 1995	Descriptive	Undergraduate Curriculum Interventions	147 community based preceptors for the University of North Carolina's third-year family medicine clerkship. Response rate: 112 (76%).	The purpose of this study was to assess the value of different types of support as rated by community preceptors who teach in a family medicine clerkship. Preceptors were surveyed with a self-administered, mailed questionnaire. Participants ranked sources of satisfaction, sources of dissatisfaction, and the value of 27 types of potential support. CME credit for teaching, financial stipends, textbooks, funds for CME, and help recruiting were ranked highest in value.
Laurence Newbury Wilkinson	Informed Opinion	Undergraduate Curriculum Interventions	N/A	This study documented the level of rural activity and the curriculum content in the Adelaide University Medical School. There has been an increase in the proportion of students with a rural background enrolled from 9% in 1994 to 22% in 2000. There has been an increase in the number of departments

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2002				offering rural placements. There has also been improved academic support to rural practitioners. Many departments provide services in rural communities. A new combined University Department of Rural Health (UDRH)/Rural Clinical School associated with the Adelaide University Medical School aims to provide at least half of all clinical training to 25% of all medical students of Australian origin.
Laven Wilkinson 2003	Comparative – Systematic Review	Pre-medicine Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Summarizes the evidence for an association between rural background and rural practice by reviewing national and international published reports. Reviews 12 studies. There is evidence that the likelihood of working in a rural practice is approximately twice greater among physicians with rural backgrounds. Rural background was associated with rural practice in 10 of the 12 studies. There is a smaller body of evidence which suggests that other rural factors are also influence the likelihood of rural practice. Rural schooling was associated with rural practice in all 5 studies that reported on it. Having a rural partner was associated with rural practice in 3 of the 4 studies reporting on it. Rural post-graduate training was associated with rural practice in 1 of 2 studies.
Lawson Chew Van Der Weyden 2000	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses the establishment of academic units located in rural centers in Australia, particularly the University Departments of Rural Health (UDRH). These units are strongly multidisciplinary and may include medical practitioners and staff from a range of health professions (including nursing, allied health and pharmacy). The units are multilevel undertaking activities at all stages of education, from promoting careers in health care to rural high schools through to involvement in undergraduate and vocational training, university higher education, continuing education and professional development. The units also emphasize partnerships and linkages with rural health organizations and services, local health-care providers and the community. They are based in rural centers but serve large regions with several subsidiary sites. Their principal aim is to promote education, training and professional support for rural health workers. Some offer courses to prepare health workers for rural practice.
Lebel Hogg 1993	Descriptive	Postgraduate Curriculum Interventions	A stratified random sample of all residents training in family medicine in Ontario, 1990 to 1991 (N = 220). Response rate: 156 (70.9%)	Examines the effect of the location of the family medicine teaching center on residency training. A survey was undertaken of family medicine residents trained at community-based or hospital-based centers. The study design involved the distribution of a questionnaire. Finds that 65 respondents (41.7%) trained at hospital-based centers and 71 (45.5%) at community centers. The survey results suggest differences in experience and in current plans. Community trained residents believe they knew the community better, made more house calls, and expected to use allied health professionals more frequently. Residents trained in the community were also more interested in working in smaller communities. The results suggest that community based residencies are more likely to produce physicians interested in small town practice.
Leduc 1997	Informed Opinion	Other (A 'Rurality' Index)	N/A	The author proposes a general practice rurality index for Canada. Six variables were weighted and values summed to a 100 point scale. These variables include remoteness from an advanced referral center, drawing population, number of specialists and presence of an acute care hospital. Further study is needed to determine the validity and reliability of this index.
Leeper Hullett Wang 2001	Comparative – Pre-Post Test	Undergraduate Curriculum Interventions	(N=166) including: - 64 medical students - 21 dental students - 40 pharmacy students - 25 nursing students - 16 nutrition students 78% of students gave an overall	Purpose of this study was to assess the pre- and post-tests of professional perceptions and attitudes toward interdisciplinary approach in a rural region of Alabama. The tests were instituted in the students' 5th and 6th years. There were significant differences in the pre- and post-tests as follows: prefer clinical experiences in rural areas ($p=0.002$); debt forgiveness opportunities are important ($p=0.036$); can assist rural patient in obtaining care ($p<0.001$); can contribute to multidisciplinary team problem-solving ($p=0.001$); can communicate effectively with team ($p=0.006$); and can utilize community resources ($p=0.003$). Pharmacy students were more likely than medical students to believe that an interdisciplinary approach kept there job interesting ($p=0.013$). It is not unknown whether the

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
			evaluation.	favourable outcomes were a result of the rural location of training or interdisciplinary approach or whether an urban would have produced similar outcomes. The pre and post tests of urban training may have produced a similar difference in student attitudes.
Lewis 1995	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes the organization of a clerkship experience at Memorial University's Faculty of Medicine and discusses its possible influence upon career choice. Faculty development is an important aspect of the teaching program. The faculty development program has three main elements: an annual meeting of community teachers, a monthly teleconference session, and a visit by academic faculty. The annual meeting of community teachers features an academic teaching session. A monthly teleconference offers an opportunity to discuss teaching problems and introduce academic material.
Longhurst 1987	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Outlines some of the principles of a curriculum, the experiences required of a resident and the setting and faculty that will make good small-town medicine. There is no core curriculum that would prepare a doctor to set up practice in rural communities. Despite a positive experience of a rural rotation, the majority of family practice residents choose to stay in urban settings. Those from small towns those whose wives were born and raised in rural communities are more likely to return to that setting.
Looney Blondell Gagel Pentecost 1998	Comparative - Cohort	Admissions	Individuals who graduated in 1990 and 1991 (N=214) from the University of Louisville School of Medicine.	Purpose was to determine if the data available when medical school admissions decisions are made can be used to predict generalist specialty choice and rural practice location. Information available to the admissions committee when the subjects applied to medical school was obtained from the original applications. The admissions data was correlated with the collected outcome data (academic difficulty, specialty choice, and practice location). Attempts were made to contact all of the graduates by telephone to confirm career specialty choice and practice location. The study findings indicate that 24 graduates (11%) were practicing in rural locations, 113 (53%) were practicing in a non-rural location, 77 (36%) were either still in postgraduate training or had not yet established a definite practice. Practice location was influenced by a rural background. Graduates from a rural hometown in Kentucky were more likely to return to a rural area to practice than graduates from an urban hometown in Kentucky. Interestingly, graduates from an out-of-state urban hometown were more likely to select a rural practice location. Suggests that these urban students may have had a pre-existing interest in rural health care and as such, were attracted to the rural nature of Kentucky for their medical education.
Lynch Willis 2000	Comparative – Pre-Post Test	Undergraduate Curriculum Interventions	The sample consisted of 137 first-year medical students. Students were randomly assigned to either small or large communities. 102 (74%) completed a questionnaire on opinions about small towns and working in small towns.	Purpose was to investigate the effect of a three-day family medicine preceptorship in a small town on first-year medical students' opinions about living and working in small towns and their plans to live in and practice medicine there. A pretest/posttest design was used whereby students were randomly assigned to different observation times (e.g. either pretests or posttest). The sample consisted of 137 first-year medical students. Students were randomly assigned to either small or large communities. 102 (74%) completed a questionnaire on opinions about small towns and working in small towns. From pretests or posttest, there were no significant differences in opinions about living in small towns among students who went to small communities or among those went to large communities. There were no significant differences from pretest to posttest in opinions about working in small towns among either group. This study suggest that relatively brief exposure to rural family medicine during first-year medical school did not influence students' opinions about living in working in small communities or their plans to live or practice medicine there. Three days of practice experiences in a small community may be insufficient to modify students' opinions about living and working in small towns. Providing rural education training experiences later in the curriculum may be more meaningful.
Lynch Teplin Willis	Comparative – Cross-sectional	Undergraduate Curriculum Interventions	N/A	The characteristics of medical schools that are more likely to graduate rural physicians include public ownership, location in a rural area, receipt of relatively small amounts of funding from the National Institutes of Health, admission policies that favour applicants from rural areas who plan to practice

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Pathman Larsen Steiner 2001				there, and applicants who are interested in family medicine. Simply exposing students to rural practice through brief preceptorships is an inadequate solution. Rural track programs integrated into medical school curricula seem to be successful. The Rural Health Scholars Program (RHSP) is an enrichment initiative designed to increase the number of students that select to practice primary care in rural, underserved areas. It is a longitudinal program that includes a skilled building workshop; a five-week summer preceptor ship with community-based preceptors in rural, underserved areas, and opportunities to return to preceptorship sites during third fourth year rotations. Key elements of the program include education about community-based medicine and life in rural, underserved areas; primary care medicine; cultural diversity; interdisciplinary health-care; and leadership development. Scholars receive books and other written materials and membership in the National Rural Health Association. Attendance at relevant national and state conferences is sponsored when possible. The purpose of this study was to examine whether a difference existed in the number of RHSP participants, compared to their peers, who match into residency programs in family medicine; family medicine alone; and community hospitals. A static group comparison design was used to compare program participants with nonparticipants regarding residency program types and locations. From the classes of 1992 to 1995, 52 students were selected to participate in the RHSP. The comparison group consisted of students expressing an interest in practicing primary care during the first-year medical school and were members of the same cohort, but did not participate in the RHSP. Of 52 scholars who had begun residency training, 77% were in primary care and 50% in family medicine residency programs ($p<.001$). Scholars were significantly more likely that their peers to match into residencies in family medicine. By providing students with relevant educational and living experiences and by integrating them early into a network of rural primary-care physicians, the RHSP strives to nurture physicians who are better prepared and equipped for living in rural practice. This study suggests that enrichment programs may be a feasible alternative to track programs. Programs are typically integrated into medical school and are more likely to involve large number of students and have administrative infrastructures that enhance sustainability. The initiation and implementation of track programs might require more resources and administrative charges that enrichment programs.
MacGregor-Potter 1995	Descriptive	Pre-medicine Other (Practice Location)	233 Alaskan family physicians Response rate: 156 (71.9%) after two mailings of the questionnaire.	Studied the characteristics of Alaskan family physicians as determinants of practice location. The study design involved the distribution of a four-page questionnaire by mail. The study findings show that factors significant for rural practice location were: size of community; opportunities for hunting and fishing; and a feeling of being needed. Interestingly, unlike other studies, the background of the physicians and spouses had no significance in predicting future practice locations. 50% of physicians and spouses living in rural communities had urban backgrounds and 50% had rural backgrounds. Experience through medical training plays a larger role in a physician choosing rural practice than background. Level of debt from student loans was also not a significant factor.
MacIsaac Snowdon Thompson Crossland Veitch 2000	Descriptive	Other (Retention)	20 GP's identified as eligible for study, 10 completed the questionnaires.	Purpose was to determine the issues relating to the decision to leave rural practice in the left Western Victoria region of Queensland, Australia. Identified 20 GP's who had left the division within the last ten years prior to 1997 October. A phone/fax survey was conducted. The GP's mentioned four main areas of dissatisfaction. These were: conflicts with local hospitals, on-call difficulties, poor remuneration for after hour's work, and problems with secondary schooling for children. The majority expressed regret that they were not still working in rural practice. They also suggested that conflict and dissatisfaction with aspects of the rural GP hospital work, appear to be relatively frequently affected it is immediately amenable to intervention. Eight of the ten respondents expressed regret that they were not still working in rural practice.
MacLellan	Informed	Pre-medicine	N/A	Describes the Quebec experience and the challenges to encourage Canadian physicians to practice in

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
1998	Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions		rural/remote regions. The University programs that expose medical trainees to Quebec's rural areas are include summer jobs in hospitals for medical students at pre-clerkship level; provision of funding for travel, lodging and meals for medical students for a four-week clinical rotation in family medicine; mandatory rotations for family medicine residents to spend two months of training in a non-University area; a recruitment day for hospitals outside University areas and regional health authorities to meet with residents and students; and fee differentials for recent graduates in favour of practice in a non-University designated area.
MacLellan 1995	Informed Opinion	Postgraduate Curriculum Interventions	N/A	This editorial discusses the main emphasis of the Scott Report, the first independent assessment of Canadian rural medicine and its needs. The report called for the development of a special family medicine residency.
Mahaffry Goldberg Girard 1994	Informed Opinion	Undergraduate Curriculum Interventions	N/A	This article describes the Oregon Health Sciences University School of Medicine's new multidisciplinary, required third-year rotation entitled the Primary Care Clerkship. Its goal is to have each student participate in an intensive and broad-based clinical experience in primary care practice in a rural Oregon.
Magnus Tollan 1993	Descriptive	Undergraduate Curriculum Interventions Other (Practice Location)	N = 417 84.2% response rate	The University of Tromso, Norway was established to recruit students who after graduation would be willing to stay in the North. The medical school was founded in 1972 and the first students graduated in 1979. The purpose of this study was to evaluate the impact of the medical school on the distribution of doctors in rural areas in northern Norway. A questionnaire survey covered 11 graduation years (N = 417 doctors). The response rate was 84.2 percent. The establishment of a new medical school in northern Norway had beneficial effects: a total of 56.1% of the graduates surveyed stayed in these remote areas. 82% of those who spent their youth in northern Norway, compared to 37.7% of graduates who lived in the southern part of the country, practiced in these remote northern areas (P >.0001). The results demonstrate that medical graduates from the rural areas of northern Norway who are educated locally stay in these remote areas more frequently than their fellow graduates.
Mainous Ramsbottom-Lucier Rich 1994	Descriptive	Other (Workload Satisfaction)	Rural primary care physicians working full-time (N=373). This data was obtained from the results of the survey 'Practice Patterns of Young Physicians' conducted by the American Medical Association in 1987.	Purpose was to examine the relationship between clinical workload and workload satisfaction in rural primary care physician retention. The study findings indicate that 49% of respondents were dissatisfied with their workload. Those who reported such dissatisfaction reported a greater likelihood of leaving that those who were satisfied with their workload. 24% of physicians were somewhat or very likely to leave their rural practice within the next two years. 21% of respondents indicated 'working too many hours' as the reason for this decision. Other reasons included 'financial reasons' (15%) and a 'preference for another geographic location' (15%). While workload satisfaction is a strong predictor of the likelihood of leaving, the quantitative indicators of workload measured (ie. # of hours worked, # of patients seen, # of patient-care hours worked) are not. What this means is that any retention strategy must address the issue of the practitioner's satisfaction with his/her workload, instead of simply intervening to reduce the workload.
Mak Plant 2000	Descriptive	Financial Undergraduate Curriculum Interventions	N=4	In 1997, the John Flynn Scholarship Program was launched as an initiative to increase the recruitment of doctors to rural areas. These scholarships enable undergraduate medical students to spend two weeks each year for four years at the same rural location. Given the magnitude of Australia's unmet needs, we ask whether the experience could be enhanced by ensuring students undertook meaningful work that was useful for the community. Paper describes, using case studies, some activities in which full JFS students have been involved and the positive contributions that they have made to rural health. The case studies indicate that the pre-clinical students can be valuable members of the rural health

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				work force. It is hoped that if JFS students are given the opportunity to work as responsible health professionals they will have a better learning experience and will be more likely to return to the bush as doctors.
Malaty Pathman 2002	Descriptive	Postgraduate Curriculum Interventions	Questionnaires were mailed to program directors of all 28 world track residencies identified in 1998 by the Residency Review Committee for Family Practice. Twenty-two of the 23 eligible programs responded (a 96% response rate).	Rural Training Track (RTT) family practice residencies are designed to prepare family physicians for rural practice. Residents in these programs spend one year in an urban location, followed by two years into rural setting. Whereas 30% of all family practice residency graduates practice in rural communities, 76% of RTT graduates are in rural practice. This study examined the match rate of rural track family practice residencies and examined factors associated with higher rates. Questionnaires were mailed to program directors of all 28 world track residencies identified in 1998 by the Residency Review Committee for Family Practice. Twenty-two of the 23 eligible programs responded (a 96% response rate). For 1996 through 1998, programs had a mean match rate of 61%, compared with a rate of 86% for all family practice residencies. Rural track residencies were less likely to match first-year positions than other family practice residencies. Geographic and community characteristics seem to influence the match rate.
Malloy 2003	Informed Opinion	Pre-medicine Financial Undergraduate Curriculum Interventions	N/A	This article discusses the success of the WWAMI (Washington, Wyoming, Alaska, Montana, Idaho) Medical Education Program in the US. For 30 years the program has offered clerkships to students throughout the Northwest, along with incentives to practice in rural areas once they finish their education. The program also has a K-12 component with the aim of identifying promising students with an interest in or aptitude for medicine and increasing participation of under-represented minorities. It also included a college-level Minority Medical Education Program which serves as a medical school pipeline for minorities, students from rural areas, and other disadvantaged students.
Markert 1991	Descriptive	Other (Career Choice)	832 graduates of Wright State University School of Medicine Response rate: 815 (98%)	Purpose was to determine why medical students switched from primary care to non-primary care as a career choice and why other changed from non-primary care to primary care as a specialty preference. Of those investigated 217 students switched preference during medical school (53 to primary care; 164 to non-primary care). Reasons for change cited by both groups included: increased awareness of specialties; a positive experience in a clinical clerkship or selective. For those who switched to primary care some reasons cited were: family and/or personal considerations; positive influence of faculty; negative experience in a clinical clerkship. Concludes that the effect of medical school experience is influential on students' career choices.
Martel 1995	Informed Opinion	Other (Rural Practice)	N/A	Physicians believe that their training is inadequate for rural practice and they also believe that access to both CME and locum relief is inadequate. Residents in family practice in 1995 felt unprepared to practice in small towns across Canada. Medical training in Canada has contributed to the reluctance of recent family practice graduates to meet the manpower shortfall. In a study sponsored by the Ontario Ministry of Health (MOH), the Ontario Hospital Association (OHA) and the Ontario Medical Association (OMA), Graham Scott identified rural practice as distinct general practice, as requiring special attention regarding training and recognition as the discipline crucial to the well-being of community hospitals and rural health care.
Maudlin Newkirk Snook Cooper 2000	Informed Opinion	Financial Postgraduate Curriculum Interventions	N/A	Describes the family medicine Spokane rural training track. The first year of residency is in a rural centre in Spokane and the second and third year are conducted in rural communities. Seventeen of 18 graduates practice within the region and 15 (83%) practice in rural communities. Ten graduates practice in or near the rural training sites. The others feel that FMSROTT offers high quality cost-effective graduate medical education. It is their opinion that the rural based medical education is a fragile model vulnerable to changes in the local economy, a reduction in the number of key physician faculty, and changes in the offset funding of graduate medical education and patient care services.

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				Federal funding cutbacks and raised accreditation requirements have threatened the viability of these programs. The willingness of the local hospital and the medical group to support the financial and educational requirements enables FMSROTT to continue the education of family practice residents.
Mayer 1990	Informed Opinion	Undergraduate Curriculum Interventions	N/A	An area health education center (AHEC) is a regional center for education and training that houses faculty and staff who teach students and residents while providing education, consultation, and technical assistance for rural practices. With the support of outreach library services and visits by university based faculty, AHECs help improve a rural community's ability to recruit, retain, and keep up-to-date primary care physicians and other health manpower. Each AHEC defines a geographic area and since 1972, the federal government has stimulated the development of AHEC activities in over 30 states.. Health education centers are the focal point for: (1) the rotation of medical and health profession students to regional settings and from them to more rural sites; (2) the regional training at the AHECs and in surrounding rural areas of primary care residents and/or the rotation of primary care residents from the university to the community; and (3) the support of practitioners through continuing education, consultative services, technical assistance activities, off-campus degree programs, library and information delivery services.
McAllister McEwen Willams Frost 1998	Descriptive	Undergraduate Curriculum Interventions	156 undergraduate students from 14 health disciplines at the University of Sidney who completed rural attachments as part of the Rural Careers Project. 43 of the 156 students were studying medicine. Response rate: N=92	Purpose was to determine whether rural attachments for students of health professionals are worthwhile. On return from their attachment, students were encouraged to write a brief report of their experiences. A content analysis of the students' written comments about their perceptions and experiences was completed. The results show that rural attachments are worthwhile learning opportunities. 57 of 92 students reported that their rural attachment was an overall positive experience. 20 of 92 students mentioned of the feasibility of a rural career.
McDonald 1990	Informed Opinion	Pre-medicine Undergraduate Curriculum Interventions	N/A	Saskatchewan graduates find rural practice unattractive and medicine as a career is not attracting students from rural areas. Rural students suffer from a lack of adequate career counselling and a disappointing low number apply to medical school. Rural high school students need to be sensitized to a career in medicine. The need for a comprehensive overall strategy ranging from recruitment to reorganization of rural health care is required. A 1980 analysis of rural hospitals in Saskatchewan indicated a reduction in major therapeutic procedures, particularly obstetrics, anesthesia and major surgery. The pressures of being on call for prolonged periods, the difficulties in obtaining relief for holidays, and the difficulties in attending continuing medical education courses have made rural practice increasingly unattractive to many physicians.
McElmurray Cone Kammerman Fowler 1992	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes the development of the Winnsboro Rural Primary Care Education Project by the University of South Carolina. It was developed in response to the shortage of primary care physicians in the state, especially in rural areas. This project established a model primary care practice and education center in the rural community of Winnsboro. Although it has a viable community hospital, this is a medically underserved area with one of the highest overall death rates in the state. The model private practice provides a full scope of medical care for the community including, inpatient, outpatient, obstetrics, pediatrics, medicine, and minor surgery. A full-time family physician and nurse practitioner permanently staff the practice and serve as university faculty members. This interdisciplinary project involves 3rd year medical students, as well as postgraduate nurse practitioners students, Pharm. D candidates, and undergraduate students in Public Health and Social Work. Students have the opportunity to treat patients. All interactions are monitored and students receive feedback through direct supervision or delayed video review. They also have the opportunity to interact with computer-

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				simulated patients in the Learning Resource Center under the supervision of the full-time health educator. Students are assisted in completing a self-directed curriculum, including seminars and a review of the current literature on rural health issues. Students also have the opportunity to learn some of the practical aspects of practice management and to be exposed to the special fiscal concerns of rural practice. They are assigned projects evaluating the cost-effectiveness of procedures for example.
McKenzie Hays Jones Veitch Sen Gupta 2000	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discussed one of the earliest regional training programs established in Australia (in 1993) for rural practice. The Royal Australian College of General Practitioners (RACGP) Training Program provided a sustained focus on rural practice in its undergraduate, intern, and postgraduate programs. In 2000 the unit became part of the new James Cook University School of Medicine. Of the 82 physicians who registered in the program between 1993 and 1998, 64 completed training and of those, 27 are now in rural practice. Of the 21 registered in the more specific 'Rural Training Stream', 15 are in rural practice in Australia, 3 have gone on to further training in other specialties, and 3 are in rural and remote locations in other countries.
McLinden Sutliff 2002	Descriptive	Postgraduate Curriculum Interventions	81 family physicians in rural communities in parts of Northern Ontario. Response rate: 58 (71.6%)	Purpose was to survey rural family physicians to determine topics to be included in a family practice cancer care curriculum for family practice residents planning to practice in rural regions. A self administered mailing questionnaire was used. Respondents rank a variety of cancer care topics from 0-6. Three broad categories of prevention/screening/early detection, supportive care, and technical capabilities were identified as more important than others.
Meek Valentine 1991	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses the "Primary Care Bridging Plan", a grant ($600,000) awarded to the University of Kansas School of Medicine-Wichita (UKSM-W) by the Wesley Foundation. Its objectives are to encourage medical students to select primary care residency programs and to encourage physicians to practice in rural Kansas communities upon completion of residency training. One of the program's goals is to stimulate interest in rural health care and enhance the rural health education of medical students. 3rd year medical students participated in a rural health workshop prior to their clinical preceptorship rotations. Residents in family practice, internal medicine, pediatrics, and psychiatry programs in Wichita, Salina, and Kansas City are eligible for the Bridging Plan. They must have completed one year of their postgraduate training and can apply any time during their 2nd of 3rd years of residency. The program involves a financial incentive and practice obligation. During the final 2 years of a residency program, participants will receive the regular resident salary plus a loan of up to $10,000 per year. In addition, the resident will receive a loan of $6,000 upon graduation and a guaranteed, competitive salary during the first 2 years of community practice. Residents are matched with a Kansas community and must agree to practice year-for-year in this community and complete a one-month rural rotation during their residency program. The loans will be forgiven as the service requirements in the community are met. Implicit in this plan is the assumption that the exposure to rural practice helps to increase awareness of and interest in opportunities for rural practice.
Mennin Kaufman 2000	Informed Opinion	Undergraduate Curriculum Interventions	N/A	The geographic and specialty distribution of medical school graduates rarely matches the needs of communities and populations. Some attribute this to the discrepancy between the goals of academic medicine and the health needs of communities. There is an overwhelming need for improved access to health care worldwide in rural communities. A growing number of academic health centers around the world are attempting to address this dilemma by shifting the focus of their academic mission towards community health needs and by moving medical education from hospitals to ambulatory clinics within the communities. While the quality of teaching and learning in off-campus sites has been criticized as being inferior to that found in university based hospitals and clinics, research demonstrates that undergraduate students who spend time learning clinical medicine in rural general practice settings experience greater access to patient and clinical learning opportunities than students at urban medical

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				centers. Community-based educational initiatives are necessary components of the academic medical center's responsibility.
Mennin Kalishman Friedman Pathak Snyder 1996	Comparative - Cohort	Undergraduate Curriculum Interventions	140 graduates from the first four classes who had completed their post-graduate training (100 from the conventional track; 40 from the primary care curriculum). 87 graduates from the conventional track responded (response rate 87%). 33 graduates from the primary care curriculum responded (response rate 83%).	Purpose was to survey graduates in practice from the first four classes of the University of New Mexico School of Medicine's parallel curricular tracks, conventional and primary care curriculum (PCC) and compare data about graduates' practice patterns, learning behaviours, and satisfaction with the profession of medicine. The primary care curriculum is community-oriented and problem-based. The study design involved a written survey which included a list of outcome categories that program evaluators and directors felt were important. There were two mailings of the survey. The study findings indicate that PCC graduates were almost 5 times as likely as conventional-track graduates to practice in medically underserved areas. PCC graduates were more likely to be in family practice, practice in publicly-funded health care settings, and care for non-paying patients. PCC graduates indicated more frequent study of clinical medicine and community health and they reported being better prepared for practice.
Miller Crittenden 2001	Descriptive	Financial Admissions	229 medical students surveyed Response rate: 183 (80%)	Determines and contrasts the impact of two types of programs on medical school choice and students' intentions to return to their home states. One program is a pay back program on state-subsidized medical education and the second program is an expanded loan repayment program. Forty-seven percent of the students reported that they would attend a different medical school if a required payback program were in place. Students who plan to pursue a non-primary care specialty and those with no preference were less accepting of both partial (OR 2.15, p= 0.024) and full payback programs (OR 2.51, p= 0.006) then students planning careers in primary care specialties. Respondents who did not indicate plans to return to their home states were less accepting of full payback programs than those with plans to return to their home states (OR 2.61, p= 0.05) but not partial payback programs (OR 1.73, p= 0.028). Eighty-four percent of students reported that they would be more likely to return to their home states if expanded loan repayment programs were available for service in areas of need. The findings suggest that payback programs may dissuade more competitive students from entering medical schools with such requirements, compromising the pool of students most likely to return to rural areas. Conversely, medical students appear willing to consider loan repayment programs upon completion of their training.
Moores Woodhead-Lyons Wilson 1998	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Describes three integrated educational programs at the University of Alberta with the aim to increase students' and residents' participation in rural health care and encourage them to take up practice in rural areas. The programs aim to expand and enrich rural educational experiences at undergraduate and postgraduate levels and to supplement family medicine postgraduate education with a third-year special skills program for rural practice. The program is sustained by reliable funding from the Rural Physician Action Plan, adequate infrastructure and commitment by university faculty, rural physicians, and communities. The rural based educational programs have allowed more than 95% of rural medical students to gain experience in rural areas. The number of family medicine residents doing rural rotations has doubled and the length of experiences in rural practice has increased fourfold. The third year special skills training for rural practice has expanded greatly and at least 29 of 49 participants have gone on to enter rural practice. In more than 30 rural Alberta communities, 56 physicians have had an important influence on the training of medical students and family medicine residents.
Mudge 1993	Informed Opinion	Undergraduate Curriculum Interventions, Postgraduate Curriculum	N/A	Discusses how the need for well-trained specialist consultants in rural and remote Australia is as great or greater than the better known need for rural general practitioners. In response to this, the Faculty of Medicine at Queensland has established a new clinical school for North Queensland. This was made possible by a grant from the Queensland Government and the support of the regional health authorities

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
		Interventions Advanced Procedural Skills Training CME		and James Cook University, which are collaborating in the venture. Professors of general practice and rural health, psychiatry, medicine and surgery have been appointed. The curriculum will be responsive to local issues and will emphasize the health needs of the area, which included Aboriginal, rural and isolated mining communities. Integration of medical education across all levels of undergraduate, postgraduate, vocational training, and CME will be recognized.
Mugford Martin 2001	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes the evolution and the problems that have been overcome by Flinders University in the rural intern-training program. Describes the tracking of activities of the interns through analyzing the invoicing patterns of the GP supervisor. Qualitative data was obtained from interview of interns who reported great opportunity to learn and practice a wide variety of procedural skills in their rural term then during the term at the primary allocation centre in Flinders Medical Centre. Exposure to continuing care was better in the rural site. The process of acceptance of clinical responsibility was accelerated in the rural environment. The interviews with the resident and the GP supervisors demonstrated that the rural general practice term provided wide breadth of clinical experience in well supervised environment.
Mugford Worley Braund Martin 2001	Descriptive	Postgraduate Curriculum Interventions	Semi-structured interviews were conducted with the rural interns (N=2), supervising GPs (N=2), and Jamestown hospital administration (number of interviews not defined).	Purpose was to describe the experience of a rural intern rotation from Flinders Medical Centre to the rural community of Jamestown, South Australia. The study design involved the use of semi-structured interviews which were transcribed and analyzed for emerging themes. The interns gave very positive comments about their experiences. They felt they had some clinical freedom to develop and implement patient management plans. They were able to provide continuity of care to patients - see them, admit them, and continue to work with them. They experienced a greater variety of patient presentations, enhanced their consulting and history taking skills, and received more feedback on performance. Some commented that they felt stimulated by the need to articulate and justify a particular approach to patient management.
Myers 2000	Informed Opinion	Financial	N/A	Comments on two approaches to funding of medical school. 'Just send money' position believes the appropriateness for the government to subsidize medical education but to leave all process and outcome questions to the medical schools and teaching hospitals receiving these subsidies. The second position is 'prudent purchaser' of health professions education in response to national workforce needs. The public investment made for each new medical practitioner is in the order of 650,000 to 700,000. This is currently done without any outcome accountability under Balanced Budget Act imposed upon a number of medical residents in training. It is believed that there is an adequate number of physicians overall. Undergraduate osteopathic medical education in training programs for advanced practice nursing are growing. This is a reflection of some state decision makers seeing this professions as preferable public investments compared to MD education. Control of medical care by generalists seemed to have peeked in the early 90's and is now in decline. Rural population is growing and are older than the general population. Rural leaders are beginning to understand the importance of local health care system to the economy as well as the medical health of their communities.
Myers Bruce Kaufman Kindig 1990	Informed Opinion	Pre-medicine Undergraduate Curriculum Interventions	N/A	Identifies issues related to the difficulties in recruiting and retaining physicians in rural communities. There appears to be a pre-selection bias against students from rural areas. Students from these areas may not have courses or activities comparable to those of urban graduates. A large majority of Canadian women students choose family practice, but they do not go to rural areas to practice. There are certain ambiguities of primary care and insecurities of practicing in isolation from tertiary support systems. There is a need for primary care educators to have personal experience with practice in a rural setting and for formal programs which stimulate medical student interest in rural practice.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
National Rural Health Association 1998	Informed Opinion	Other (Recruitment and Retention Factors)	N/A	Describes the health status of rural US population as older, poorer, sicker, less educated and with perception of worse health status than their urban counterparts. Recruitment to rural practice is aided by positive rural physician role models, early and long term clinical training in rural sites and hospitals. Osteopathic physicians made up only 5.5% of physician work force but represent 15% of rural physicians. Training graduate students through rural tracks and electives can enhance recruitment and retention. National Health Service Corps program which provides temporary financial and technical support in the hope that the physician would stay and establish private practice. In 1997 20% of physicians assigned to rural areas were still located in the county of their initial assignment and an additional 20% in some other rural location. International medical graduates through state initiated J-1 visa programs have initially met some unmet needs of rural areas. International medical graduates constitute a greater percentage of the US primary care physician work force in underserved, rural areas than in rural areas that do not have a physician shortage. Private, religious and corporate leaders have been instrumental in addressing the needs of rural citizens and an integral reason for the advancement of issues, interventions and services. Current problems with retention of rural physicians as poorer earning potential, difficulty with social adjustment, lack of orientation to cultural aspect of the community and greater work load demands. The paper also describes policy issues relating to research, education, graduate training, professional fulfillment, financial remuneration and lifestyle
Neelands Geroux Maurer 1993	Descriptive	Pre-medicine Undergraduate curriculum interventions Postgraduate curriculum interventions Other (Practice location)	NOMP-participating physicians	Reviews 15 years' experience with 1500 medical students and residents in a community-based preceptorship program, the Northwestern Ontario Medical Program (NOMP). The objectives of the program are as follows: (1) to develop a network of community-based clinical teaching practices to provide medical students and residents with the opportunity to experience health care in a remote setting; (2) to provide educational enrichment to local health professionals; (3) to encourage physicians to establish their practices in rural and remote communities; and (4) to encourage residents of northwestern Ontario to seek careers in the health professions. A tracking study was implemented as part of the program in order to monitor the choice of practice location of program participants. Results of the program to date confirm that training in remote settings influences choice of practice location.
Newbery 1999	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	If rural citizens are to have reasonable access to health care services, their rural physicians must have the skills to care for them. Rural physicians have found it difficult to access advance skills training. Newly graduating physicians are often choosing not to practice in rural communities because they do not have the confidence nor the skills and abilities to cover rural emergency rooms and offer the required obstetric services.
Newbery 1990	Informed Opinion	Postgraduate Curriculum Interventions	N/A	The author suggests that residents training in northern communities are likely to gain appreciation of Native culture; awareness of nation's treatment of its aboriginal peoples; and healing may have far more to do with justice than technology.
Norington 1997	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Purpose was to provide an historical overview and recent developments in Australia. The Rural Undergraduate Steering Committee identified three main priority areas for change: (1) students; (2) curriculum; and (3) support systems. Advocates the selection of students into medical schools based on appropriate mix of academic results, aptitude and rural interest; raising awareness of country high school students of career possibilities in medicine; establishing mechanisms to increase the number of rural students to equal the proportion of rural population in the State; addressing the social, emotional and financial support needs of rural students; integrating rural health into the mainstream medical education, while allowing opportunities for enhanced rural learning experience; allowing students to spend sufficient time in rural hospitals and in rural general practice (minimum of 8 weeks); and providing support for students and preceptors during rural attachments. Also describes a funding package of $20 million for rural medical workforce readjustment and hospital career initiatives.

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Norris 2003	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses the potential of an accelerated training program for rural family physicians. The goal would be to place specially prepared family physicians into rural practice in the same 7 years that most family practice residents spend in preparation for undifferentiated practice. Rural physician who feel more prepared are more likely to remain in their practice sites. According to the author, the success of such accelerated, rurally-oriented residency programs could help to alleviate the shortages of family physicians in rural communities.
Norris 1998	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes the contribution of family practice residency programs to the preparation of physicians for practice in number of communities. Rural oriented family medicine education programs have addressed rural physician shortage with rural training tracks (RTTs) and rural fellowships. One of the major contributions to medical education made by family practice residencies has been to decentralize the educational process out of teaching hospitals. The rural training track programs have taken this decentralization one step further and moved it from the model residency clinics to rural family practice sites. As educational sites become more decentralized, long-distance communications among faculty, residents, administrators, specialist, and others will become increasingly important. Whether discussing e-mail, computerized medical literature searches, electronic decision support algorithms, or computerized medical records, the graduates of family medicine residencies will practice in an environment that is rich with information and will need competencies in the use of the electronic tools to be effective in their future practices.
Norris Norris 1988	Descriptive	Postgraduate Curriculum Interventions	Surveyed 2nd and 3rd year family practice residents (N=123) who participated in rotations offered by the Montana Family Practice Residency Satellite Program. Rotations are mainly rural (only 2 out of 30 rotation sites are in metropolitan areas). 95 surveys (77%) were returned.	Providing a rural training period during residency is one way to try an increase the number of family physicians who practice in rural areas. The purpose of this paper is to examine the effect of this type of program. Purposes of rural rotations have included providing an enhanced clinical experience, exposing physicians in training to clinical medicine in rural settings, and increasing the number of physicians interested in rural practice. 66% of respondents felt their Montana rotation influenced their choice of practice site. 95% of respondents indicated that their rotation influenced them to consider rural practice opportunities. 56 respondents (69%) are now practicing in communities with populations of <25,000. 36 of these 56 respondents are practicing in communities with <10,000.
Norris Flaherty 1993	Comparative - Cohort	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	Patients coming to their family physicians office for a routine visit at training sites associated with the Montana Family Practice Residency Satellite Program. Each site had a 2nd or 3rd year resident. There were 750 questionnaires distributed from seven different practice sites. All but one site were in rural communities. 178 questionnaires were returned, for a response rate of 23.7%. 93% of respondents were from rural areas.	Purpose was to explore if patients seeing family practice residents, who were working as preceptees in rural family physicians' offices, would have a positive perception of the physician-patient interaction and would be satisfied with their care. A questionnaire was developed to measure patients' satisfaction with the care received during their visit to their family physician's office. Patients were seen by their regular physician, the family practice resident, or both. Upon leaving the clinic they were given a questionnaire with a stamped address envelope. They were asked to complete it and return it by mail. No attempt was made to contact non-responders. The survey questions were used to separate patients into 3 groups: (1) those who saw on their regular physician (used as a control group); (2) those who saw both the resident and their regular physician; and (3) those who saw only the resident. Groups 2 & 3 were compared with the control group. The study findings indicate that 43 patients (24%) saw only their regular physician (control group); 70 patients (39%) saw both their regular physician and the resident (group 2); 65 patients (37%) saw only the resident (group 3). The most important findings of the survey were revealed when the satisfaction levels of the patients in each group were compared. There was no statistically significant difference (P values were >0.05) between the satisfaction levels of each group. In all cases the level of satisfaction was well above "satisfied". Most respondents (77.5%) indicated they would like to see the resident for future office visit. 96% wanted to see their physician continue working with residents.

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Norris Acosta 1997	Descriptive	Advanced Procedural Skills Training	Approximately 30 (6 fellows are chosen each year. This assessment was conducted after 5 years). Sample size was not specifically defined in the article.	Describes a post-residency fellowship (1 year) in rural family medicine developed by Tacoma Family Medicine, affiliated with the University of Washington. Essential requirements to start a rural fellowship program: experienced faculty; adequate numbers of patients; a supportive parent hospital; and the ability to manage both change and programmatic stress in a positive fashion. There is a large pool of family physicians interested in fellowship training which is designed to prepare them for rural practice (program receives 40-50 applicants per year). The most common reasons cited for this interest are (1) the desire to practice in a rural setting, (2) the need to develop the confidence and competency, not achieved in residency, to allow them to enter rural practice. 80% of fellowship graduates are practicing in communities of < 10,000. According to fellows, 6 months of advanced obstetrical training is adequate to prepare for rural practice. Allowing fellows to tailor the education they receive by allocating adequate time for electives is essential.
Norris Coombs Carline 1996	Descriptive	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	1096 family physicians in the US who had finished residency and entered rural practice within the past 3 years. 627 questionnaires were returned, for a response rate of 57.2%.	Purpose was to develop a nationally applicable set of education needs of rural physicians. An educational needs assessment questionnaire was distributed. Respondents were asked to rate their educational preparation for a variety of clinical areas into one of four categories: (1) minimal or no preparation, (2) underprepared, (3) adequately prepared, (4) exceptionally well-prepared. Questionnaires were coded to allow for 2nd and 3rd follow-up mail-outs to non-responders. The study findings indicate that almost 60% of respondents participated in a rural rotation in medical school and nearly 50% participated in a rural rotation in residency. Adequate preparation is received in many clinical areas, but there were some areas in which respondents noted receiving inadequate preparation. These areas included: allergy; rehabilitation medicine; many forms of counselling; advanced and operative obstetrics; pediatric trauma care; and nutrition. These areas need to be included in the education of rurally oriented family practice students.
O'Connor Davidson 1992	Descriptive	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	Physicians who completed postgraduate training in the family medicine program at Queen's University from 1981 to 1988 (N=132). 90 questionnaires were completed and returned (68%)	Questionnaires were distributed to participants to determine the year they completed training, current practice profile, and continuing education preferences, whether or not they had received ant additional postgraduate training and how frequently they managed seriously or critically ill patients. 80% of respondents were in centers with a population of <150,000; 46% were in a center with <50,000. Management and procedural skills identified as important were: suturing techniques; superficial infections; wound exploration and debridement; radiographic investigations; x-ray interpretation; analgesia; casting techniques; pediatric resuscitation; ACLS principles; patient transport principles; endotracheal intubation; plastic surgical procedures. However, of these skills, in only six did respondents feel comfortable with their performance when they completed residency training. There was consensus among respondents that before graduation all medical students must be competent in skills considered essential to manage common emergencies.
O'Driscoll 1999	Informed Opinion	Other (Recruitment)	N/A	Describes and discusses some principles for recruiting physicians to practice in rural communities. These include: (1) the process should never end; (2) recruit all physicians that comes through town; (3) set up teaching connections with the nearest medical school; (4) do not set up differential system based on seniority; (5) treat new physicians like royalty; (6) and recruit through phone calls.
O'Maonaigh 1997	Informed Opinion	Financial	N/A	Describes medical politics and policies and how they affect rural physicians in Newfoundland and Labrador. Describes the strategies of increasing exposure of medical students to rural practice through rural placement and the use of telemedicine.
Ontario Regional Committee of the Society of Rural	Informed Opinion	Pre-medicine Financial	N/A	A group of knowledgeable and committed representatives of rural medicine and medical training recognized the need for a comprehensive Blueprint to address physician recruitment and retention in Ontario's rural and northern communities. This Blueprint is intended to provide a comprehensive and

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Physicians of Canada Professional Association of Interns and Residents of Ontario 1998		Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME		integrated package of measures which, if implemented as a whole, would address the need for effective and sustainable physician recruitment and retention in remote and rural communities. The report provides an overview of the extent of the present problem, including the underlying demographic trends, as well as a summary of the current needs for physician services. The report then identifies the present obstacles to improved recruitment and retention, explains why present strategies have not worked, reviews those strategies which have been successful in other areas, and recommends specific areas for implementation.
O'Reilly 1994	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Summarizes the frustration of rural physicians. They work longer hours, suffer more fatigue and sleep deprivation, have higher rates of dysfunctional family life, endure professional isolation and are more likely to die on the job than retire. As a result, fewer Canadian-trained family physicians are opting for rural practice. Today's family physicians graduate with a broad range of skills which is in fact, too broad for rural practice. Those who choose to enter rural practice do not feel they are prepared in relevant clinical skills and procedures, such as obstetrics, surgery, and emergency medicine. Combined with all of the factors mentioned above, this lack of training has become "the straw that broke the camel's back". GP clinical training needs to be improved.
Pathman 1996	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Many educators believe that primary care rotations and various types of community-based training programs affect graduate's likelihoods of choosing careers in primary care and in rural and underserved areas. Many studies support this belief as well. This article discusses this belief and questions if it indeed is accurate. Shortcoming of some studies is that there is little or no accounting for pre-existing characteristics, interests and career plans of students and residents. Therefore, the extent to which positive career outcomes are a consequence of the special training that learner's receive or are instead simply the nature of the learners, is unknown. This raises the question "how important are learners' pre-existing career interests and inclinations relative to the influences of curricula, role models, and sites of training?" The author reviews the literature and determines that no curriculum effect is evident in many studies where learners take part in short rotations. This is because many of these studies do not control for the characteristics of students. However, in studies of long and multidimensional programs, career effects have been demonstrated.
Pathman Riggins 1996	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Provides background on policy to eliminate shortage of physicians in US (i.e. increased admissions) and discusses curricular reforms (i.e. preceptorships and rotations) that have been made to influence physicians' decisions to practice in a medically underserved area. Makes a distinction between "rural" and "underserved". Questions whether programs designed to promote careers in underserved areas work. Some key findings: (1) only an individual's attitudes about a specific behaviour are highly predictive of that individual actually carrying out that behaviour; (2) attitude changes induced by participation in special programs are temporary unless supported and reinforced by the medical school environment (i.e. faculty, curriculum, and values of the school). Longer and more multi-faceted training experiences in underserved areas should also be provided; and (3) if projects are being designed to influence students' career choice they should strive to have a greater effect on the specific student attitude most proximate to the desired career choice.
Pathman	Informed	Other (Retention)	N/A	This article discusses a range of issues encountered in rural physician retention studies for the purpose

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Konrad Agnew 1994	Opinion			of strengthening future studies. Issues discussed include: defining retention; identifying a study population; identifying retention-affecting factors for study (weakness of past studies has been researchers' lack of imagination in identifying potential retention-affecting factors); and prospective versus retrospective data collection.
Pathman Williams Konrad 1996	Descriptive	CME	Sent questionnaires to 1513 primary care physicians who moved to non-metropolitan counties between 1987 and 1990. 1048 returned the questionnaire, for a response rate of 69.3%.	Purpose was to identify areas of satisfaction and dissatisfaction for primary care physicians working in rural areas across the US. The study design involved the distribution of a 16-page questionnaire. There were three mailings. Respondents were asked to rate their satisfaction levels in several areas including: access to medical information and consultation; relationships with patients; autonomy; pay; manageability of work hours; professional fulfillment; and the community and its resources. The study findings indicate that physicians were most satisfied with the quality of their relationships with their patients, their clinical autonomy, the care they provided medically needy patients, and life in a small community. Physicians were generally dissatisfied with access to cultural activities, access to the amenities of city living, having adequate personal time away from work, and freedom from bureaucratic interference. They were also dissatisfied with access to CME and the medical literature. Contrary to what might have been expected, physicians raised in rural areas were no more of less satisfied with their communities. Most aspects of satisfaction for this study were unrelated to retention. Only satisfaction with community, the opportunity to achieve professional goals, and earnings, were somewhat related.
Pathman Konrad Ricketts 1994a	Comparative	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	Surveyed primary care physicians (N=202) who graduated from an allopathic (convention western medicine) medical school from 1970-1980 and who in 1981 were working in a nationally representative sample of externally subsidized rural practices. Physicians were first identified in 1981 as part of an earlier study.	Focuses on whether there is an association between characteristics of physicians' training and the length of time that those who choose rural practice actually stay in rural settings. Physicians with rural training experiences as medical students did not stay in rural practices any longer than those without such experiences. Brief rural rotations are unlikely to protect physicians from burnout, the financial difficulties of rural practice, their families' changing needs, or other factors which lead some rural physicians to relocate to urban settings. Physicians who had rural training experiences as residents tended to demonstrate shorter retention in rural practice than those without similar training (although authors note this result was not statistically significant). Private medical school graduates stayed in rural practice longer than those who graduated from public medical schools (4 years vs. 3 years respectively). Authors believe that rural practice retention is influenced primarily by circumstances encountered by practicing rural physicians (i.e. workload, income), or by situations that arise when rural physicians and their families changing needs are no longer being met by their rural communities. Conclude that it is not sufficient to simply provide training for future rural physicians in certain types of institutions or rural rotations commonly experienced by participants of this study. Educational efforts need to be planned with a much more critical eye. We need to determine what outcomes are possible from training initiatives for those with an interest in rural practice and the types of educational initiatives which favour these outcomes.
Pathman Konrad Ricketts 1994b	Comparative	Financial Postgraduate Curriculum Interventions	Group 1 - all 675 physicians in the NHSC program. Their initial placement occurred between 1987 and 1990. Group 2 - stratified random sample of 1000 non-Corps physicians. Both groups were sent questionnaires in 1991.	Purpose was to describe the National Health Service Corps (NHSC) scholarship program. Its purpose was also to describe the physicians who work in the program, their perceptions of their work and living situations. The NHSC program provides financial support to students training in medicine and other health fields to cover all or part of their education. For each year of support they receive students incur a year's obligation to work in a federally designated rural health professional shortage area. The findings indicate up in the depth of the plan to Corps physicians as having the following characteristics: female; white; less likely to have grown up in rural areas or be married to spouses who grew up in rural areas; less likely to have graduated from public made schools and to have trained in family practice; and had greater interest in underserved area practiced location as compared to rural practice. The study findings also indicate that 30% of corps physicians, despite serving in rural areas, thought it was important to live when they had access to city amenities. Associated with increased

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				retention was better physician - community matching, greater satisfaction, and greater community integration.
Pathman Konrad Ricketts 1992	Comparative - Cohort	Financial	412 primary care physicians initially identified during an earlier study as working in a national stratified random sample of 178 externally subsidized rural clinics in 1981. The sample size was reduced to 375 as these were the only physicians for whom current addresses could be located. These 375 physicians were resurveyed in 1990. 304 physicians responded to the questionnaire, for a response rate of 81.1%.	Purpose of this 9-year follow-up study was to compare the retention of physicians serving National Health Service Corps (NHSC) Scholarship obligations in rural settings to that of non-NHSC physicians working in the same or similar practices and to identify promising retention-enhancing strategies. Study participants were first identified in 1981 and then resurveyed in 1990 to learn of their backgrounds, experiences in their practices, and their subsequent careers moves. They were sent two mailings of a 10-page questionnaire, followed by an abbreviated questionnaire to remaining non-respondents. The study findings indicated that when compared to non-NHSC physicians working in comparable rural settings, the retention of rural NHSC physicians is poor. NHSC-physicians were much less likely than non-NHSC physicians to have remained in their 1981 practices (14.7% vs. 39.2%; P<.001), in their original communities (22.9% vs. 47.9%; P<.001), or in any rural county (33.6% vs. 52.9%; P=.001). Part of the Corps' retention problem is that it sometimes places physicians in rural settings who are relatively disinclined toward rural living.
Pathman Steiner Jones Konrad 1999	Comparative - Cohort	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	Data was collected through two mail surveys (one in 1991 and the other in 1996-97). 1991 survey: Primary care physicians (N=661) who had moved to rural practice in the US from 1987 through 1990 (and who had not served with the National Health Service Corps). Physicians were randomly selected from the American Medical Association Physician Masterfile. Response rate: 456 (69%). 1996/97 survey: These 456 eligible physicians were resurveyed about their career paths and more details about their medical training. There were 3 mailings and follow-up phone calls. There were only two non-respondents to this survey. They could not be located.	Purpose was to identify educational approaches that best prepare physicians for rural work and small-town living, and that promote longer rural practice retention. The study findings indicate that 63% of physicians recalled they had been interested in rural practice when they started medical school. Participation in rural rotations was common among respondents, although typically brief. More than half of the respondents had participated in rural rotations as students and almost half had participated as residents. 28% had participated in rural rotations as both students and residents. Physicians who felt better prepared for rural careers were found to stay longer in their rural practices. In addition, feeling prepared for small town living was more important to retention than was feeling prepared for the practice of rural medicine. Rural experiences during residency, not medical school, appeared particularly effective. During medical school, only rural experiences of < three months were associated with a greater preparation for rural practice. This might be explained by the fact that residents are at a stage of their professional development where they are more receptive to the important lessons of rural rotations. However, only those physicians who were in their first jobs following residency benefited from their rural and other educational experiences by feeling more prepared and staying at their practices. The study findings suggest that once physicians have practice experience, their earlier formal educational experiences no longer positively affect their sense of preparedness and retention.
Pathman	Descriptive	Other (Community	Random sample (N=500) of	Authors propose that physicians can interact with their communities in 4 ways: (1) by identifying and

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Steiner Williams Riggins 1998		Interaction)	primary care physicians in the US. Response rate to questionnaire was 66.6%.	intervening in the community's health problems, (2) by being aware when treating patients of the particular health issues of local cultural groups, (3) by coordinating the community's health resources in the care of patients, (4) by assimilating into the community and participating in its organizations. Questionnaires were distributed to test this framework. The study findings show that physicians were confident in their ability to locate, employ, and collaborate with other health workers in their community. However, they expressed the least confidence in their ability to understand their communities' perceptions of their health problems, the use of the tools of epidemiology to understand their communities' health needs, engaging community members in efforts to address local health problems, and documenting the effects of a community health intervention. Physicians who were more interested in being part of their communities during their medical school training reported being more active in their current communities. Community participation and assimilation was lower for those physicians in poorer areas, those with more minority patients, those caring for more HMO patients, and those raised in rural areas. Primary care physicians must understand their patient's social situation and find/use the community resources necessary to manage lifelong medical problems and challenge unhealthy lifestyles. This is also important for specialist physicians. They must know how to work with patients of a variety of backgrounds and understand how diseases vary across communities.
Pathman et al. 2000	Descriptive	Financial	N/A	Identifies and describes US programs that provide financial support for physicians and practitioners in exchange for service in underserved areas. A cross-sectional, descriptive study of data was collected by telephone, mail questionnaires, and other documentation. All state programs operating in 1996 that provide financial support in exchange for service in defined underserved areas to student, residents, and practicing physicians were identified. In 1996, there were 82 eligible programs operating in 41 states, including 29 loan repayment programs, 29 scholarship programs, 11 loan programs, 8 direct financial incentive programs, and 5 resident support programs. Programs more than doubled in number between 1990 and 1996. Common features of state programs were a mission to influence the distribution of the health-care workforce within the state and an emphasis on primary care. Programs to support physicians clearly targeted primary care physicians. Far fewer programs accepted physicians of other specialties. This study demonstrates a remarkable growth in these types of financial support and reimbursement programs.
Paulman Medder 2002	Descriptive	Undergraduate Curriculum Interventions	Junior medical students (120 per class) at the University of Nebraska College of Medicine (UNCOM)	Describes the development and evaluation of a population health project which is a required part of students' 8 week rural family medicine preceptorship. Designed to acquaint students with population health and CQI (continuous quality improvement). Students were required to select a population problem to be studied from within the preceptor's practice. They were to define the current state of the problem and propose an action plan. Results indicate that process improvements, such as increased rates of vaccination documentation and improvements in record availability were documented in at least 5 rural practices as a result of student initiatives. More than 80% of students indicated an interest in applying principles they learned to their practices during or following residency. Documented changes in patient care delivery and process in preceptor's practices have occurred as a result of student initiative.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Paulman Davidson-Stroh 1993	Comparative (Pre-Post Test)	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	Senior medical students (N=598) at the University of Nebraska Medical Center (UNMC). Data are available from all students, for a response rate of 100%.	Purpose was to determine if the senior medical student rural family practice preceptorship at UNMC (a required 8 week rotation) was a positive influence on students' selection of family practice as a specialty. According to the literature, early exposure to family practice in the curriculum appears to have a positive influence on students' choice of family practice. Students completed pre- and post-rotation questionnaires. Questionnaires included the question 'What is your first choice for a residency at this time?' The study findings indicate that 565 students (94.5%) were uninfluenced by the preceptorship. 98 of these students had chosen family practice before the preceptorship and planned to follow on with this career choice. 33 students (5.8%) reported a change in residency choice after completing the rural preceptorship. 23 (3.8%) of these students were positively influenced toward family practice; 10 (1.8%) were negatively influenced. 15 of the 23 students who indicated they were positively influenced toward family practice went on to choose a family practice residency.
Paulman Gilbert Davidson-Stroh Ulrich 1995	Descriptive	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	407 students at 51 sites in 36 rural Nebraska counties.	Purpose of this study was to determine if the clinical content of students' community preceptorships reflects the scope of community practice and should therefore be considered in the design of pre-doctoral and graduate educational programs. The study design involved an examination of the clinical experiences of senior medical students at the University of Nebraska Medical Center during their required 8-week preceptorships in rural family practice. It was conducted over 4 years. During their preceptorships students recorded all clinical diagnosis and procedures. The study findings indicate that there may be differences in the patterns and frequencies of diagnoses encountered by students that are determined by the "rurality" of their preceptorship site. Further research is required to determine whether such differences are significant and whether they should be considered in the design of future curricula.
Payne 1993	Informed Opinion	Pre-medicine Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Sufficient numbers of physicians need to be provided to the rural areas of Canada and the excessive workload of physicians needs to be eased so that they can enjoy a satisfying social, family, and professional life. Author suggests several changes that can be made: (1) encouraging high education in health careers among rural children since children raised in a rural environment are more likely to return; (2) implementing a selective medical school admissions policy; (3) facilitating early exposure to rural medicine and practice during residency; (4) providing adequate explanation of the advantages and disadvantages of rural life to both physicians and their spouses; and (5) distributing better manpower to improve conditions for patients and physicians.
Peach Barnett 2002	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Discuses whether an early rural placement in the 3rd year of medical school in Australia influences students' internship choices. Referred to a cohort of students from an earlier study, who had taken part in the rural placement, and followed them to determine if the placement actually influenced their career choice. While the combined number of students taking internships in regional and outer Melbourne hospitals increased from 6.2% to 14.9%, the proportion of students having completed placements who undertook internships in regional or outer Melbourne hospitals did not differ significantly from that of other students. In addition, the proportion of students with a rural background undertaking internships in such hospitals also did not differ significantly from that of other students. Therefore, neither the early placement nor rural background accounted for the increase. The author did not make known what might have influenced the increase.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Peach Bath 2000	Descriptive	Undergraduate Curriculum Interventions	80% (28) of the rural and 70% (114) of the non-rural students completed a post placement questionnaire.	Melbourne University began offering third-year students a voluntary placement in a rural general practice or hospital in 1995. The objectives were for students to experience rural health-care services, to understand the problems of delivering health care in rural areas and experience rural lifestyle. The purpose of this study was to examine the experiences of rural and non-rural students undertaking a voluntary rural placement in the early years of medical school. Students were sent a post-placement questionnaire asking them to rate the placement and to rate the extent of their feelings towards rural practice. Eighty percent (28) of the rural and 70 percent (114) of the non-rural students completed a post placement questionnaire. The two groups did not differ on their overall rating of the placement. However, 46% of the rural students reported the placement had changed their feelings towards rural practice compared with only 24% of the non-rural students.
Perkin 1994	Informed Opinion	Advanced Procedural Skills Training	N/A	In order to better understand the circumstances and concerns of rural family physicians, the CFPC conducted a survey in 1990. One in three respondents believed that they were not adequately trained for rural practice. One in three was unsatisfied with their access to continuing medical education. Two of three had difficulty in obtaining locum coverage. Four of five expressed satisfaction with rural life. Nine of 10 expressed professional satisfaction with the work and 19 of 20 experienced some level of personal stress. Appropriate training for rural practice was not as widely available as it should be.
Perkin 1988	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes the certification of the special competence in emergency medicine by CFPC. This can be done through the residency eligible or by a practice eligibility route. During the residency eligible route the first two years is a completion of CCFP followed by a third year of emergency medicine. In the practice eligible route the minimum number of hours worked in emergency department is 400 hours per year for five years. There is close corporation between the College of Family Physicians of Canada and the Royal College of Physicians and Surgeons of Canada in accreditation of emergency medicine programs
Phillips Rosenblatt Schaad Cullen 1999	Comparative - Cohort	Undergraduate Curriculum Interventions	Medical students who had entered the University of Washington between 1968 and 1973 and participated in a family physician curricular pathway (N=239).	Purpose was to report the specialty and rural/urban distribution a mean of 19 years after graduation for a cohort of students from a family physician curricular pathway. The study design involved the collection of information from the sample population from the 1994 Physician Masterfile of the American Medical Association. The study findings indicate that 72% of the students had left school intent on careers in family practice; 57% were family physicians in 1994. This exceeded an original goal of the pathway curriculum planners, that at least 20% of each class should enter family practice. 3.5% of these graduates were family physicians in rural Washington in 1994. Early identification and support of students interested in family practice is an appropriate starting place for producing more family physicians.
Pincott 1987	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes a small town's family medicine practice in Cowansville, Quebec, which is staffed by four family physicians. The group, which serves a diversified clientele, has access to a general hospital, consultants, and paramedical resources. Residents in family medicine have spent some time in their practice during the past year. The advantages for the resident are that they know patients as individuals rather than as disease entities. The resident will see them as members of a family, a community, and business.

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Piterman Silagy 1991	Descriptive	Pre-medicine Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N = 300 64% response rate (n = 192)	Studies have highlighted the fact that negative perceptions of rural practice are frequently developed during undergraduate and postgraduate training. It is difficult to encourage those who do not have a rural background to practice in rural areas. Measures to overcome have been suggested and include selective recruiting of undergraduates from a rural background, providing lengthy rural preceptorships during undergraduate training and providing financial incentives for doctors training for the country. In a number of studies it has been highlighted that there is a need to provide rural doctors with better local support services, better educational facilities for their children and more occupational opportunities for their spouses. The purpose of this study was to examine the attitudes of junior hospital doctors towards rural training and practice in Victoria, Australia. A cross-sectional survey of 300 randomly selected Victorian hospital interns and resident medical officers was undertaken using a mailed questionnaire. A 64% response rate was achieved. The survey tested for differences between those doctors choosing to train and work in rural areas and those choosing urban areas. Only 15 percent indicated a preference for rural training. Those from a rural background were more likely to express intention to train and practice in the country ($p<.05$). The most important determinants in choosing a rural training post included the perceived quality of education and training facilities and the view of the doctor's partners or spouses. The decision to practice in the country was more likely to be influenced by family than professional factors ($p < .05$). A significant relationship was found between a rural background and the decision to train and practice there. Although rural training was well received and enjoyed by most residents, a much smaller percentage indicated that it had positively influenced them towards selecting a career in rural medicine. The length of time which doctors had spent in a rural training position was positively associated with the subsequent choice of both rural residency and future location of medical practice in a rural area. Doctors also felt that opportunities for their own professional development were important in determining practice location in rural areas.
Politzer Harris Gaston Fitzhugh Mullan 1991	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses the current status of the primary-care physician supply, the role of the federal government in the training of primary care physicians, the difficulties of financing primary-care training, and the influence of community-based training. A number of recommendations are made in order to sustain an adequate supply of primary-care physicians: (1) build postgraduate training in-service linkages - schools of medicine and community health centers for the delivery of primary-care services need to work together to incorporate ambulatory training experiences and primary care education; (2) redirect admissions criteria to students who are more likely to choose primary care careers and serve the underserved; (3) promote required third-year undergraduate medical clerkships in primary care; (4) promote primary care research - establish primary care as a scientific discipline, research activities in clinical patient care, primary care education, and health services research should be in integral part of the medical school research agenda; (5) train and develop community-based faculty; (6) establish graduate medical education financing initiatives for primary care training.
Pong 1995	Comparative – cross-sectional	Other (Practice Location)	Physicians who graduated from the family medicine program of Queen's University between 1976 and 1991 (n=303). Response rate: 77%.	Purpose was to find out what factors are seen by physicians as important in influencing their choice of practice location; to address some of the deficiencies in previous research by examining if male and female physicians and physicians who established practice in different time periods differ with respect to the perceived importance of certain factors influencing where they practice; and to study the differences between rural and urban physicians with respect to factors affecting their practice locations. Study findings indicated that spousal influence and lifestyle factors are more important that income potential and career advancement. The only statistically significant differences reported at the .01 level between male and female physicians were income potential & influence of spouse/partner. Male physicians placed more emphasis on income; female physicians were more likely to consider their spouse's place of employment. There were no statistically significant differences between males and females with respect to the quality of education for children or proximity to family members.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Pope Grams Whiteside Kazanjian 1998	Descriptive	Other (Retention)	404 rural physicians surveyed. 121 responded	Purpose was to understand decision making process that rural physicians and their families undergo when they decide to relocate and withdraw implications that might be useful for those facing similar relocation decisions. There were 121 rural physicians surveyed and their narrative responses were analyzed using Grounded theory - a theory for understanding the retention of rural physicians. The results were organized around three major categories: community commitment, medical confidence, and compensation. Throughout these categories a theme emerged - 'taping the decision - making skills' - which describes the delicate balance of issues that surround the physician's decision on practice location. From this theme patterns have emerged to explain what tips the balance that leads rural physician to 1) make a rational decision to leave, 2) wait for the last straw, 3) experience the last straw scenario, and 4) make a decision to stay. It is the experience the physician has with balancing his or her own lifestyle with commitment to the community, the confidence that he/she has to fulfill that responsibility and appropriateness of the compensation which he/she receives that influences the decision to stay or live in rural communities. The physician often develops a very close relationship with the community. Rural practice is usually characterized by a very demanding work schedule particularly with on-call responsibilities. In an isolated setting a physician carries much greater responsibility for quick decision making and must use a wide variety of medical skills. Access to special skills training and CME is often limited in rural areas. There is no financial incentive for doctors to undergo additional training to enable them to perform a specialty medical skill. Financial compensation does not reflect the realities of rural medicine. Community attributes, opportunities for the physician and family and a sense of community are important personal compensatory factors.
Potts 1994	Descriptive	Undergraduate Curriculum Interventions	N/A	Purpose was to describe 'Primary Care Management' - a student-centred third-year clerkship involving student choice and on-site investigation of rural community health agencies at Michigan State University's Upper Peninsula campus. The objective of the clerkship was student understanding of how to explore and use community agencies to enhance the care of patients. The course was evaluated using questionnaires to measure changes in students' attitudes, students' evaluations of the course, faculty evaluations of the students' reports, and a review of the course by an external evaluation team. Concludes that exposure to community agencies can offer students an increased awareness of the interdisciplinary nature of primary care.
Powis Bristow 1993	Informed Opinion	Pre-medicine Admissions	N/A	It has been argued that physicians are more likely to choose to work in a rural area is they have been born and attended high school there. One strategy that may increase the number of rural physicians is to therefore select more medical students from rural areas. In addition, the application rates from individuals in these areas must also increase. It may therefore be necessary to work with country high schools to increase retention rates and improve the academic achievements of students.
Price Prideaux 1996	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Discusses the major features of the curriculum design process. The authors were curriculum design consultants for the "Rural Medicine Curriculum Design Project", established to prepare separate curricula in surgery, anaesthesia and obstetrics for use in advanced training within the integrated Rural Training Program of the Faculty of Rural Medicine of the Royal Australian College of General Practitioners. Input for the design of the curriculum was obtained through a series of meetings and teleconferences with participants drawn from the major groups with an interest in the particular topic areas. Meetings for each of the curriculum areas were held separately. Key features which were critical to the successful development of the curriculum included: a well-defined organizational structure for the project; a well-prepared and comprehensive background papers for each of the three curricula. These were essential for the meetings which took place among the interested parties; and face-to-face national meetings and teleconferences involving the major stakeholders.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Price Miflin 1994	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Rural medical educators are disadvantaged as teachers, because of lack of access to teacher support. This article describes a project to develop a teacher development training package. The essential characteristics of the package included: a model of teaching and learning appropriate to rural contexts, features of which included one to one teaching, complexity and diversity, and the individual differences of particular settings where teaching and learning take place; that they are accessible to teachers isolated from centrally located teaching support, education and training provisions; and that they are educationally sound, especially in their reflection of the existing abilities and self-directedness of the teachers for whom they are designed.
Price, Miflin Mudge Jackson 1994	Descriptive	Undergraduate Curriculum Interventions	n = 183 (76.5% response rate)	Rural medical teaching appears to be a relatively unexplored area of medical teaching. In 1992 the Faculty of Medicine of the University Queensland introduced a compulsory, two week, rural general practice term into the undergraduate medical curricula as a response to the national rural health strategy recommendations. The purpose of this study was to examine the experiences and perceptions of medical undergraduate students of teaching and learning in rural settings in Queensland, Australia. 240 medical undergraduate students were surveyed. The response rate was 76.5 percent. The supervisor/teachers for these undergraduates were rural general practitioners and hospital medical personnel. Teaching and learning most often revolved around patients, and involved learners in an active way. Teaching and learning was most effective when teachers perceived their role as encouraging and facilitating the process of contextualizing knowledge by the learner. Learners identified integration as occurring via simple observation, as well as hands-on learning and solo consultations, provided that these contexts provided worthwhile interaction with teacher, especially clear explanations of decisions, and/or feedback on performance. The major positive features identified by 90% of students were: being treated as a colleague; being allowed/encouraged to work independently; receiving feedback on their work; and being given ample hands-on procedural experience and/or teaching. The 10% of students who reported unfavourably on their rural experiences identified lack of opportunities to carry out solo consultations/work independently; lack of structure in teaching/learning experiences; and lack of hands-on experience. The chief barrier to effective teaching and learning in rural settings was time, that is, the rural term was too short. Rural teachers confirmed a deep dissatisfaction with lack of support for their teaching and supervisory roles with respect to both undergraduate and postgraduate learners.
Prideaux et al. 2001	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Provides an overview of changes which have taken place in the Austrian medical education system. Australian medical schools have undergone significant reform over the last decade. Government funding has led to the establishment of rural clubs, Departments of Rural Health and community-based programs. The Australian medical workforce is maldistributed, with significant undersupply in rural and remote areas and oversupply, particularly in general practice, in some urban locations. The increasing number of female medical practitioners is changing professional work patterns as female practitioners are less likely to practice in a rural setting than male doctors. Indigenous Australians and aboriginals are significantly underrepresented in the medical workforce and medical school intakes. The 11th Australian medical school opened in 2000 and is located at James Cook University in Northern Queensland. This new medical school will have a focus on training for rural and remote practice. The new medical school intends to address the inequity of access by promoting medical careers to rural students and increasing quotas both for students from rural and regional communities and indigenous Australians. The new medical school will be much more community oriented with emphasis on placing students in a variety of dispersed non-hospital settings.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Rabinowitz 1999	Informed Opinion	Admissions	N/A	Discusses the medical student characteristics (which have been identified in the literature) that are related to graduate's entering generalist careers. These include: initial specialty preference (a large body of data indicate that most students end up in areas closely related to their original career plans; geographic background; gender, age, & ethnicity; female, married and older (nontraditional) students; economic and lifestyle factors; attitudes and personal values; service orientation; and premedical academic performance. The author presents some strategies that medical schools could use in the selection process to enhance the matriculation of students who are most likely to become generalists. These could include: increasing the number of generalists on the admission committee; including community-based faculty on the admissions committee; and broadening admission criteria to increase the weights of relevant student characteristics while maintaining high academic standards.
Rabinowitz 1995	Informed Opinion	Admissions	N/A	Discusses how rural areas have always been underserved and explores the progress made in the recruitment and retention of physicians in these areas. The reasons why many rural physicians relocate are well known. They include professional isolation, lower reimbursements, a heavy on-call schedule, and solo practice. A Practice Support Outreach Program has plans to address issues of professional isolation through telemedicine and CME for example. Some of the literature has addressed the rural physician shortage by focusing on, and changing, who should become a physician. There has been much discussion about changing admissions policies and the curriculum. The author notes, however, that while the effects of admissions and curricular strategies on recruitment have been studied, their effect on retention is often overlooked. Recruiting and training physicians for a practice location that meets their own needs and expectations is part of keeping them in rural communities as well. This article discusses how these strategies to address the shortage of rural physicians - practice support, admissions, and curriculum - are not of equal importance. The available data indicate that changes in medical school admissions are more effective in increasing and retaining rural physicians and are more cost-effective that isolated changes in curriculum or practice support. It is of interest, however, that more medical schools have not adopted changes in their admissions policies.
Rabinowitz 1993	Comparative - Cohort	Admissions Undergraduate Curriculum Interventions	N/A	Jefferson Medical College initiated the Physician Shortage Area Program (PSAP) in 1974. This program provides a selective medical school admissions policy which admits medical school applicants from rural backgrounds who intend to practice family medicine in rural areas. The program also involves a special family medicine program which includes a required third-year clerkship in family medicine at one of two non-metropolitan locations, and a senior out-patient sub internship in family medicine, frequently consisting of preceptorship with a rural family physician. The purpose of this study was to evaluate follow-up information from all PSAP graduates and their non PSAP classmates between the years 1978 and 1996. Graduates of the PSAP were tracked longitudinally and compared with their non PSAP classmates. Information was obtained about the retention of family physicians in rural areas and areas with physician shortage over the previous five years, the geographic specialty choices of more recent graduates, and the recruitment of applicants into the program. The results indicate there was a substantial attrition among non PSAP graduates practicing family medicine in rural (10 of 31, 32%) areas. PSAP graduates from the classes of 1978 through 1986 were 4 times as likely as non PSAP graduates to practice family medicine (55% versus 13%), to practice in a rural area (39% versus 11%), and to practice in underserved areas (33% versus 8%). They were ten times more likely to combine a career in family medicine with practice in a rural area (26% versus 3%). Overall, 85% of PSAP graduates were either practicing a primary care specialty or practicing in a rural or small metropolitan area or one with a shortage of physicians. PSAP was successful in increasing the number of family physicians in rural and underserved areas as well as in retaining them. This suggests that medical schools can have a substantial influence on the distribution of physicians principally through admissions criteria.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Rabinowitz 1991	Informed Opinion	Other (Health Research/Policy)	N/A	Discusses how academic health centers can help to address the shortage of physicians by supporting health services research which is designed to shape public policy that affects the rural US. Concludes that there needs to be more research in several areas: (1) health personnel and primary care. Such research might study the educational interventions which are being utilized by may medical schools in order to increase the number of students who are establishing practices in rural areas; (2) emergency medical services; and (3) rural hospitals.
Rabinowitz 1988a	Descriptive	Admissions	US schools (N=117) which listed selection factors for preferentially admitting students into the graduating class of 1982 from rural backgrounds and/or an interest in family medicine as a future career choice.	Purpose was to address the question of whether those medical schools which preferentially admit students from rural backgrounds and/or students with an interest in family medicine have a larger percentage of students actually entering family medicine as a career. The study design involved using a chi-square test to determine the relationship between those medical schools with preferential admission policies and the number of students entering family medicine programs from each group. Schools were determined through published medical school admission requirements for 1978-1979 and classified into one of four groups: Group 1 - a preference for students from rural backgrounds who were also interested in a career in family medicine; Group 2 - a preference for students from rural backgrounds; Group 3 - a preference for students interested in a career in family medicine; and Group 4 - no preferences. The study findings indicate that 23.7% of the graduates from group 1 entered family medicine programs; 14.5% of graduates from group 2 entered family medicine programs; 12.4% of graduates from all other schools entered family medicine programs. These findings are consistent with the literature.
Rabinowitz 1988b	Comparative - Cohort	Admissions Undergraduate Curriculum Interventions	Part 1: PSAP students (N=139) and their peers admitted into the classes of 1978 to 1985. Part 2: This part of the analysis was conducted only with graduates from 1978 to 1981 (47 PSAP graduates; 843 non-PSAP graduates).	Purpose was to present the results of a 12-year follow-up of Jefferson Medical College's Physician Shortage Area Program (PSAP) and evaluate the program's success with regard to its goal of increasing the number of family physicians in underserved rural areas. The study was conducted in two parts. The data for Part 1 on the age, sex, academic performance, and postgraduate specialty choice of students was retrieved from the database of the Jefferson Longitudinal Study, provided through the Center for Research in Medical Education and Health Care at Jefferson Medical College. The Alumni Association provided the data for Part 2 by which place of practice and choice of specialty were evaluated. The findings for Part 1 of the study indicate that 135 PSAP students graduated. The academic performance of PSAP students was lower than that of their peers. However, there was no difference between PSAP students and their classmates' clinical performance. Part 2 of the study finds that PSAP graduates were more likely to practice in nonmetropolitan areas than their peers (42.2 %vs. 11.8%). 28 out of 47 PSAP graduates were practicing in family medicine. PSAP graduates were almost 5 times as likely as non-PSAP graduates to practice family medicine, 3 times as likely to practice in rural areas, and 2 to 4 times likely to practice in areas where there is a physician shortage. The study concludes that the medical school admissions process can have a major influence on the specialty choice and practice location of physicians.
Rabinowitz Paynter 2002	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Americans living in rural areas have more health problems that their urban peers, yet there are fewer medical services available to them. A major part of the disparity between rural and urban health care is a long-standing shortage of physicians in rural areas. Although 22% of the U.S. population lives in rural areas, only 9% of physicians practice there. There are a number of known predictors of choice of rural primary care, including rural background, freshman medical student plans for family practice, and receiving a national health services corpse scholarship. Women are slightly less likely to practice rural medicine to men. Spousal influence and economic issues also play a role in physicians' decisions about where to practice. During medical school, taking a rural clinic rotation is the strongest predictor of a later decision to practice in rural setting. However, since most medical schools are located in urban areas, the vast majority students have their clinical training care. Overall, medical schools with special

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				admissions programs and those with extensive rural curricula have been more successful in producing rural physicians, as have residency programs with rural training tracks. Physicians' decisions about where to practice are also related to their choice of specialty. A higher proportion of rural physicians are generalists. Family physicians are the only specialty group which distributes itself proportionately to the population in rural and urban areas. The size of the future rural physician workforce may be threatened by the trend of U.S. medical students to increasingly train in non-generalist specialties and subspecialties.
Rabinowitz Henick 1985	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Describes an initiative of the Jefferson Medical College of Thomas Jefferson University in attempt to respond to the shortage and uneven distribution of primary care physicians. The university established the Physician Shortage Area Program (PSAP), which involved both admissions and curricular changes. Students' backgrounds (i.e. those raised in rural areas) and their specialty choices were factors to be considered. The program aimed to identify medical student applicants who would eventually practice family medicine in physician shortage areas. 24 places for admission to the first year class were reserved. Students who applied to this program were placed in a special applicant pool, by judged by the same parameters as the regular applicant pool. Curricular requirements included junior family medicine rotations in smaller areas, a family medicine preceptorship, a three-year family medicine residency, and the practice of family medicine in a physician underserved area.
Rabinowitz Diamond Markham Paynter 2001	Comparative - Cohort	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	3414 Jefferson Medical College graduates from the class of 1978 to 1993 and included 220 PSAP graduates.	Purpose was to identify factors independently predictive of rural primary care supply and retention and to determine which component of the Physician Shortage Area Program (PSAP) lead to its outcomes. The study findings indicate that freshman-year plans for family practice, PSAP participation, receiving a National Health Service Corps Scholarship, taking an elective senior family of practice rural preceptorship, and gender (male) were independently predictive of physicians practising rural primary care. For 1978 to 1982 graduates, growing up in a rural area was the only independent predictor of rural primary care. Non-PSAP graduates with two selection characteristic of PSAP students (having grown up in a rural area and a freshman - year plans for family practice) were 78% as likely as PSAP graduates to be rural primary care physicians and 75% as likely to remain, suggesting that admissions component of the PSAP is the most important reason for its success.
Rabinowitz Diamond Markham Hazelwood 1999	Comparative-Cohort (retrospective)	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	206 PSAP graduates from the classes of 1978 to 1991.	Purpose was to determine the direct and long-term impact of the Physician Shortage Area Program (PSAP) of Jefferson Medical College (JMC) on the rural physician workforce. Compared the PSAP graduates currently practicing family medicine in rural and underserved areas of Pennsylvania with all allopathic medical school graduates in the state, and with all US and international allopathic graduates. All PSAP graduates were also compared with the non-PSAP peers at JMC regarding the US practice location, medical specialty, and retention for the past 5-10 years. The PSAP graduates account for 21% (32/150) of family physicians practicing in rural Pennsylvania who graduated from one of the state's seven medical schools. Even though they represent only 1% (206/14710) of graduates from those schools (RR 19.1). Among all US and international medical school graduates, PSAP graduates represent 12% of all family physicians in rural Pennsylvania. Results were similar for PSAP graduates practicing in underserved areas. Overall, PSAP graduates were more likely than their non-PSAP classmates at JMC to practice in a rural area of the United States (34% vs. 11%: RR 3.0), to practice in an underserved area (30% vs. 9%: RR3.2), to practice family medicine (52% vs. 13%: RR4.0), and to have a combined care area in family practice with practice in a rural area (21% vs. 2%: RR 8.5). Of PSAP graduates, 84% were practicing in either rural or small metro-high, with a number of PSAP graduates currently practicing rural family medicine equal to 87% of those practicing between 5 and 10 years ago, and the number practicing in underserved areas, 94%. The PSAP after more than 22 years had disproportionately high impact on rural physicians in the workforce. Policy makers and medical schools can have a substantial impact on the shortage of physicians in rural areas.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Rabinowitz Diamond Hogat Hazelwood 1999	Comparative – Cross-sectional	Financial Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	1609 medical college graduates from 1972 to 1991 in Pennsylvania	The data previously collected from the Jefferson longitudinal study were analyzed for 1972 to 1991 graduates of Jefferson Medical College practicing in Pennsylvania in 1996. Of the 93 available analyzed for prediction, ten were univariately predictive of rural practice and three of the ten variables that were meaningful predictive of rural practice involved professional plans of students when they were in their senior years of medical school and were not entered into the logistic model for the calculation of the remaining seven variables on a sample of 359 graduates. These show that growing up in a rural area was the most important independent predictor of practice in a rural area ($p<0.001$). Entering medical school with plans to become a family physician was the only other independent predictor of rural practice ($p=0.002$) no other variable, including curriculum or debt, added significantly to the likelihood of rural practice. None of these variables, however, including rural background, was predictive of retention, which appeared to be more related to practice issues such as income and workload. These results suggest that the increasing number of physicians who grew up in rural areas is not only the most effective way to increase the number of rural physicians, but an policy that does not include these may be unsuccessful. Support for retention should include policies that help increase reimbursement to rural physicians and help to decrease their burden of work.
Rafuse 1994	Informed Opinion	Pre-medicine Financial	N/A	Discusses some initiatives being taken to increase the number of aboriginal students who want to become doctors. In the past, medicine has not been an attractive career path for aboriginal students for several reasons: (1) it is not seen as being successful; (2) there are too few role models; and (3) the course of study is longer and more expensive than other professions. Another factor working against aboriginal students is the insensitivity and lack of commitment from many Canadian medical schools. Only 4 of the country's 16 medical schools (Alberta, Toronto, Manitoba, and British Columbia) have programs that address aboriginal health sciences career development, recruitment and retention. There are some initiatives being taken to change all of this. The Native Physicians Association in Canada (NPAC) is using a series of videos for school career fairs to increase medicine's profile among younger students. When possible, native physicians and medical students try to attend career fairs on reserves and in urban areas that have significant aboriginal populations to answer students' questions and act as role models. The CMA supports NPAC's efforts and offers assistance to undergraduate aboriginal medical students through a special bursary program.
Ramsbottom-Lucier Caudill Johnson Rich 1995	Descriptive	Other (Satisfaction)	All primary-care physicians practicing in Kentucky (N=1604) including family practitioners, general practitioners, and general internists during summer 1991. While 569 questionnaires were returned, only 446 contained usable responses. A sub-sample of respondents (N=381 community physicians) was used in this study's analysis.	Purpose was to compare the professional satisfaction of physicians in rural and urban settings to determine how practice settings, practice type, work hours, and interactions with colleagues influenced satisfaction. A questionnaire was designed and distributed to gather information on physician and practice characteristics. Overall, physicians were satisfied with their practices, with those in larger communities more than 35,000) being more satisfied than those in smaller communities. Professional satisfaction was associated with practice location, practice type, number of years since graduation from medical school, number of colleagues identified, and the quality of professional interactions with colleagues.
Ramsey Coombs Hunt Marshall Wenrich	Informed Opinion	Pre-medicine Undergraduate Curriculum Interventions	N/A	Describes the WWAMI Program at the University of Washington School of Medicine (UWSOM). In 1970 USWOM administrators and faculty initiated a four-state community based program to increase the number of generalist physicians throughout a predominantly rural and underserved region in the US Northwest. The program developed regional medical education for three neighbouring states that lacked their own medical schools, and encouraging physicians in training to practice in the region in

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
2001		Postgraduate Curriculum Interventions CME		1976 Wyoming joined the WWAMI Program. Practices prone to success include widespread participation in and ownership of the program by the participating physicians, faculty, institutions, legislatures, and associations; partnership of our constituents, education equivalence among training sites; and development of an educational continuum with recruitment and/or training at multiple levels, including K-12, undergraduate, graduate training, residency, and practice. The programs positive influences on UWSOM have included historically early attention to primary care and community based clinical training and development of ethic of closely monitored innovation. The use of new information technologies promises to further expand the ability to organise and offer medical education in the WWAMI region. WWAMI has implemented and supported many programs such as the Minorities Medical Education Program; the Medical Scholars Program; the Ambassador's Program; the Rural Observation Experience; the UDOC; the Rural Integrated Training Experience; and the WRIGE Program. WWAMI research centres were set up to perform research on rural and underserved health care issues. Programs for healthy communities were set up to help rural communities stabilise their health systems. Community assessments, market surveys, management and financial studies, and other analysis were conducted to assist local community leaders in developing long-range plans for improvement in health systems. The program also serves as a home to the WWAMI rural telemedicine network. The WWAMI graduate retention rate for Idaho was 44% (n=107), Montana was 41% (n=119), and in Alaska 51% (n=76). According to a 1997 alumni survey, approximately 21% practice in rural communities of less than 10,000 and 31% practice in communities of less than 25,000. Of the 1999 graduating class of the University of Washington School of Medicine, 35% entered primary care training, indicating a strong likelihood of pursuing a career in primary care.
Reddoch 1998	Informed Opinion	Other (Rural Practice)	N/A	Describes the practice of medicine in the Yukon. Many of the medical students and family practice residents who spend time in the Yukon feel that their training has not equipped them with the skills and knowledge you need to work outside a tertiary care setting. Communication skills in particular may be a challenge because of First Nations people. In remote and rural practices it is vital for physicians to maintain their technical skills. General surgeons provide general surgical care as well as caesarean sections, emergency orthopaedic services, and emergency neurologic, plastic, urologic, and vascular surgery. Working in a rural and remote area is really a type of specialty practice. Doing a rotation in a rural practice also exposes the students and residents to some of the pleasures of rural life. Forcing physicians to go somewhere against their will would not encourage them to stay. Exposure to rural practice, appropriate training, reciprocal remuneration, and holiday time, opportunities for postgraduate training and employment opportunities for spouses will help to entice rural physicians to work and stay in rural and remote areas.
Rhoades Duffy Hall Voth 1995	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Describes the educational programs available at the University of Oklahoma College of Medicine, all of which are focused towards increasing the number of graduates choosing to practice in rural areas. Also discusses some informal principles regarding the role that academic health centers such as the College of Medicine must play in providing for rural health care. This includes locating educational experiences to the extent possible away from the larger urban centres, creating a specific curriculum appropriate to rural practice is desirable, and centering training on the primary care specialties of family medicine, internal medicine, pediatrics, obstetrics/gynecology, and emergency medicine. Attempts are made to ensure that members of the Admissions Committee include those from rural areas. The college offers a comprehensive series of educational experiences throughout the undergraduate and postgraduate years, including primary care specialty training.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Rico Satcher 1993	Informed Opinion	Other (Rural Health Policy)	N/A	This article reports on the policy recommendations made by the Council on Graduate Medical Education (COGME). COGME was invited by the federal government to review and examine issues related to the nation's medical education system and its ability to produce a supply of physicians that met the populations' needs. The findings included: the nation has too few generalists and too many specialists; problems of access to medical care persist in rural and inner city areas despite substantial increases in the physician supply; the racial/ethnic composition of the physician workforce does not reflect the general population and results in access problems for minorities; shortages exist in general surgery, adult child psychiatry, preventive medicine, and among generalist physicians with additional geriatrics training; the nation's current physician to population ratio is adequate; further increases in this ratio will do little to enhance the public's health or to address access to care problems and will hinder efforts to control costs; the nation's medical education system can be more responsive to public needs for more generalists and minority physicians. Fewer specialists, and more physicians for medically underserved intercity and rural areas are needed; and the absence of a national physician workforce plan, combined with financial and other disincentives, are barriers to health-care reform Among the recommendations: the nation should move toward a system in which 50% of all physicians practice in the disciplines of family medicine, general internal medicine, and general pediatrics; all primary medical care shortage areas should be eliminated and disparities between the metropolitan and non-metropolitan distribution of physicians should be reduced; and the racial/ethnic composition of the physician population should reflect the populations' overall diversity Among recommendations for medical education and medical schools: mission statement and strategic plan that contains specific outcome measures for the number of graduating generalists and minorities and the number of graduates who choose to practice in underserved communities; recruitment, school admissions, and retention policies to reflect the need to increase the number of entering students more inclined toward general practice; faculty composition and reward system that increases the number of minority and generalist position role models, primary care researchers, and community-based practitioners; medical education objectives and curriculum that integrate the biopsychosocial aspects of health and health care, emphasize self-directed learning and problem solving, and prepare medical students, residents, and practicing physicians with competencies needed for primary care practice; and medical education teaching environment which shifts a greater proportion of medical training from hospitals to physician's offices, community health centers, health departments, and other community-based, outpatient sites
Riley Myers Schneeweiss 1991	Descriptive	Other (Recruitment and Retention Factors)	302 medical school graduates from 1986 to 1988 and current residents in 12 family practice residency programs in the Northwest. Response rate: 72%	Compared the recruitment practices of rural communities and urban sites. Graduates and residents were surveyed to identify important factors in the recruitment process for their first post-residency placement. The study findings indicated that most job searched were initiated in the first six months of the third year of training and that referrals from faculty were the most valued source of information. Some of the problems identified included an unreceptive community (residents/physicians did not feel welcome) and a reluctant spouse or partner. Suggestion for how communities can more effectively recruit a rural physician: (1) establish a recruitment committee with a diversity of community interests; (2) carefully plan a recruitment strategy; (3) develop access to family practice residency programs and identify early those residents interested in a rural practice and stay in touch with them; (4) understand the importance of the initial impression; (5) pay for as many of the site costs as possible; and (6) call the resident after the visit to answer any questions he/she might have.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Riley Myers Gordon Laskowski Kriebel Dobie 1991	Descriptive	Financial Undergraduate Curriculum Interventions	74 students who participated in the first two years of the programs. Evaluations were received from 73.	Purpose was to describe the first few years of the Rural/Underserved Opportunities Program (R/UOP), a collaborative effort undertaken by the University of Washington School of Medicine, the WAMI Area Health Education Center Program, the Washington Academy of Family Practice, and the Family Health Foundation of Washington to provide students with an early introduction to primary care practice in rural and urban underserved settings. Placements were offered to undergraduate students between their first and second years. Students were extremely satisfied with the program's ability to provide them with first-hand exposure to community medicine. In terms of future rotations or practices, 65 students (89%) they were interested in future rural or underserved area placements while in medical school. 57 students (78%) indicated interest in such placements one they would become residents or practicing physicians.
Roberts et al. 1993	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes the methods used at the West Virginia School of Osteopathic Medicine to place physicians in rural areas: the school has a focused, achievable mission (to provide primary care physicians who are trained to meet the medical needs of rural Appalachia and to improve the health care of the rural Appalachian population); a personalized and interactive recruiting, admission, and placement process aimed to attract nontraditional, rural students; the provision of early and long-term clinical training in rural sites (both hospitals and physicians offices); a dedication primarily to the education of medical students rather than to research or other goals; and a freestanding school in rural environment. The first two years of the curriculum are designed to give students a background in the basic sciences and to correlate clinical basic science knowledge. There is also an emphasis on interdisciplinary teaching and clinical faculty participate in the curriculum of the basic sciences. The curriculum is oriented toward teaching primary-care physicians and the clinical curriculum includes for the most part community hospitals. Community-based medical schools that rely on community hospitals and local practitioners to teach clinical skills are more effective in influencing their graduates to enter primary care practice. Early exposure to community practices is positive reinforcements that guide students towards the practice of community primary care medicine. Previous studies suggest that the medical school admission process can influence the specialty and geographic distribution of physicians. Applicants from rural backgrounds who express intent to practice primary-care medicine in rural areas are more likely than their peers to combine a career in primary-care with practice in a rural area.
Roberts Davis Wells 1991	Descriptive	Other (Recruitment)	Medical school graduates from 1978 to 1986	Purpose was to determine the health professions' ability worldwide to educate and place primary care physicians in rural areas of Appalachia. The study design involved an analysis of data concerning: (1) The institutions that trained physicians who were practicing in Appalachia, and (2) the physicians' distribution in the rural and urban areas of that region. Data was collected by retrospectively following all graduates who began practicing in Appalachia as listed in the American Medical Association and American Osteopathic Association physician files. For cross-checking purposes, data was also obtained for all the West Virginia School of Osteopathic Medicine graduates through review of the alumni placement files and physician files. The study findings indicate that the University System of West Virginia, including the West Virginia School of Osteopathic Medicine, West Virginia University Medical School, and Marshall University Medical School, produced the most primary care physicians who began practicing in rural Appalachia during the 1980's. 36% of the primary care physicians practiced in rural areas; 31% of all physicians, regardless of specialty, practiced in rural areas. More physicians (69%) were practicing in urban areas. The concerns of medical educators and public health officials over poor distribution of physicians in rural Appalachia are well-founded.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Rolfe Pearson O'Conell Dickinson 1995	Descriptive	Pre-medicine Admissions Undergraduate Curriculum Interventions	217 graduates who had completed at least their intern year between 1982 and 1986. 162 returned the questionnaire, for a response rate of 75%.	Purpose of this study was to examine the differences between doctors who chose to practice in rural areas and those who chose urban areas after graduation from the University of Newcastle medical school in Australia. The study design involved a questionnaire. It was designed to gather demographic information and information about background, undergraduate experiences, current employment, and choice of practice location. The study findings indicated that 70% of graduates were employed in urban locations; 22% in rural areas. With regards to future practice location, 55 graduates reported they were presently working in or considering working in a rural area. 76 graduates were working in urban areas and had no intention of working in the country. Respondents who lived in a rural area before medical school were 2.49 times more likely to be working in a rural area than those living in rural areas. This relationship suggests that medical school admission criteria should favour rural background in order to increase the number of physicians who work in rural areas. Attention should also be given to rural high school students who need often encouragement and academic assistance in order to apply to medical school. Respondents who chose a rural location for their general practice attachment were 3.02 times more likely to be working in a rural area than those who chose an urban location.
Rosenblatt Hart 2000	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses the shortage of physicians in rural America, but also the fact that this shortage is not uniform. Larger rural communities that are closer to the metropolitan centers have not experienced this shortage as profoundly as smaller rural communities. Choice of specialty is a major factor in practice location. The more highly specialized the physician, the less likely he/she will settle in a rural area. Gender also affected practice location. Women are less likely to choose rural practice than men. One possible solution to this shortage is to train more health care workers who choose to practice in rural areas. Modifications to training should consider the following: students with rural origins are more likely to train in primary care and return to rural areas; residents trained in rural areas are more likely to choose to practice in rural areas; and family medicine is the key discipline of rural health care. Physicians might also be more likely to practice in rural areas if some sort of financial incentive is offered.
Rosenblatt Whitcomb Cullen Lishner Hart 1992	Descriptive	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	Physicians who graduated from American medical schools between 1976 and 1985. There were 578 610 physicians listed in the Masterfile. Those who reported they were still in training were excluded from the study, but since this number is not defined in the study, the exact sample size is unknown. It is known that 15,375 physicians (12.6% of the study population) were practicing in rural areas.	Purpose was to examine the hypothesis that medical schools vary systematically and predictably in the proportion of their graduates who enter rural practice. The methodology involved the examination of the 1991 rural and urban practice locations of the sample. This was determined using the December 1991 American Medical Association Physician Masterfile which, in addition to practice location, also includes information on the year and medical school of graduation and the physician's self-designated specialty, gender, and current practice status. The study findings suggest that medical schools vary enormously in the likelihood that their graduates will enter rural practice. The results range from 41.2% of graduates from the University of North Dakota practicing in rural areas to 2.3% of Mt. Sinai's graduates. 13 medical schools had over 20% of their graduates practicing in rural areas, while another 13 had fewer than 5% practicing in rural areas. This study also examined the association between medical school characteristics and the practice locations of their graduates. The study findings indicate the strongest association is between the percentage of rural graduates and the rurality of the state where the medical school is situated. The study findings also indicated that the total amount of federal funds that a medial school receives is inversely related to its propensity to produce rural physicians.
Rosenblatt et al. 1996	Descriptive	Financial Postgraduate Curriculum Interventions	All physicians who graduated from medical school between 1980 and 1983, received NHSC Scholarships, completed family	Purpose was to address the long-term career paths and retrospective impressions of family physicians who served in rural National Health Service Corps (NHSC) sites in return for having received medical school scholarships. Physicians received up to 3 copies of a questionnaire, as well as a telephone call after the second non-returned mailing. The study findings suggest that 60.1% of respondents were

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
			medicine residencies, and served in rural areas (N=383). 258 responded to the survey.	currently practicing in a location that was in some way at least relatively underserved. 20.9% of respondents were still in their initial NHSC settings. The study findings also suggest that one-half of al scholarship recipients leave their NHSC assignments almost immediately after completing their obligation; one quarter, however, remain, long-term in the area where they were assigned. This is particularly true is their initial obligation length was 4 years.
Rosenblatt Schneeweiss Hart Casey Andrilla Chen 2002	Descriptive	Postgraduate Curriculum Interventions	Questionnaires were sent to the 453 civilian family practice residency programs listed in the directory of the American Academy of Family Physicians; 435 of the programs responded, a response rate of 96%.	Purpose was to examine the extent to which U.S. family practice program directors consider training future rural physicians to be a priority and the location of all scheduled training rotations, including electives. Questionnaires were sent to the 453 civilian family practice residency programs listed in the directory of the American Academy of Family Physicians; 435 of the programs responded, a response rate of 96%. Of these, 402 (92.4%) are based in urban areas. Although 150 (37.2%) of these programs consider training rural physicians an important part of their mission, only 2.3% of the training sponsored takes place in rural communities. Only 33 (7.6%) of the responding programs were in rural areas, and most of these were in large rural towns. Twenty-eight (N=28) of these 33 rural programs (84.8%) consider training future rural physicians to be a high priority, and virtually all of the training sponsored by these programs was located in rural areas. The results suggest that very little U.S. family medicine training occurs in rural areas. Only 7.5% of family medicine training in the United States occurs in rural areas, although 22.3% of Americans live in rural places.
Rosenthal 2002	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	94% of graduates of the rural training tracks in Spokane, Washington in 1986 reported that the rural track experience adequately prepares them for rural practice. Urban hospitals participating in the rural tracks programs average 427 beds and rural hospitals average 173 beds with ranges from 14-308. 76% of the rural track graduates practice in rural communities thus establishing that rural track is the most effective educational model for retaining rural practice interest. Community, economy health, modern schools and personnel income is well established as a measure of active physician supply and retention. Merely increasing the number of physicians in a society does not increase rural recruitment. Between 1974 and 1997, England increased the number of general practitioners by 32% but there was little change in the relative in equality of distribution. India is producing physicians who cannot find employment yet 70% of India's rural community health centres have vacant posts. In the United States, international medical graduates make an important contribution to the supply of rural physicians, but fewer than half stay in the community after satisfying the J1 Visa requirements. America can encourage regional health centres strategies to ensure rural physicians and their families a competitive lifestyle. Family practice is the specialty most likely to distribute itself in patterns that reflect the population. Recruiting talented students from disadvantaged communities who demonstrate commitment to serve in the community of origin and providing medical training experience so that good role models have a positive influence on supplying physician in rural communities.
Rosenthal Rosenthal Lucas 1992	Descriptive	Other (Practice Location)	Physicians (N=1551) who graduates from New York state family medicine residencies between 1970 and 1989. 711 physicians responded, for a response rate of 46%.	Purpose was to determine the practice satisfaction, profiles and location factors of graduates of New York state family practice residencies since 1970. Questionnaire was designed to gather practice profiles and determine the factors that influence a physician's location decision. Three mailings were completed between December 1989 and May 1990. The study findings indicate that 272 (38%) of respondents were located in communities of <25,000. The majority of them (74%) considered their communities as rural. 423 (62%) lived in communities of >25,000. The majority of respondents rated 12 factors as important or most important to practice location: (1) spouse opinion, (2) hospital consultants, (3) hospital services, (4) colleague interaction, (5) after-hours coverage, (6) quality of schools, (7) proximity to hospital, (8) recreation, (9) family health and education needs, (10) personal income, (11) employment for spouse, (12) cultural opportunities.
Rosenthal	Informed	Undergraduate Curriculum	N/A	Describes the development and success of the Western New York Rural Health Care Cooperative.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Bissonette Parisella 1991	Opinion	Interventions Postgraduate Curriculum Interventions		Rural hospital cooperatives represent a new level of shared management that addresses mutual problems using a horizontal organizational model. The State University of New York at Buffalo medical school is actively involved in this initiative. As the cooperative was being established, the medical school was exploring ways to develop a rural initiative for training and service. Its Department of Family Medicine has received a state grant to develop an Office of Rural Health. The decision was made to appoint the executive director of the cooperative as the administrative director of this office, thereby providing shared salary support and ensuring coordination between the two initiatives.
Rosenthal Bissonette Holden Brunelle 1989	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	The Department of Family Medicine at the State University of New York in Buffalo has established a novel collaborative network of public and private organizations who put in place four physician rural group practice concurrently accomplishing three major goals: high quality primary and specialty medical service to medically underserved populations; enriched training opportunities for students, residents, and fellows; and financial viability. They are meeting regional needs, however, the components and nature of the collaborative effort indicate reproducibility in many communities throughout the country. Start-up costs were covered by a loan from the Department of Family Medicine clinical practice plan. After one full operational year the rural group had double the income of the clinical practice plan. The impact of this resulted in the development of the following: an office of rural health, which offers technical assistance in the development and maintenance of rural initiatives. Western New York rural health co-operative which deals with quality assurance, physician recruitment and grant procurement. Growing support and contribution to the department of family medicine as a leader in primary health care delivery and training. The impact on increasing of hospital occupancy rate, the development of rural teaching initiatives, and the performance of rural obstetrics, the development of a second project in the western New York region, the appointment of academic family physicians and a contract for the care of developmentally delayed citizens.
Rosenthal Maudlin Sitorius Florence Markowski Cleveland Schneeweiss 1992	Informed Opinion	Postgraduate Curriculum Interventions	N/A	This article describes four residency programs (in Washington, Nebraska, New York, and Kentucky) that have established rural training tracks (RTTs) in their family practice residencies. Underlying their establishment is the predisposition for residents to practice in the regions where they trained. The goal is to increase the number of residents selecting rural careers. (1) Washington - RTT services areas range in population from 11,000 to 25,000. Each RTT site has an established family practice group of at least 4 physicians who serve as primary faculty and must include obstetrics and surgery in their practice. Each community site also has a hospital that maintains obstetric and surgical services, as well as emergency room and critical care services. There are no more than 2 residents at a time are placed at one site. First year of the residency is completed in the urban tertiary center. Residents move to their RTT site in the 2nd year. (2) Nebraska - RTT sites are in communities with populations of 800 to 1,200. Practices in the communities range in size from 4 to 7 family physicians and each designates one physician as program coordinator. (3) New York - RTT site is Cuba Memorial Hospital, in Cuba, New York. This community has a population of approximately 2,000 and is located 70 miles south of Buffalo. First year of residency is completed in the large tertiary center. Residents relocate to Cuba in year 2. (4) Kentucky - As with the other programs, the first year of residency takes place in the urban center. In Year 2, residents move to the RTT site, the Appalachian Regional Healthcare Medical Center. The area's population (6000) are economically depressed, medically underserved & aging.
Rosenthal McGuigan Anderson 2000	Comparative – Cross-sectional	Postgraduate Curriculum Interventions	77 graduates of 13 nationally distributed rural training tracks between 1988 and 1997. 64 responded (83%)	Purpose was to look at the graduate outcomes of rural resident tracks in family practice in the US. In rural residency tracks residents complete the first year of training in an urban based program and the last two years in a rural community. 76% (n=49) of respondents practice in a rural community and 61% (n=39) practice in federally designated health professionals shortage areas. 69% (n=44) of respondents admitted patients to rural hospitals, 67% (n=43) provided labour and delivery services, and 40% (n=31) performed caesarean sections. Assisting physician groups were major influences on

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				practice location. 39% (n=25) were near their hometown and 45% (n=29) were near the community in which they completed their residency training. Only 14 (n=9) had a financial obligation to the community and 94% (n=60) reported that their rural training was adequate or better. Most graduates from rural training tracks have located their practice sites in rural communities and most graduates provide labour and delivery services.
Rosenthal McGuigan Osbourne Holden Parsons 1997	Descriptive	Postgraduate Curriculum Interventions	12 program directors	Purpose of this survey was to determine whether the family rural practice I - II residencies are meeting the goal of providing trainees with a rural immersion experience. A survey was mailed in 1996 to residency program directors for the rural training track identified by the residency review committee for family practice. All the surveys were returned. More than half of the rural training programs surveyed were located in health profession shortage areas, most in communities with little urban influence. These programs are equally likely to be sponsored by University or community based residency programs. 75% (n=9) placed two or fewer residents per year in a rural site; minorities accounted for 4% of the placements. 30% of the programs had unfilled positions in their second year slot. 37% of the second and third year residents were women and three residents (4%) were from underrepresented minorities. 75% (n=14) used tele-video technology as an educational strategy. Of the total of 99 residents who had completed a one or two year rural training program and graduated, 76% entered practice in the rural community after graduation. This survey suggests that family practice rural I-II residencies are meeting the goal of providing trainees with a rural immersion experience.
Rourke 2002	Informed Opinion	Undergraduate Curriculum Interventions	N/A	The new Northern Ontario rural medical school is to be developed to have a significant impact on education, recruitment and retention of physicians in rural and Northern Ontario and Canada. It will be a co-operative partnership between Laurentian University, Sudbury and Lakehead University, Thunder Bay, and will have a network of learning sites throughout Northern Ontario. The program will be patient centred, clinical problem based, and systems organized with a significant health determinant focus, and aboriginal health content and contacts. Small group learning will be used in distributed learning network with advanced information technology support. The new Northern Ontario medical school will aim to graduate highly qualified physicians with a state of art medical education, with enhanced knowledge, skills, and interests, in aboriginal, rural, northern, and underserviced health care.
Rourke 2000	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Describes the milieu of rural physician in Canada and reports on efforts to develop a postgraduate medical education model for rural family practice that will produce more physicians with the knowledge, skills, and interest to practice in small, mid-sized communities. Key recommendations of the College of Family Physicians of Canada include: providing earlier and more intensive rural medicine experience for all undergraduate medical students, developing rural postgraduate training programs, providing third year optional special and advanced rural family medicine skills training and making advanced family medicine skills training competency-based and nationally accredited. Within the context of a growing population and a diminishing number of physicians, both increase medical school enrolment with a focus on earlier and more extensive rural medical education and increased numbers of rural training stream positions at postgraduate family medicine level will be needed to address the serious problem of shortage of rural doctors.
Rourke 1998a	Descriptive	Advanced Procedural Skills Training	85 hospitals contacted, 65 (76%) responded in 1995. 88 hospitals contacted, 80 (91%) responded in 1988 60 of the hospitals responded in	The Chief of Staffs of small hospitals, identified has having fewer than 100 acute care beds, were mailed survey questionnaire. Main outcome measures were: hospital size, and location; numbers of physicians; availability of obstetrics, anaesthesia, and general surgery service; and other medical services available. In the 60 hospitals that responded in both years, the number of acute care beds decreased in 59 of these hospitals, with a decrease of 503 (20.1%) the means number of beds available was 42.3 in 1988 and 33.8 in 1995. 48 of the 60 hospitals reported a number of births in both years. In these hospitals the number of births dropped from a mean of 107 in 1988 to 87 in 1995. There were

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
			both years and provided data for this article.	also fewer GP anaesthetists than in 1988, mean 1.8 and 1995 mean 86. There were fewer family physicians who attended births, 1988 mean 5.3 and 1999 mean 4.1. This was despite an 11% increase in full time family physicians and 6% increase in part time family physicians in 1995 compared with 1988.
Rourke 1998b	Descriptive	Advanced Procedural Skills Training	35 small hospitals that provide active obstetric care	Purpose was to compare obstetric services provided in small Ontario hospitals in 1995 with those provided in 1988. Survey questionnaire was mailed to the Chiefs of Staff of hospitals. 300 births is the upper cut off for small hospital obstetrics. The mean births in 1998 was 136.3 and 121.9 in 1995. There was a decrease of 11.4% (n=84) from 1988 to 1995 (not significant). The mean number of obstetrical epidural anaesthetics rose from the mean of 13.9 in 1988 to 14.4 in 1995 (not significant). In 1988, 80% of family physicians in these hospitals attended births and by 1995 the proportion had dropped to 64%. The mean in 1998 6.9 and in 1995 5.7.
Rourke 1997	Informed Opinion	Other (Definition of Rural)	N/A	Describes the search for a definition of rural. In Canada, communities up to 10,000 people are often classified as rural by this definition and according to the 1991 census information, that is 31.6% of Canadian population lives in rural areas. In contrast only 11.3% of doctors practice in these rural areas. The Royal Australian College of General Practitioner defines remote rural practice as a practice in communities more than 80km or one hour by road from a center with no less than one continuous specialist service in anaesthesia, obstetrics, surgery, and a fully functioning operating theatre. The Ontario Ministry of Health and the Ontario Medical Association identified communities of fewer than 10,000 people, greater than 80km from a regional center of more than 50,000 people specified or isolated communities. The Eugene Leduc royalty index for Canada presents a preliminary model that measures six community variables to define rural practice. These variables are distance from the closest advisory centre, distance from the closest basic referral centre, growing population, number of GP's, number of specialists, and presence of an acute care hospital. The proposed British Columbia Northern and Isolation Allowance Program measures five medical isolation factors: number of GP's, number of specialists in a geographical area, distance from a regional referral hospital, exceptional circumstances, and doctor population ratio. Two leaving factors: remoteness from a community population centre and size of community. The New Zealand Rural GP Network rural ranking scale measures seven variables: travelling time from the office to the base hospital, availability of ambulance services, on-call for motor vehicle accidents, travelling time to nearest GP colleague, travelling time to visit most distant patient, on-call duty, and number of regular peripheral clinics.
Rourke 1996b	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes the goals and opportunities for postgraduate training for rural family practice. Rural family medicine training streams provide the best education for family medicine residents who are planning a career in rural family medicine. Integrated training for rural family practice should be high quality, economically sound, needs driven, evidence based, learner centred and outcome measured. This involves competency development of curriculum that provides specific skills in appropriate course objectives in rural practice as well as solid family medicine foundation. Contractual and exponential learning in areas similar to in actual areas where there is a need for rural physicians and appropriate hospital rotations to learn skills for the hospital role of many rural family doctors, are important components of rural family medicine training.
Rourke 1994	Informed Opinion	Advanced Procedural Skills Training CME	N/A	Discusses the format, objectives, and educational principles of a successful Rural Advanced Life Support Update Course. The course is designed to improve the knowledge, skills, and confidence of family physicians who manage critically ill and injured patients in rural community hospital emergency departments. A secondary objective is to improve the communication and interaction between major referral centers and their surrounding community hospitals. The curriculum included: an Advanced Trauma Life Support (ATLS) Update; a Pediatric Advanced Life Support (PALS)

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				Update; an Advanced Cardiac Life Support (ACLS) Update; and Toxicology Update.
Rourke 1993	Informed Opinion	Pre-medicine Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Discusses the continuous challenge of providing healthcare in underserviced areas. Discusses some of the reasons why physicians choose rural practice, why some of them move from rural to urban practice, and some of the factors which can be modified to keep physicians in rural communities. Physicians choose rural practice for several reasons: a desire for a rural practice; attractiveness of a rural location to the spouse; considerations of children; recreational opportunities; experience in training; community size; and financial incentives. Nonetheless, factors such as long work hours, the lack of professional support and hospital and specialty services, and the lack of access to additional training and continuing medical education encourage physicians to move from rural to urban areas. Suggests several things that can be done to help keep physicians in rural communities. These include improved rural medical education initiatives and hospital facilities; providing group practice opportunities, as well as financial incentives; and considering spousal factors.
Rourke 1991	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Discusses the state of rural medical care in Ontario. The number of specialists is low. Family physicians provide the bulk of the medical care in rural Ontario. Family physicians are therefore heavily involved in the hospital care of their patients. They work in the emergency departments, do deliveries, and GP anesthesia. CME is required to maintain these skills, but it is usually not available locally. Some steps need to be taken to encourage interested and adequately trained family physicians to practice in rural areas and at the same time, encourage them to practice the "riskier, complex, and more lifestyle-disruptive hospital aspects of family medicine". More training in rural practice and training in skills such as obstetrics and emergency medicine needs to be provided. In addition, financial incentives need to be made available to rural physicians. There also needs to be adequate hospital facilities.
Rourke 1988a	Descriptive	CME	40 family practice physicians in Huron County, Ontario. Response rate: 82.5%	Continuing medical education is one of the many challenges facing rural family physicians. Rural family physicians must develop and maintain a special knowledge base and technical skills applicable to their major hospital roles. As well as the care of general medical and pediatric inpatients, the responsibilities of rural family physicians usually include emergency medicine, obstetrics, and often anesthesia. These areas require special knowledge and technical skills. The distance to CME conferences and the need to arrange practice, obstetrics, and hospital coverage for the time away are obstacles to obtaining adequate CME. The study findings indicate that books and journals were most widely used for CME.
Rourke 1988b	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Rural family practice is a challenging and rewarding career, quite distinct and different from family practice in an urban center. The postgraduate educational needs of rural family physicians can be met by a compact, flexible, integrated training program. It should be possible to integrate most of the training for rural family physicians into a flexible two-year family medicine program with the possible addition of a further six to 12 months of training as needed. Specific training in family medicine should include some time spent in a rural family practice setting. Emergency medicine is a basic part of rural family practice, therefore training in both adult and pediatric emergency medicine, preferably with some intensive care unit experience is necessary. Advanced cardiac life-support training should also be included. As well as administering epidurals for obstetrics and general anesthesia for elective and emergency operations, the GP anesthetist is often called on to assist with cases of life threatening trauma. Ideal training would last one year and what include active ICU experience and pediatric anesthesia, along with a core of at least six months general adult anesthesia. The rural family physicians should also have specific education and training in public health and community

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				health/disease patterns related to rural practice.
Rourke Rourke 1996	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Provides practical tips for rural family physicians teaching residents. An increasing number of residents are taking some or all of their family medicine in the rural practice setting. A positive and practical approach to teaching, combined with the benefits of this setting, can make the experience enjoyable and successful for the resident, the preceptor, patients, staff, and colleagues. This article groups practical tips under the following headings, before the resident arrives, the first day, during the rotation, office practice, house-calls, nursing home, and hospital; evaluation; and travels. The article intended to provide a constructive frame within which rural family physicians can develop their own approach to teaching residents in their practices.
Rourke Rourke 1995	Descriptive	Postgraduate Curriculum Interventions	N=18 family medicine training programs	Purpose was to examine the status of postgraduate family medicine training that occurred in rural family practice settings in Canada and to identify problems and how they are addressed. Family medicine training was provided in 18 family medicine training programs as a two-year postgraduate program accredited by and leading to certification examination by the College of Family Physicians of Canada (CFPC). Family medicine block time during this two-year program varied from the prescribed minimum of eight months to a maximum of 12 months, some of which can be in a rural setting. The remaining time was spent in hospital rotations and electives or selectives. An optional third-year can be taken for advanced skills training, such as anesthesia, emergency medicine, or obstetrics. A retrospective questionnaire was sent to all family medicine training programs followed by focus group discussion of the results. Nine of 18 programs offer some family medicine training in a rural practice setting to some or all of their first-year family medicine residents (99 of 684 first-year family medicine residents had some training in a rural practice). All programs offer some training in a rural practice to some or all of their second-year residents (567 of 702 second-year residents had some training in a rural setting). In 12 of 18 programs, a rural family medicine block is compulsory. In-depth rural family medicine training models ranged from four months to 12 months of rural family medicine block time. Such a long rural placement was optional in most programs, and in two it was compulsory. Isolation, accommodation, and supervision were common problems for rural family medicine residents. Isolation and faculty development were common problems for rural physician teachers. There is no common rural family medicine curriculum. Most family medicine training programs in Canada have responded to the need for training physicians for rural family practice by incorporating a rural experience for family medicine residents or the opportunity for in-depth rural family medicine training. Rural family practice teaching provides diverse clinical learning opportunities with a mixture of office, house calls, nursing home, and hospital responsibilities including inpatient care, obstetrics, and emergency work. In local hospitals, residents can have a more responsible role in patient care than in large tertiary centers where there are many other more senior residents. Rural physician teachers need to be attentive to and supportive of the residents' various needs. This often involved helping them feel integrated, not only in the medical practice and professional community, but also the community at large. Like rural family practice, teaching rural family medicine brings many joys and challenges. Teaching is an excellent, but sometimes humbling way to remain current with skills and knowledge, as residents not only bring new ideas from their recent university training but also often ask difficult questions.
Rourke Strasser 1996	Informed Opinion	Pre-medicine Admissions Undergraduate Curriculum Interventions	N/A	Discusses the contexts of the Canadian and Australian health systems and medical education and their rural education initiatives. Similar rural education initiatives are being undertaken in both countries. There are initiatives underway in both countries in an attempt to encourage rural students to consider medicine as a career including career promotion days at high schools and the development and distribution of videos on rural medicine. All of the medical schools offer opportunities for learning in a rural setting. Some medical schools have established rural practice clubs or mentor programs to

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		Postgraduate Curriculum Interventions CME		encourage interest in rural practice. The development of CME programs and opportunities for rural GPs. In Canada, these include the availability of courses such as Advanced Cardiac Life Support (ACLS), Advanced Trauma Life Support (ATLS). In Australia, one example is the GP Rural Incentives Program, which provides funding for GPs to take part in 1 to 12 months of training in obstetrics, anesthesia and other fields. Another example is the Rural Health Education Satellite Network that provides internationally known speakers with a rural GP panel and moderator hooked by satellite link to hundreds of rural hospitals around the country. There are, however, some differences between the two countries. None of the medical schools in Canada have affirmative action programs for increasing the number of students from rural areas, but some Australian schools have recently introduced such programs with a rural focus. Approaches to postgraduate training in rural practice. In Canada, postgraduate rural education has been developed almost exclusively at the provincial level. There is no common curriculum for rural practice training or advanced skills training. Family medicine training programs have been developed in response to regional needs and available resources. The advantage to this approach is that residents can choose from a variety of different programs to find one that suits their own needs. In Australia, however, the Faculty of Rural Medicine (FRM), established by the Royal Australian College of General Practitioners, is responsible for overseeing and coordinating the development of rural general practice training in Australia. It has developed a Rural Training Stream and detailed curricula for advanced training which are standard across the country.
Rourke Rourke Belle Brown 1996	Informed Opinion	Other (Female Physicians)	N/A	An opportunity for spousal employment is often less a factor listed for male physicians than for female. The chief factor affecting a woman physician's decision to practice in a rural area might be the absence of job opportunities for her partner. Women physicians are more likely to be divorced or never married than men physicians. The multiple roles of women physicians who juggle their medical careers with their marriages, homes, and children can be further complicated in rural settings. The hospital and after hour call responsibility can be difficult for physicians who are mothers. It is also more difficult to find practice coverage for maternity leave. The increasing number of women physicians and the unique features of rural medical practice pose special challenges for the future.
Rowe Mulloy Ryan Pong 1995	Descriptive	CME	Primary care physicians and specialists in northeastern (n=503) and southern (n=400) Ontario. Response rates: - northeastern Ontario (64%) - southern Ontario (48%)	Describes the results of a survey undertaken to determine attitudes toward CME, barriers to access and CME preferences of physicians practicing in northeastern Ontario. A mail survey was distributed to collect information. Physicians in both areas favour traditional CME, with physician consultation being the most popular. The leading barriers include lack of time, cost of travel and availability.
RPAP Co-ordinating Committee Working Group on Rural Medical Education 1999	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Summarizes some of the relevant issues pertaining to the introduction of a core postgraduate curriculum for rural family practice in Alberta, delivered through a rural medical stream. A core postgraduate curriculum is essential in order to develop the knowledge, skills and attitudes needed for rural family practice. The premise is that by providing rotations in rural or regional centres you provide the medical resident with a more diverse educational experience and broader potential practice considerations. A rural medical stream can enhance recruitment to rural areas; can better prepare graduates for rural practice; and can influence practice location in a rural area.
RPAP Co-ordinating Committee	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Summarizes some of the issues with regards to additional skills training for both family medicine residents and practicing rural family physicians. As there will always be regional variation in the needs for advanced skills in rural Canada, the challenge will be to define the core problems and procedures

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Working Group on Additional Skills Training 1999		Advanced Procedural Skills Training		which will require national programs and, at the same time, meet the needs of individual physicians and their communities. Any training provided must also be flexible, competency-based, and based on some degree of standardized curriculum so that a certificate of competency can be awarded.
Rural Physician Lifecycle 2002	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Describes the rural physician lifecycle as a useful approach for policy that would enhance the production, recruitment, and retention of rural physicians. The proposal for rural physician lifecycle follows: 1) preparation for rural practice 2) search for rural practice 3) deciding for a rural practice 4) initiation and orientation 5) establishing a rural practice 6) maintaining a rural practice 7) transitioning the rural practice. Ten steps for successful rural practices: 1) purpose for rural lifestyle 2) transition to medical school 3) early rural exposure 4) transition to clinical 5) clinical experiences 6) transition to residency program with rural emphasis of curricula 7) preparation for rural at residency level 8) transition to rural practice, search process, recruitment 9) initiation of practice - good orientation and practice foundation 10) establishing a practice and position in the community.
Sanders Brucker Miller 1995	Informed Opinion	CME	N/A	This article provides an overview of the Telemedicine Continuing Medical Education (CME) program of the Medical College of Georgia.
Sanmartin Snidal 1993	Descriptive	Other (Physician Demographics)	All physicians licensed to practice medicine in Canada, excluding interns and residents (N=52,422) were mailed a questionnaire. Two follow-up letters were mailed to non-responders. 771 were deemed ineligible when they were later identified as students, interns, or residents. There were 38,313 valid responses, for a response rate of 74.2%.	Purpose was to determine the supply, mix, and distribution of physicians in Canada and to compare data with those of the 1982 and 1986 physician surveys. The study findings indicate that 11.3% of active physicians were practicing in rural Canada. A higher proportion of general/family practitioners (18.6%) than specialists (3.8%) were located in rural settings. Physicians in rural practice tend to be younger than their urban colleagues (mean age 45.2 vs. 47.0 respectively). The study findings reaffirm the trends observed in the 1986 survey. Recruitment to rural areas and retention of physicians within them continues to be a challenge. The urban/rural distribution of physicians and its effect on access to health care services continue to be a concern for the medical profession and government.
Sansom Doig Morris 2001	Descriptive	Advanced Procedural Skills Training	41 GP anesthetists 31 responded	All physicians who completed their 3rd year postgraduate training in advanced anesthesia skill from 1995-2000 were surveyed. Analysis of variance (ANOVA) was used to analyze relationship between the university and the degree of preparation. 87% were still practicing as GPAs; 5% remained in Ontario. GPAs perceived themselves as very well to extremely well prepared for their anesthesia duties. Areas where residency training could have been augmented included: pediatrics, neonatal medicine, intensive care, chronic pain, regional blocks, trauma management and administrative functions as they relate to GPAs. 84% of respondents wanted a certification exam implemented.
Scammon Williams Li	Descriptive	Other (Practice Location)	N/A	Reports the findings from focus group research in which the investigators explore the practice choices of physicians currently practicing in rural areas. Personal values are one of the primary motivators for choosing practicing rural settings. The availability of career opportunities for spouses and educational

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1994				opportunities for children are major obstacles. The health-care system also poses barriers to success for providers in rural settings. The key rewards include the ability to become integrated into the local community and provider/patient relationships that develop.
Scaletti 1995	Informed Opinion	Undergraduate Curriculum Interventions	N/A	This article provides a brief overview of the University of New Mexico School of Medicine's rural health community-based education curriculum.
Scutchfield Keck 1994	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes a program at the University of Kentucky which placed field professors of community medicine in rural communities some distance from the health science center. The field professor in each community was actively engaged in the design, development, implementation, and evaluation of activities whose objective was improvement of the health of the community. They were most actively involved in the senior rural clerkship in community medicine and their tasks included: monitoring, supervising, and evaluating the experiences of students assigned to their area; and visiting with the rural practitioner and the student to ensure that all involved were please with the experience and that maximum learning opportunities were occurring.
Seifer Vranizan Grumbach 1995	Comparative (cross-sectional)	Postgraduate Curriculum Interventions	The sample size included 227,660 physicians who completed graduate medical education between 1980 and 1992. Fifty-one percent of these physicians are practicing in the state in which they obtained their graduate medical education (range among states, 6% to 71%).	Purpose was to examine the relationship between graduate medical education and physician practice location. The main research questions included: Do most physicians ultimately enter into practice in the same state or region within which they trained, or are their considerable movement physicians across state and regional boundaries? Do some states predominately train physicians for local practice markets and other states produce physicians who tend to diffuse to more distant practice locations? A cross-sectional analysis of physicians and active practice location, classified by state of graduate medical education and stratified by specialty professional activity was undertaken. States with the highest numbers of residence per capita, retained higher percentage of physician graduates. Generalist physicians were somewhat more likely than specialists to in their state of graduate medical education. Physicians completing graduate medical education in states with higher levels of resident physicians per capita are somewhat less likely to remain in the state and practice than are physicians completing their graduate medical education in states with lower rates of physicians and training. States with large graduate medical education programs tend to retain large numbers of graduates as practicing physicians. In summary, most physician training programs function as a national market, with physicians disbursing relatively widely after completing a graduate medical education.
Seim 1997	Informed Opinion	Undergraduate Curriculum Interventions	N/A	The University of Minnesota medical school offers first-year medical students an opportunity to spend a few days with rural family physicians the week before classes began. The hope is that exposing students early to the challenges of rural medical practice will result in more choosing to practice medicine in rural areas. Students live with the local family physician for about three days. They observe the physician at work and take part in family and social activities. After returning from the clinical sites students are invited to a feedback session to share highlights of their experiences and complete a post-test of their knowledge of and attitudes towards rural practice. Students typically show about 20% improvement in knowledge. With regards to attitudes students typically give the highest rankings to the following characteristics of rural medical practice: lifestyle; the ability to develop closer relationships with patients and their families; and the diversity of cases and the opportunity for continuity of care.
Sesney Kreher Potts	Descriptive	Undergraduate Curriculum Interventions	56 graduating physicians from the program between 1978 and 1989	Purpose was to describe the results of a qualitative study of 1978 to 1989 graduates from the Upper Peninsula campus of Michigan State University College of Human Medicine. The focus of the study was on the program's philosophy, curriculum and general operational features. Graduating physicians from the program were interviewed. The overall findings identify several factors that were significant

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1994				to graduates: exactly role models, problem focused curriculum and early applied clinical work in a regulatory, primary care, rural setting. The curriculum was the most frequently mentioned reason for choosing as was the level of exposure to clinical training.
Shack 1999	Informed Opinion	Pre-medicine	N/A	Describes the rural outreach program at the University of Toronto was started by Jason A. Shack, a medical student. The goal was to instill an interest in rural medicine and make high school students realize that it is possible for someone from a rural area to make it through medical school.
Shannon Gunel 1999	Descriptive	Postgraduate Curriculum Interventions Other (Practice Location)	All family medicine residents enrolled in the training programs at West Virginia University in Morgantown and Charleston, at Marshall University in Huntington, and at community hospitals in Wheeling and Clarksburg (N=110). 73 responses (66.3%) were received.	The purpose of this study was to survey family medicine residents in West Virginia in order to: (1) estimate the number of them planning to practice in West Virginia and in rural areas; (2) study the association between cumulative clinical experience and plans to practice in West Virginia and rural areas; (3) quantify resident perception of preparation for certain aspects of rural health care delivery and practice; and (4) characterize the importance of various factors affecting resident decisions regarding practice location. Questionnaires were mailed in April 1996. Follow-up questionnaires were sent to non-responders in June. The study findings indicate a statistical association between year of residency and likelihood of practicing in a rural area (P=0.02) and in West Virginia (P=0.04). 36% of residents indicated intent to practice in a rural area. The study findings also indicate that residents believe they could receive more instruction or experience for independent practice in some disciplines (ie. obstetrics and orthopedics). This perception may contribute to residents' insecurity regarding their ability to provide rural health services.
Sibbald 1999	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses the report "From Education to Sustainability" which was released by the Ontario Regional Committee of the Society of Rural Physicians of Canada (SRPC) and the Professional Association of Interns and Residents of Ontario. The report says that any solution to shortages must begin with the medical education lifecycle that runs from recruitment in rural high schools through to CME opportunities. The report recommends rural medical experiences for premedical undergraduates, recruitment of more students likely to serve in rural communities and establishment of offices of rural medicine at all Ontario medical schools.
Sibbald 1998a	Informed Opinion	Admissions	N/A	This article discusses the significance of recruitment fairs in recruiting students for rural practice.
Sibald 1998b	Informed Opinion	Other	N/A	This is a brief on doctors in four Canadian Provinces who have chosen to use job action and other militant approaches as leverage to encourage governments to improve health care and funding. The Canadian Medical Association Journal asked physicians why this is happening and the four Provinces are British Columbia, Manitoba, Quebec, and Alberta. After years of cuts in health care services and spending it seems that the dam holding back the physician's anger has finally burst.
Silagy Piterman 1991	Descriptive	Postgraduate Curriculum Interventions	Final-year medical students (N=360) at the two universities in Victoria, Australia. 314 responded (87%).	Purpose was to assess the attitudes of these students towards the choice of location for postgraduate training as well as ultimate practice location. Survey collected demographic data; personal information; and information on gender, marital status, religion, place of birth, place of education, location of parents, and frequency of visits to rural areas. The study findings indicated 42% of this group were women; 20% of students were born and educated in a rural area; 87% wanted to do their internship training in a metropolitan hospital if given a choice. The reasons indicated for this included (1) partner or family, (2) better training and educational opportunities, (3) preference for city life. After completing their training, 59% of students wanted to work in urban areas, 12% in rural areas, and 29% were undecided. Factors which emerged as influential in determining the students' choices of training locations: (1) education and training, (2) personal and social factors. The study findings support those

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				which are commonly found in the literature - that the majority of medical students favour a metropolitan training post. The findings also confirmed a strong relationship between a rural background and the subsequent intention to train and work in a rural area. The study findings also indicated the influence of spouse/family on training location choice. This raises the possibility that while a number of students may choose to train in rural areas, the ultimate decision to live and work there involved factors outside their immediate control (ie. spouse, family, and children).
Silver 1994	Informed Opinion	Other (Recruitment)	N/A	This editorial discusses the challenges of recruiting physicians to rural areas.
Slack Cummings Borrego Fuller Cook 2002	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Discusses the strategies used by five U.S. rural interdisciplinary training grant programs to respond to local needs and to promote recruitment to rural communities. The programs provide services to the rural communities through individual clinical or case management services, population level interventions, and collaborative research. The academic institutions involved are expected to develop linkages with rural health care agencies or practice facilities, health professionals who practice in rural areas, and health departments. Unique learning strategies include the use of problem based learning and community health workers on the interdisciplinary team to increase responsiveness. The programs also provide educational support to students while they work in the rural communities. Students are actively involved in identifying needs and providing direct patient care for underserved citizens through intensive case management programs. Community-based research is conducted by interdisciplinary faculty teams in collaboration with rural practitioners or organizations. Researchers are mandated to work in collaboration with the community so that the findings can be used to improve the health of rural residents. The primary recruitment and retention strategies include: (1) rotations, in which students are placed in rural health facility ranging from one week to one year; (2) site match programs in which interested providers are matched with professional positions in rural areas; (3) spousal programs in which a community resident addresses the concerns of the provider's spouse or family; (4) the Jay-1 visa program, which is a visa waiver program enabling physicians from foreign countries to practice in rural communities; (5) financial/tax incentives such as subsidizing malpractice insurance or income tax credit; and (6) locum tenens programs to provide time off and backup to rural practitioners.
Slifkin Popkin Dalton 2000	Descriptive	Financial Postgraduate Curriculum Interventions	33 Administrators completed the survey (16 via telephone, 17 via fax), for a response rate of 49%.	Purpose was to assess the importance of medical residents to rural hospitals and to predict the possible effect of reductions in Medicare graduate medical education (GME) payments. The study design involved analyzing the data from Medicare hospital cost reports, as well as conducting telephone surveys with senior administrators of rural hospitals with residency programs. 68 hospitals met the study criteria (located in non-metropolitan counties, reported receiving Medicare GME payments during the study period, and hosted one or more residents). The study findings indicate that 66% of those surveyed felt that the presence of residents at their facility resulted in better or much better patient care. The influx of new physicians in training ensured a flow of new ideas and training methods into a facility. As excessive workload is a common problem for rural physicians, almost 60% of administrators felt that the presence of residents helped to improve staff on-call hours. The study findings also suggest that rural residency training programs are important to the hospitals and the surrounding community in terms of improvement in recruitment and retention of physicians. 72% of survey respondents believed that the residency programs had a positive effect on their hospital's recruitment efforts. 88% of respondents reported that residents had remained at the hospital as staff physicians after completing their training. The presence of the residency program had resulted in the recruitment of other staff physicians who had not served as residents, but were attracted by the opportunity to work with residents in the program.

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Smith Desch Simonson Kane 1991	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Describes the Rural Cancer Outreach Program (RCOP) of the Massey Cancer Center Medical College of Virginia. It is a rural cancer education program which provides hands-on training in cancer care and continuing education. The program provides educational opportunities for medical and nursing students, medical residents, and fellows in all the oncology related disciplines. If a rural area is unable to recruit and/or support an oncologist, the next best thing is for primary care physicians to acquire enough experience in the management of common cancer-related problems to interact successfully with the urban specialist. This would enable patients to seek and receive care in their own rural communities.
Society of Rural Physicians of Canada 1999	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	This is a report on a special conference on advanced skills in rural Canada held by the Society of Rural Physicians of Canada and the College of Family Physicians of Canada. Specialists GP teams would permit a sustainable lifestyle for specialists where the specialists' skill set could be shared with the GP's. Provisions of advanced skills by local GP's enhanced recruitment and retention. The Royal College of Physicians and Surgeons of Canada and the Canadian Association of General Surgeons and other specialists training programs need to re-examine the training of specialists for practice in rural and regional centres. All the groups call for national standards with regional/ local facility in the training system. National standards would permit portability of advanced skills. There was support for third year, an augmented two-year program and a module designed that account for individual community and learner needs. There should be a few centres of rural excellence that will administer the programs. Return of service contracts were controversial. It might promote recruitment but it might also cast rural practice as second class. Further research is required in finding out why GP anaesthetists often give up their anaesthesia skills after a few years. Document programs, preceptors, and sites currently providing training in advanced skills in Canada for rural physicians.
Somers Young Strasser 2001	Comparative	Other (Attitudes Towards Rural Practice)	127 Y1 students at Monash University in 2000 1373 practicing rural GPs in 1996-97	Purpose was to compare the attitudes of practising rural GPs with those of medical students concerning rural practice. Policies for attracting new rural GPs in Australia have been based on opinions of established GPs and this may not be a good idea since student group is younger and more female and has grown with different attitudes to work. The study design involved a comparison of two sets of survey data – (1) Y1 students in 2000 were asked to use a 7-point Likert scale to assess the importance of 44 factors in determining career choice. The survey was done partly in person and partly by mail; (2) rural GPs in 1996-97 used a 7-point Likert scale to assess the importance of 28 factors. The survey data received from the Y1 students was compared to the previous survey conducted with GPs in 1996-97 using 27 factors common to both surveys. The study findings indicate significant differences on 9 of 27 common items and show that students have a wider range of concerns about rural practice than do rural GPs who have adapted to these issues and who could help students do so via mentorship programs.
Special Considerations in the Preparation of Family Practice Residents Interested in Rural Practice 1994	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Family practice is the specialty most likely to be found in rural communities. The clinical practices of rural family physicians differ from those of their urban counterparts. Therefore, certain curricular elements should be emphasized for residents anticipating practice in rural or medically isolated communities. These include: (1) Hands-on rural training (including a rotation and integrated curriculum); (2) practice management; (3) training in specific clinical areas (emergency care, obstetrics, surgical and procedural skills, etc.); and (4) community-oriented primary care.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Speechley Dickie Weston Orr 1993	Comparative - Cohort	Postgraduate Curriculum Interventions	44 residents	Purpose was to compare changes in self-assessed clinical confidence over a two-year residency between two groups of family practice residents, one starting in a family practice center and the other starting in hospital. Confidence regarding 177 topics in 19 general topic areas was assessed using self completed questionnaires administered at baseline and after 6, 12, and 24 months. There was no difference between the group's grand means at any time. The initial site of training appears to have not affected learning.
Square 1996	Informed Opinion	Pre-Medicine Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses initiatives of the University of Manitoba and the Canadian Medical Association (CMA) that help support aboriginal students who want to pursue a career in medicine. The Island Lake communities in northern Manitoba are part of the J.A. Hildes Northern Medical Unit (NMU) at the University of Manitoba. This is a network of nursing stations. The NMU helps prepare aboriginal students for university academic life by offering tutorials and extended courses in chemistry, reading, writing, and study skills. The CMA has established a bursary program to help support undergraduate aboriginal medical students. The CMA provides up to $4000 per academic year to each successful applicant. Recipients also receive memberships in the CMA, the relevant provincial/territorial division and NPAC. While the hope is that these students will eventually return to live and work in their communities, the NMU still recruits mainly non-aboriginal physicians to work in the North because of the shortage of aboriginal physicians.
Stageman Bowman Harrison 2003	Descriptive	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Describes the accelerated rural training program at the University of Nebraska Medical Center in 1993. It is a 3-year medical school, 4-year residency track program. As part of the program a 1-year rural procedures fellowship and a commitment to practice in rural Nebraska are required. If a resident completed the four years of training the College of Medicine agreed to forego all senior year tuition and fees and provided a senior year cost-of-living allowance in return for practicing in rural Nebraska for at least 2 years. The program seems to have met expectations. A high percentage of graduates have gone into rural practices. One advantage of the program might be the acceleration of a final decision for rural practice. In a typical residency program residents do not seriously consider their future practice locations until they have completed their internship year. Residents in the accelerated program make a rural commitment in their third year of medical school.
Stearns Stearns 2000	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Reviews the training recommendations outlined in the American Academy of Family Physicians Monograph, special considerations in the preparation of family practice residents interested in rural practice (1994). Although preparation for rural medical practice has been addressed and is being adequately accomplished in the clinical knowledge and procedural skills area, instruction and experiences relating to the realities of rural living need to be enhanced to increase the retention of rural physicians. This can be accomplished with more curricular emphasis on developing community health competencies, including community-orientated primary care. Significant strengthening is needed in two areas: instruction in the entire area of sincerity to social issues gearing to rural life, and fostering of self confidence to function effectively in an environment where resources are limited or distant.
Stearns Stearns Glasser Londo 2000	Descriptive	Undergraduate Curriculum Interventions	39 medical graduates	The Illinois Rural Medical Education (RMED) program was developed by the University of Illinois college of medicine at Rockford. The RMED program is a comprehensive, multifaceted program that combines recruitment, admissions, curriculum, support, and evaluation components and is longitudinal across all four years of medical school experience. The admissions process seeks to select students who process traits indicating success in the eventual rural family practice. These traits are fostered and developed by the four year rural curriculum, which emphasis family medicine, community orientated primary care, the physician functioning in the context of community, relevant aspects of the hidden curriculum, and service learning. After six years, RMED had graduated 39 physicians: 69% have gone

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				into family practice and a total of 82% have selected primary care residencies.
Stearns Glasser Fulkerson 1997	Informed Opinion	Admissions Undergraduate Curriculum Interventions	N/A	Discusses the creation of a special admission and curricular track at the University of Illinois College of Medicine at Rockford to commit students to family medicine careers in rural Illinois. While applicants must first meet the college's admission criteria, a secondary screening evaluates the rural origins of students and their families, evidence of rural community involvement and leadership, understanding of family medicine, and other variables that increase the likelihood of a primary career choice. Those accepted into the program must sign a pledge to enter family practice residency and to return to practice in rural Illinois. In the first year of the curriculum there are seminars on rural health and safety, rural community structure, and community-oriented primary care. Students are also encouraged to participate in rural primary care summer internships. In the second year, there are seminars on family medicine relating to rural health care delivery. In the third year, there are seminars focusing on community-oriented primary care. In the fourth year, students spend 16 weeks in a rural Illinois community.
Strasser 2001	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions CME	N/A	Explores key issues in the training for rural practice drawing experiences from Australia. Compared with the metropolitan counterparts, rural practitioners carry a heavier workload, provide a wider range of services, and carry a higher level of clinical responsibilities in relative professional isolation. Rural medicine has three components: 1) all around family practice; 2) procedural care, particularly dealing with emergencies; 3) rural family medicine practitioners important public health role. Preparing for rural practice is best seen as a part of a continuum or education in training that begins at a secondary school level and continues through undergraduate education and postgraduate training to continuing professional development at university graduate studies. It is essential to promote medicine and health professions to rural secondary schools. It is essential to have some formal affirmative action built into the selection process in order to achieve the target number of rural students in medical school. Student support for rural students can be achieved through rural students club and a rural mentor's scheme. Overall there is endorsement of rural practice that is secure, that is professionally challenging rewarding and personally satisfying, high quality clinical and educational experiences at different stages of undergraduate and postgraduate training are some of the initiatives at improving medical education in Australia. Accommodation for students in rural placement should be of a high standard and be provided at no cost to the students and travel costs should be reimbursed. Specialist teachers doing hospital placements are encouraged to focus their training on the resident's future in rural family practice. Successful training for rural practice requires a commitment to people in rural communities and to training to produce highly skilled rural practitioners.
Strasser 1995	Informed Opinion	Other (Nature of Rural Practice)	N/A	Explores the nature of rural practice so as to determine whether it qualifies as a distinct discipline. There are several criteria to be considered and Strasser discusses how rural practice meets each of them. First, since establishment of the Faculty of Rural Medicine with the Royal Australian College of General Practitioners (RACGP), a specific rural training stream has been introduced within the RACGP Training Program. It has been determined that preparation for rural practice requires 4 years of training post-internship. An advanced rural skills curricula in surgery, anaesthetics and procedural obstetrics has also been developed. Trainees who successfully complete all components of the rural training program and pass a "ruralised" College examination will be awarded a specific qualification in rural medicine by the College. Second, over the past 20 years there have also been a growing number of publications reporting research in rural practice. The creation of the "Australian Journal of Rural Health" indicates recognition that there is a sufficient research and intellectual discussion about rural practice to merit its own refereed academic journal. Finally, recognition by others outside the discipline, especially other disciplines, universities and societies is confirmed by the fact that several universities have established chairs in rural health and general practice. The author concludes that if

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				rural general practice does not yet qualify as a distinct discipline then it is well on the way towards such a status.
Strasser 1994	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	Discusses the RACGP Rural Training Program in Australia. The RACGP has determined that training for rural general practice requires four years of training post-internship, including training in advanced rural skills. During the first two years of training trainees rotate through hospital terms relevant to their future in rural practice. In the 3rd and 4th years of training the focus is on the acquisition of advanced rural skills. The program has been designed to augment any previous experience obtained.
Strasser 1992a	Comparative	Other (Attitudes)	All rural GPs (N=787) in Victoria, Australia. 2 random samples of metropolitan GPs: - group 1 in suburban practice (N=200) - group 2 in fringe metropolitan areas (N=200) Response rates: overall - 74.6% rural GPs - 77.5% suburban GPs - 67.2% fringe metropolitan GPs - 70.2%	Purpose was to identify the attitudes and perceptions of the Victorian rural GPs as a basis for developing a co-ordinated programme to improve the recruitment, training and retention of rural GPs. The study findings indicated that a rural upbringing was significantly associated with rural practice. Many rural GPs (67.1%) experience difficulty in arranging continuing education. The disadvantages of rural practice include the time commitment, poor educational facilities, and lack of opportunities for family. Barriers to medical graduates entering rural practice (as seen by rural GPs): negative societal attitudes towards rural areas; negative attitudes in medical school towards general practice; and negative attitudes in medical school towards rural practice. Suggestions for improving the recruitment, training and retention of rural GPs (as indicated by respondents): a significant proportion of clinical experience in rural hospitals and practices; reciprocal links between country hospitals practices and medical schools teaching hospitals; extra financial reward for rural practice; and programmes which identified and met the needs of the rural practitioners spouse.
Strasser 1992b	Comparative	Other (Attitudes)	See above.	This is a article that report on the same study above (Strasser, 1992a) - an extensive survey of rural general practitioners in Victoria. The greatest barriers to entering rural practice identified by rural doctors were spouse problems, lack of skills, city background and training, ignorance of country practice, lack of self-confidence and adequate remuneration. The main recommendations for improving recruitment, training and retention of rural GPs included substantial clinical experience in rural hospitals and practices, reciprocal links between the country and medical schools, extra financial reward for isolated rural practice, establishment of rural medical education centers, and programs to meet the needs of the rural practitioner's spouse.
Stratton Geller Ludtke Fockenscher 1991	Descriptive	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	Questionnaires were mailed to graduates of the University of North Dakota school of medicine (N=2230). 924 questionnaires were completed and returned, for a response rate of 41%.	In 1973 the University of North Dakota school of medicine expanded its curriculum to include all four years of medical education. The hope was that this change, along with a renewed emphasis on primary-care oriented residency training, would encourage medical students to establish practices within the state. The purpose of this study was to compare the number of graduates practicing medicine in North Dakota before and after the implementation of the expanded medical curriculum. The purpose was also to compare personal and professional characteristics all the school's alumni. The study findings indicate that the expansion into a four-year degree program signalled a dramatic increase in the number of native North Dakotans establishing practices within the state. Before expansion 23.6% of rural alumni and 18.6% of urban alumni chose to stay and practice in the state. Following expansion these percentages increased to 34.4% and 26.9% respectively. The findings indicate that when students complete all phases of their medical education and residency training in-state they are much more likely to practice in-state. Since North Dakota is a rural state this emphasizes the need to recruit and train students from rural backgrounds.
Sturmberg	Informed	Undergraduate Curriculum	N/A	Outlines the educational philosophies and methodologies used for the development of a community-

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Reid Thacker Chamberlain 2003	Opinion	Interventions		based, patient-centred, longitudinal approach to medical education at the School of Rural Health in Australia. The program involves introducing students to patients in community settings and ensuring that the students follow the progression of those patients along the different pathways in the healthcare system. Presents a synopsis of experiences during the initial implementation of the curriculum and provides recommendations for future developments.
Sullivan Busk 1998	Descriptive	Other (Physician Demographics)	8000 active physicians Response rate 44%. The sample size equates to accuracy within +/- 1.7%, 19/20	This study is the result of CMA's 1998 physicians' survey. 68% of physicians age 35-44 and 70% of those aged 45-54 state that their workload is heavier than they would like. 43% agreed or strongly agreed that lack of locums have affected their way to take vacations. Of the physicians with overhead expenses, 43% reported a decrease in net income during the previous year. The incomes appear to be declining even though hours of work have risen slightly to 53.4 hours per week from 53.2. Female family physicians work an average of 46.1 hours per week compared with 55.2 hours per week for their male colleagues. Surgical specialists continue to put in the longest hours at 57 hours per week. Physicians under age 35 were least likely to prefer fee for service (29%) 34% say they would prefer blended payment. Only 19.1% of family practitioners now provide obstetrical services down from 35.7% in 1982. The same holds true for anaesthesia down to 2.2% in 1998 from 5.6% in 1982 and emergency room work 22.1% compared with 36%. The decade has been marked by declining incomes, increasing stress, less job satisfaction and more government intervention.
Szafran Crutcher Chaytors 2001	Comparative – Cross-sectional	Postgraduate Curriculum Interventions	702 family medicine residency graduates between 1985 and 1995 The response rate was 63% (442 graduates).	Purpose was to examine the effectiveness and influence of Alberta's family medicine graduates choice of practice location. A study was done by cross-sectional, retrospective survey employing a self-administered mailed questionnaire. This was sent to graduates of the family medicine residency program at the University of Alberta and the University of Calgary in Alberta. The outcomes measure work: current practice location; factors influencing family practice location; gender; and community lived in under 18 years of age. Overall, the most influential factors in attracting graduates to their current practice locations were spousal influence, type of practice, proximity to extended family. Types of practice, income, community efforts to recruit, medical need in the area, and loan repayments had a substantial influence on the family physicians decision to practice in rural areas. Male physicians ranked type of practice, where family physicians ranked spousal influence, as the most influence on choice of practice location. Significantly more female than male identified working hours, familiarity with medical community or resources and availability of support specialties and personnel as having a moderate or major influence on their decision.
Talbot Ward 2000	Comparative	Undergraduate Curriculum Interventions	N = 103	Purpose was to assess the efficacy of a 4-day rural placement as part of the 5-week General Practice term, for Y4 students in Western Australia in altering students' attitudes towards rural general practice. Questionnaires were distributed to students who participated in the program both before and afterward with comparison of answers. The study findings show that the percentage of students interested in rural practice increased from 48% before program to 81% after. This is another confirmation that early exposure to rural practice increases likelihood that students will choose rural practice
Talley 1990	Informed Opinion	Postgraduate Curriculum Interventions	N/A	All medical schools should be involved in seeking solutions to the problems of rural health. There are a number of generally accepted truths in reference to rural health and student and resident choices of a rural practice career: (1) students from rural areas are more likely than those from urban areas to train in primary care and to return to rural areas to practice; (2) residents who have a significant part of the residency training in rural areas are likelier to choose to practice medicine in rural areas; (3) residents practice close to where they train.
Taylor Blue	Descriptive	Undergraduate Curriculum Interventions	4 teaching sites	Describes 4 university teaching practices established by the South Australian Center for Rural and Remote Health (SACRRH). The practices are co-located with a hospital or accident and emergency

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Misan 2001				service community based nurses and allied health professionals. They provide integrated health and multidisciplinary health care student placements in a learning environment where students experience rural multidisciplinary practice and country life. The study found that although the sites differed in significant ways, they all provided integrated care and effective placements for students. This style of health delivery is flexible and broadly applicable. Sustainability is achieved through financial viability, attracting and retaining health care professionals the development of electronic information systems to support integrated practice.
Tepper Rourke 1999	Informed Opinion	Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Evaluates recommendations in 3 specific areas: the importance of recruitment of future physicians from rural settings, the need for exposure to rural medicine in medical school, and the role of exposure in residency training. Programs to facilitate electives in rural areas must be well funded to support student expenses, as well as preceptor time and costs.
Thommasen 2000	Comparative – Cross-sectional	Other (Retention)	1979 family physicians and general practitioners from 78 communities in BC with less than 30,000 people, at least one physician and have either a hospital or diagnostic and treatment center; excluding communities located in the Lower Mainland and southern Vancouver Island.	Purpose was to quantitate the retention of family physicians and general practitioners in BC. Data was obtained from British Columbia Medical Directories, 1979-80 to 1998-99 and the 1996 British Columbia census data. The lowest population communities have the lowest year-to-year retention rates and highest recruitment rates. Typical retention rates for communities of fewer than 7000 people are between 70-80%. Typical retention rates for communities with 7000 or more people are between 85-90%. Typical recruitment rates for communities of fewer than 7000 people are between 20-30%, and can be as high as 38%. Recruitment rates for communities of 7000 or more are typically between 10-15%. The mean stay in communities of different population sizes increases linearly with the size of population but did not reach statistical significance.
Thommassen Thommasen 2001	Descriptive	Other (Retention)	57 Northern and Isolated Allowance (NIA) communities	Purpose was to determine if there was a relationship between long-term retention of general practitioners and low GP-to population ratios, low specialist-to-GP ratios, poor regional health indicators. Health status indicators were: age-standardized mortality rate, teen pregnancy rate and smoking rate. Data were obtained by asking BC Medical Service Plan, phoning the clinics and randomized survey of rural physicians. The study findings show that health regions with the lowest long-term GP retention rates tended to be the more northerly ones. Health regions with the low GP-to population ratios and low specialist-to-GP ratios tended to have the lowest long-term GP retention rates. Health indices data reveal that health regions with high standardized mortality traits, high regional smoking rates and teen pregnancy rates had the lowest long term GP retention rates.
Thommasen Lavanchy Connelly Berkowitz Grybowski 2001	Descriptive	Other (Physician Depression/Burnout)	Random sample of 198 rural physicians in BC. Response rate – 131(66%)	Purpose was to determine the prevalence of depression and burnout among physicians working in British Columbia's Northern and Isolation Allowance communities. Current level of satisfaction with work and intention to move were also investigated. Self-reported depression was 29%. The Back depression Inventory indicated that 31% of physicians suffered from mild to severe depression. About 13% reported taking antidepressants in the past 5 years. Self reported burnout rate was 55%. The Maslach Burnout Inventory showed that 80% of physicians suffered from moderate to high on emotional exhaustion scale. Depression scores correlated with emotional exhaustion scores. More than half the respondents were considering relocation. Intention to move is strongly associated with poor mental health.
Thorne	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes how more residency positions are being located away from the traditional urban teaching hospital. All provinces have expanded training opportunities along these lines. Some examples include

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1993				the rural family medicine program at Memorial University and community-based training offered by the University of Calgary and in Ontario. To achieve long-term retention in underserved areas, non-urban training needs to be more than the 2 or 3 months that some schools allot. Exposure to various types of practice helps residents make career choices.
Thorsteneinson 1988	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Describes the experience of University of Manitoba family practice residency program in Native communities on the east shore of Lake Winnipeg. The residents and preceptors have provided care on-site in the communities, as well as being the primary referral services in the tertiary-care setting. During the 12 years of the program, much experience was gained dealing with a generally high risk obstetric population whose care was complicated by such factors as language barriers, distance, and economic and social circumstances. Participating in the care of Native communities have been exciting and stressful. It has been a rewarding experience for many of our residents and faculty.
Tippets Westpheling 1993	Descriptive	Admissions	560 medical students (191 who participated in the HPDP Project and 369 non-participants).	Purpose was to examine the relationships between medical students' background characteristics, specialty preference following the first year of medical school and during the second half of the fourth year, and attitudes regarding practice in medically underserved areas (in both rural areas and inner cities) and intent to work with medically underserved populations. The study design involved gathering data in connection with longitudinal tracking and evaluation of the National Health Service Corps Health Promotion Disease Prevention Project (HPDP). This project is a preclinical, stipended externship program designed to introduce students to the practice of community-based primary care through prevention-oriented service projects implemented at community health centres for example. Data on their backgrounds and the specialties that interested them were gathered by written assessment during the summer following the first year of medical school; data on their attitudes and intention were gathered during the second half of the fourth year. The study findings indicate that women were more likely to intend to work full-time with the underserved. Their attitude towards this type of practice was also more positive than the men's. The black student's attitude was more positive than the white or Asian students. Students who preferred primary care specialties were also more likely to work with the underserved. It is possible to conclude that structuring admission criteria to give preference to women, minorities, and students preferring primary care specialties could produce more students intending to work with underserved populations. However, such changes in admissions policy should also be accompanied by curriculum changes such as long-term community-based primary care rotations.
Tolhurst McMillan McInerney Bernasconi 1999	Descriptive	Advanced Procedural Skills Training CME	147 general practitioners in the Hunter region of New South Wales. Questionnaires were sent by mail and reminders were sent to non-responders. 84 questionnaires were returned, for a response rate of 57%.	Purpose was to identify the emergency medicine training needs of rural general practitioners in the catchment area of the Hunter Rural Division of General Practice in Australia. This area included a number of small rural towns. The questionnaire was divided into 4 sections: (1) 6-point likert scale designed to measure GP perceive confidence in managing specific emergencies or performing specific emergency procedures; (2) GPs were asked to list their 5 highest priorities in terms of upskilling needs over the next 2 years; (3) GPs were then asked to indicate which training options would meet these needs; and (4) demographic data including gender, year of graduation, and nature of current practice. The study findings indicate that GPs reported low confidence in areas such as airway trauma or burns, use of x-ray machine, chest trauma, suicide attempt, drowning, gunshot, spinal cord injury, neonatal resuscitation, obstetric emergencies, and meningitis, among others. The needs identified for upskilling by the highest percentage of GPs included: (1) pediatric and infant emergencies and procedures; (2) airway emergencies and procedures; (3) circulatory emergencies and procedures; (4) respiratory emergencies and procedures; (5) management of neurological emergencies; (6) management of drowning and near drowning; (7) management of multiple trauma; (8) management of toxicological emergencies; (9) orthopedic emergencies; and (10) management of spinal cord injuries
Usatine	Descriptive	Undergraduate Curriculum	101 preceptors	Purpose was to examine preceptors' attitudes about having students in their offices and to determine if

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Hodgson Marshall Whitman Slavin Wilkes 1995		Interventions	Response rate: 89 (88%).	this experience resulted in professional growth. A survey was mailed to preceptors recruited to teach in the "Doctoring" course of the University of California, Los Angeles. The Doctoring course is for all first-year medical students and involves a visit to a family physician's office over the course of a month for four visits. More than 75% of the preceptors reported that the medical students had positive effects on their patient's satisfaction with their care. However, some respondents revealed worries about balancing time with the student vs. maintaining a busy practice.
Van der Goes Grzybowski, Thommasen 1999	Comparative – Cross-sectional	Postgraduate Curriculum Interventions	92 program directors and site or unit directors of family medicine residency programs in Canada. Response rate - 65 (71%)	Purpose was to discover which procedural skills residents are expected to learn. There were 24 unique lists of procedural skills; the shortest listed only 10 procedural skills; The longest, 75 skills; and average 36 skills. Only 5 procedural skills were found on more than 80% of the lists; 30 skills were found on half or more of the lists. Canadian family practice residency programs have widely varying expectations of procedural skills for their residents. This survey is a first step in the examining the whole issue of procedural skills training in Canadian family medicine programs.
Vanselow 1990	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Medical education constitutes only one of a complex set of factors that influence the recruitment of physicians to rural America. A solution to the rural health crisis will require not only changes in student selection, curriculum, and training location, but also strengthening of the rural economy, improvement of reimbursement to rural hospitals and primary care physicians, and increased sensitivity by leaders of the medical profession to the needs of rural areas and rural practitioners. A concerted effort is required to interest students from rural areas in the medical profession. Reaching out to rural students at an early age through the development of programs at the junior high school and high school levels is needed. These programs should attempt to stimulate interest in medicine and science and might be modeled after those aimed at minority students.
Verby 1992a	Informed Opinion	CME	N/A	Describes how the Minnesota Rural Physician Associate Program (RPAP), an undergraduate program, serves as a form of continuing medical education (CME). The RPAP offers undergraduate students the opportunity to study for 9 to 12 months in rural communities. It has been discovered, however, that this program also serves a valuable function for CME. Many practicing rural primary care physicians, by participating in the program as student mentors: learned new skills and information that either confirmed or updated some of their medical practices and areas of knowledge; were able to validate the general quality of medical practice within their communities; and were able to meet their CME requirements. This is a valuable model for CME as it allowed rural physicians to obtain onsite, free CME and it eliminated the costs that physicians otherwise incur, in terms of fees, income lost, time away from their practices, and inconvenience.
Verby 1992b	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions	N/A	Discusses how it was unreasonable for the US government and the National Health Service Corps (NHSC) to expect students to receive all of their clinical medical education and residency experience in urban centres then expect them to practice in small rural communities. This would be particularly difficult when students have been born, raised, and educated in urban communities. Verby points out that to meet the future needs for access to care in rural America, partnerships with academic centres must be enhanced and expanded. Raises in interesting points from the literature - those related to which medical schools are more proficient in producing rural physicians. Four variables are strongly associated with a tendency to produce rural graduates: (1) location in a rural state; (2) public ownership; (3) production of family physicians; and (4) smaller amounts of funding from the National Institutes of Health. This article reviews what every medical school in the US should be doing to promote more rural physicians: (1) Shorten, improve, and reduce costs for undergraduate and graduate medical education; (2) ongoing review of courses to ensure that the needs of the people and changes in health and disease care are being reflected; (3) Increase family medicine clinical clerkships to at least 9

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				months; and (4) More clinical time for medical students in rural areas/hospitals.
Verby 1988	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Provides a description of the Minnesota Rural Physician Associate Program (RPAP), a rural clinical education elective for 3rd year students that lasts 9-12 months. The program is designed to contain educational elements not found in the regular medical school setting - i.e. to remain in one setting long enough to trust a preceptor personally and professionally; to experience continuity of care. Both students and their spouses are given an orientation to the community; what to expect living in a rural community. After 16 years of the program, all counties in Minnesota have an acceptable ratio of general physicians for the first time in the state's history (1 physician for 2500 people or better). As of 1986, 57% of former RPAP students in practice were in rural locations.
Verby 1987	Descriptive	Undergraduate Curriculum Interventions	295 RPAP graduates	Describes the success of Minnesota's Rural Physician Associate Program (RPAP) which gives Y 3 and Y4 undergrads a 9-12-month placement in a small community under the tutelage of a volunteer rural physician preceptor. Involved the examination of cohort data for 295 RPAP graduates. The findings show that RPAP graduates tend to choose rural practice locations (58% of 295 students) more often than the national average. In addition, RPAP graduates' scores on National Board exams were no different overall from others, but they scored significantly better on 33 of the 50 questions measuring confidence and behavioural, verbal and mechanical skills, as well as community health questions.
Verby 1985	Informed Opinion	Financial Undergraduate Curriculum Interventions	N/A	Describes the Rural Physician Associate Program (RPAP) at the University of Minnesota Medical School. Third year undergraduate medical students work with rural physicians in their offices and hospital practices for 9 to 12 months, receive 2 academic quarters (6 months) of credit for their RPAP education, and receive $7500 to $10,000 from the state taxpayers and from the practicing physician-tutors. There is no legal commitment to return to rural Minnesota or pay back the money. According to the author (in 1985), 60% of RPAP practice full-time in rural Minnesota and its region. Essential factors for the success of this program include: (1) Support of the community; (2) a willingness of health science faculty to support such a long-term effort with undergraduate medical students; and (3) the commitment of rural physicians to volunteer their time and resources.
Verby Newell Andresen Swentko 1991	Informed Opinion	Undergraduate Curriculum Interventions	N/A	Describes the Minnesota Rural Physician Association Program (RPAP), a 3rd year, 9 month preceptorship in a rural community. By 1985 the RPAP was instrumental in providing an acceptable ratio of primary care physicians for all 87 counties in Minnesota. The program had a notable effect on distribution and specialty selection of graduates. 74% of all graduates chose primary care; 64% family practice. In addition, of the 284 graduates practicing in Minnesota 88.6% practiced in primary care, 71% in family practice, 58.8% were practicing in rural areas, and 68% were practicing in communities of <25,000. Curriculum change does have an impact on students' career choices and on their tendencies to select primary care careers in rural settings. 87% of RPAP students who responded to a recent survey stated that this program influenced their choice of rural practice. Partnerships within the medical school, and with government, organizations, communities, and physicians, are essential for effecting curriculum change.
Watanabe Fick 1995	Comparative (Cohort)	Other (Practice Location)	N/A	Purpose was to examine the practice locations of graduates of the University of Calgary and the University of Alberta for the years 1986 and 1991. The practice locations of graduates from these medical schools were examined through the Canadian Medical Association's Physician Resource data system. The percentage of graduates of the University of Calgary practicing family practice in urban and rural communities increased. Retention is a problem in communities of less than 4000 people. Those with no medical educational experiences in Canada are more likely to locate in small communities. Communities with populations of less than 4000 also expressed the greatest loss of physicians, as well physicians are more likely to relocate from communities of less than 4000 people.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
				Those with postgraduate training in Alberta or Canada are more likely to locate in urban centers.
Watts 1993	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	For many doctors, the more procedural nature of rural practice is a source of satisfaction. Performing procedural skills requires appropriate training and an ongoing commitment to critical analysis of performance. Lack of skills is a common reason given by general practitioners for not entering rural practice. In 1992 the Faculty of Rural Medicine and the RACGP released training curriculum in surgery, and aesthetics and obstetrics for rural general practice. This is of major importance to those considering rural medicine as a career as it will guarantee a minimum standard training. It will also provide a mechanism for practicing rural GPs to upgrade their skills.
Weaver 1990	Informed Opinion	Financial	N/A	Provides an update of the National Health Service Corps (NHSC), summarizes experiences with the community and migrant health center models, and describes some ongoing programs to increase interactions between the NHSC, students and residents. Also offers suggestions for enhancing the partnership between the NHSC and academic centres.
Weissman Campbell Gokhale Blumenthall 2001	Descriptive	Other (Practice Location)	4019 residents completing their training in eight specialties at 162 U.S. academic health center hospitals. Response rate - 2626 (65%)	Purpose was to examine the preferences of resident physicians to locate in underserved areas. A national survey of residents completing their training in eight specialties at 162 U.S. academic health center hospitals was undertaken in 1998. Only one-third of residents rated public hospitals as desirable settings, although there were large variations by specialty. Desirability was not associated with having trained in public hospital or having greater exposure to underserved populations (39% vs 31%, P = .02). Only about one-quarter of respondents ranked rural (26 percent) areas as desirable. Men (29%, P <.01) and non-citizen IMGs (43%, P <.01) were more likely than others to prefer rural settings. Residents with plans to specialize or enter fellowships were much less likely to prefer rural areas (17% vs 34%, P<.01). Specialty was predictive of location preference, with 44 percent of family practice residents preferring rural areas. This study demonstrates the need to expose graduate trainees to underserved populations.
West Norris Gore Baldwin Hart 1996	Descriptive	Other (Practice Location)	358 graduate physicians	The purpose of this study was to learn more about the geographic and temporal career patterns of family physicians and how these patterns differ by sex and graduation cohort. Information was obtained from the 1991 University of Washington Family Practice Residency Network Graduate Follow-up Survey. The study findings indicate that 33.8% of the initial practices of graduate physicians were in rural locations; 64.5% were in urban locations. Very few respondents switched between rural and urban environments after the first 4 years of a career. Female graduates were significantly less likely to choose a rural first practice than their male counterparts.
Wetmore Stewart 2001	Comparative – Cross-sectional	Postgraduate Curriculum Interventions	247 family medicine residents in Ontario Response rate - 157 (63.6%)	Purpose was to determine if the levels of confidence in procedural skills of family medicine residents in Ontario is associated with the choice of rural practice location. In 1997, surveys were mailed out to second year residents in Ontario. The respondents were similar to the total sampling frame with respect to gender and family medicine program. There was no association between confidence in a procedural skill and choice of practice location. Logistic regression analysis showed that residents who received some rural training were 1.5 times more likely to choose a non-urban practice location than residents who did not receive rural training. Residents with some rural training in both ambulatory care (p=0.01), overall technical skills (p=0.01) and emergency procedures (p<0.01). On the other hand, residents with rural training had significantly lower overall confidence as a family physician than residents without rural training (p<0.01). Results suggest that more training required for rural practice. Small sample size may have lead to not finding significance. More research needed to determine the contribution of rural training, taking into consideration pre-existing inclination to rural practice, and other variables, in choice of practice location.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Whiteside 1996	Informed Opinion	Advanced Procedural Skills Training	N/A	Describes the Enhanced Skills Program at the University of British Columbia. It was created to meet the needs of primary physicians, especially those who practice in rural areas, with regards to special skills (ie. obstetrics, surgery, etc.). The goals of the program include: meeting the identified needs for medical skills in communities throughout British Columbia; developing sites of training which will allow trainees to maintain their practices and family life while enhancing their skills; and choosing preceptors who are front-line generalist specialists or family physicians with special skills.
Whiteside Newbery 1997	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Discusses the efforts of the University of British Columbia (UBC) to develop a rural curriculum. The Department of Family Practice at UBC has developed a community-based program that streams residents into specific areas of need including inner city, urban, regional (Prince George and Chilliwack) and rural community-based locations of training. The rural training program focused on training residents to meet the needs of rural medicine. The department also established an enhanced skills program for rural doctors, aimed at meeting specific medical special-skill needs as identified by rural communities. Practicing physicians from these communities are offered the paid opportunity, for up to a year, to train in areas such as psychiatry, anesthesia, surgery, obstetrics, and emergency medicine. CME sessions are offered to isolated communities throughout the province. Each session is one hour long and case-based. Communication is possible between presenters and participants.
Whiteside Longhurst 1987	Descriptive	Postgraduate Curriculum Interventions	N/A	Describes the rural practice program at UBC. Residents spend 39 weeks in rural practice during their second year. The remaining 13 weeks of re 2nd year are divided between educational leave, academic work and elective clinical experience. The private practices support the residents financially. The residents are paid for service on a locum basis, and any surplus monies are used to pay their salary and reimburse the preceptors for their teaching time.
Whiteside Mathias 1996	Comparative – Cross-Sectional	Postgraduate Curriculum Interventions	46 rural trained and 46 non-program trained graduates were identified for the study. An overall response rate of 79.3% was achieved: 84.8% for rural trained, 76.1% for non-program trained.	Purpose was to evaluate preparedness for rural practice and to ascertain the practice locations of graduates of the rural-based training program at the University of British Columbia. A mailed cross-sectional survey of graduates of the University British Columbia's rural training program from 1982 to 1991 was conducted. The survey was also mailed to a random sample of non program trained rural BC physicians. Rural program graduates reported being better prepared in family medicine, community medicine, practice management, and behavioural science. Non-program trained rural physicians thought themselves better prepared in medical subspecialties such as hematology, nephrology, cardiology, gastroenterology, neurology, and rheumatology. Rural program residents were located in rural areas (51%), regional settings (20.5%), and metropolitan areas (17.9%). The results suggested a structured, community-based training program for physicians interested in rural practice encouraged physicians to locate and stay in rural areas.
Whiteside Pope Mathias 1997	Comparative – Cross-sectional	Postgraduate Curriculum Interventions	46 graduates of rural training programs in British Columbia, 84.8% (39) responded; 14 community preceptors	Purpose was to determine which components of rural medicine training were in need for improvement. This was done through a cross sectional survey given to preceptors to determine the importance of each components of training in rural practice, in order to give each component a weight. A second survey goes to the graduates of rural training programs for their assessment of how well each component prepared them for practice. The list of curriculum areas most in need of reform were: Trauma, counselling, radiology, vacuum extraction, fracture care, exercising community leadership, cost effective use of diagnostic tests, using community health resources, obtaining hospital privileges, opthalmology, dermatology, otolaryngology, personal and professional growth, relationship with other physicians and personnel issues. Some of the components that we less in need for change were care of common clinical problems, in-hospital management of patients, providing health maintenance, doctor-patient relationship, etc
Whitfield	Informed	Advanced Procedural	N/A	Discusses how the problem of inadequate training among rural physicians can be addressed. It

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1998	Opinion	Skills Training CME		discusses the establishment of the North Carolina-based Area Health Education Centers (AHEC), which work with local medical schools to train physicians about ever-changing rural health science trends. The Centers also assist physicians who wish to work in underserved rural areas. The author notes that according to the AHEC, physicians trained in rural areas settle where they are trained. The AHEC also provides medical libraries and CME to further develop physicians' skills. They have begun exploring how to assist rural physicians by linking them electronically to a videoconferencing system.
Wilkinson Beilby Thompson Laven Chamberlain Laurence 2000	Comparative (Cohort)	Pre-medicine	298 rural and 337 urban practicing general practitioners in South Australia Response rate: Rural GP's – 268 (90%) Urban GP's – 236 (70%)	Purpose was to determine the association between rural background on practice location of general practitioners (rural or urban). The study design involved the comparison of data from two postal surveys – a rural and an urban survey. The study findings showed that rural physicians were more likely than urban physicians to have grown up in the country (37% vs. 27%), to have received primary (33% vs. 19%) and secondary (25% vs. 13%) education there, and to have a partner who also grew up in the country (49% vs. 24%). Concludes that there is still a need to promote entry to medical school of students with rural backgrounds and to address the needs of partners of physicians.
Wilkinson Symon Newbury Marley 2001	Descriptive	Other (Recruitment and Retention Factors)	17 physicians were recruited - 8 were female and 6 worked part-time.	Purpose was to describe the positive impact of a network of rural academic family practices in South Australia had on rural medical recruitment and retention of general practitioners. Recruitment strategies followed included: advertising locally and internationally; personal networking; and offering an employment package which included assistance with relocation and accommodation, an academic appointment, a percentage of gross receipts, and university support. Retention strategies followed included: support from university staff to reduce personal and professional isolation; support for leave and locum needs; and maintenance of modern facilities and information technology. Four physicians left the practices after an average 20 months service. Suggests developing partnerships and ensuring local flexibility as two key factors for the retention of physicians in rural areas.
Wilson Woodhead-Lyons Moores 1998	Descriptive	Financial	N/A	Describes the development and characteristics of a comprehensive, integrated and sustained program for the education, recruitment and retention of physicians for rural practice in Alberta - the Rural Physician Action Plan. The participation of various stakeholders and the sustained program budget has been the key organization issues for success. Critical to the effectiveness of this program has been the focus on professional and lifestyle issues targeting 3 distinct groups: physicians in training, physicians in practice and rural communities and health authorities. Since 1991-92, funding up to $3 million per year has increased rural based activities significantly. 87% of medical students and 91% of residents in family medicine in Alberta now experience 4 weeks or more of rural practice. The authors believe that recent trends militating against recruitment and retention of rural physicians will continue unchecked without comprehensive and sustained approaches such as RPAP.
Wise Hays Adkins Craig Mahoney Sheehan et al. 1994	Descriptive	CME	767 general practitioners (487 rural; 140 urban; and 140 provincial city) in Queensland Australia. Response rates: a. Rural - 311 (64%) b. Urban – 67 (48%) c. Provincial city - 75 (54%)	Purpose was to identify requirements for vocational training and continuing education programs in rural general practice. A questionnaire was sent to general practitioners in Queensland Australia. There were significant differences between rural and urban practice profiles. Rural doctors had to practice a range of clinical skills in an environment with restricted access to health professional support. Rural doctors are less likely to consider that they spend enough time on CME. One outcome of these results is an approach to determining core and optional categories of curriculum content for vocational training programs for rural practice. At the core level, basic training should be provided in all of the procedural disciplines and skills needed to provide emergency care in communities remote from regional support services. Rural doctors tended to work longer hours and be concerned about the availability of locums. Limited career opportunities for spouses and educational opportunities for children were also seen as major disincentives.

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Wise Hays Adkins Craig Mahoney Sheehan et al. 1992	Descriptive	Advanced Procedural Skills Training	N/A	Purpose of this conference paper is to present the results of a survey of training needs of rural doctors in Queensland, Australia. Does not define methods use or sample population studied. Concludes that rural doctors practice a wider range of clinical skills more frequently than metropolitan GPs. This includes dermatology, geriatrics, gynecology, minor surgery, resuscitation, and emergency medicine. Concludes that we now have the data to advise rural physicians and medical education providers more precisely on what training is required for different kinds of rural practices.
Woloschuk Tarrant 2002	Quasi-Comparative	Admissions Undergraduate Curriculum Interventions	Clinical clerks from 1996-2000 who trained at rural sites as part of their family medicine clerkship with the University of Calgary (N=273). Those who completed this rotation in an urban site were not included in the study. Response rate: 254 (93%).	The family medicine clerkship at the University of Calgary is a four-week mandatory rotation in the final year of a three-year program. The purpose of this study was to determine whether exposure to a rural educational experience changed students" likelihood of doing a rural locum or rural practice and whether student background and gender were related to these practice plans. Students completed a pre-rotation demographic questionnaire and an evaluation questionnaire following the rotation. The study findings indicate that 50 students (20%) had rural backgrounds and 23 of this 50 (46%) were female. Students stated they are more likely to do a rural locum as a result of the rural educational experience. However, a pre- to post increment in the likelihood of rural practice was not observed. Reasons for this finding are unclear, but may reflect the greater commitment required for rural practice demands which might be too excessive for many students at this stage in their training. Students with rural backgrounds have a more favourable attitude toward rural practice. Training in a rural community actually discourages some students from rural practice. This was evident more for students with urban backgrounds. It seems that students from rural backgrounds might be more accepting of the experience. For this reason, admissions should give preference to candidates raised in rural areas.
WONCA Working Party on Training for Rural Practice 1996	Informed Opinion	Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Policy paper of recommendations. These include: (1) increasing the number of medical students recruited from rural areas; (2) exposing undergraduate students to rural practice; (3) offering specific, flexible, integrated, coordinated, rural practice vocational training programs; (4) offering specific, tailored, continuing education and professional development programs that meet identified needs of rural family physicians; (5) providing appropriate academic positions, professional development, and financial support for rural doctor-teachers to encourage rural health research and education; (6) taking responsibility for educating appropriately skilled doctors to meet the needs of their general geographic region, including underserved areas, and should provide regional support for health professionals and accessible tertiary health care; (7) developing appropriate needs-based and culturally sensitive rural health care resources with local community involvement, regional cooperation, and government support; (8) improving professional and personal and family conditions in rural practice to promote retention of rural doctors; and (9) developing and implement national rural health strategies with central government support.
Woodhead-Lyons 1995	Informed Opinion	Financial Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions		Describes the Rural Physician Action Plan, a comprehensive series of initiatives designed to address the issues that have had a negative impact on recruitment and retention of physicians to rural Alberta. Initiatives include: (1) a rural rotation program for medical students and residents to provide them with the opportunity to experience rural medical practice; (2) a third full year of family medicine training; (3) a student loan remission program; (4) the provision of CME to physicians currently in rural practice; (5) a rural locum program; and (6) increased access to specialists consultations.
Woollard et al. 2000	Informed Opinion	Financial Undergraduate Curriculum	N/A	Describes the nature of family medicine opportunities in Canada, outlines the resources required, and provides a framework through which the development of the discipline can be managed. Current state of family medicine in undergraduate education: only 8 medical schools offer precelrkship electives in

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
		Interventions		Family Medicine; 15 medical schools offer a compulsory clerkship rotation in family medicine of 4 to 8 weeks duration. The 16th school, the University of Ottawa, labels the rotation an "ambulatory clerkship"; and many schools offer both university and rural-based core clerkship rotations in family medicine. Four schools have a mandated rural component. The resources required to support the teaching of family medicine include family physicians, residents, and patients, but also accommodations and equipment for students working in remote locations and funding sources which support family medicine and rural or remote placements.
Woollard Hays 1993	Descriptive	Advanced Procedural Skills Training	N/A	Many rural general practitioners are responsible for providing obstetric services to the majority of women living in rural communities. This paper reports on a comparison of deliveries conducted by rural GPs in Australia with all deliveries during that same period. Eighty-six non-metropolitan hospitals where intrapartum care was either wholly or predominately provided by general practitioners were identified. Rural doctor representatives in each of the communities were sent a questionnaire to be filled in retrospectively from hospital records concerning GP obstetric services in the local hospitals. Comparative data was obtained from the Australian health department and represented all obstetric services. The results indicate no significant difference in the quality of rural obstetric care between non-metropolitan and urban areas.
Working Group of the Society of Rural Physicians of Canada in Cooperation with the College of Family Physicians of Canada and the Canadian Anesthesiologists Society Date Unknown	Informed Opinion	Postgraduate Curriculum Interventions Advanced Procedural Skills Training	N/A	The lack of programs to assess the training and skills of family practice anesthesiologists (FPAs) to determine their eligibility for anesthetic privileges is problematic. This paper discusses the recommendations of a working group on Training for Rural Family Physicians in Anesthesia. It is recommended that support should be provided for university departments of family medicine and anesthesiology to provide an adequate number of training positions in family practice anesthesiology to meet the needs of rural Canada. Training programs in family practice anesthesiology should be nationally accredited and should provide successful trainees with verification of the qualifications which are based on national standards and portable across Canada.
World Organisation of Family Doctors 1995	Informed Opinion	Pre-medicine Financial Admissions Undergraduate Curriculum Interventions Postgraduate Curriculum Interventions Advanced Procedural Skills Training CME	N/A	Discusses some of the ways in which the numbers of skilled rural physicians can be increased. First, high school students from rural areas need to be encouraged to consider medicine as a career. There is a need for specific programs which will do this. Admissions policies should also give special consideration to students from a rural background. There needs to be provision of undergraduate and postgraduate clinical experience in a rural setting and the establishment of rural clubs to encourage students to develop an interest in rural practice. Advanced skills training in emergency medicine, anasthesia, obstetrics and others need to be developed. CME programs needs to be accessible to rural practitioners. Distance education is one way this can be done. Rural practitioners need some financial support. This might include special incentive payments for practicing in underserved areas, financial assistance with accommodations, education and travel for the GP and/or family. The provision of adequate medical facilities would also be helpful. Finally, spousal support is essential.

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
Worley Prideaux Strasser Silagy Magarey 2000	Informed Opinion	Undergraduate Curriculum Interventions	N/A	In 1995 medical students from rural backgrounds in New South Wales were found to be two and a half times more likely than students of urban origin to become rural doctors. However, at the same time only 7.9% of Australia's medical students were of rural origin. In the U.S., when positive rural placement was combined with an affirmative action policy of admitting students of rural origin to medical schools, over 50% of rural graduates subsequently practiced in rural areas. There is good evidence from US studies that rural communities are a credible setting for generalist medical training. In rural communities, the social forces influencing health can be more readily defined, while opportunities for intervention are more accessible to students. Rural communities also provide access to both community and hospital caseloads. Verby found that his rural community-based students in Minnesota, USA had twice as many patient encounters and learned three times the number of procedural skills as their city hospital-based counterparts. Kamien reports that his rural hospital-based students in Western Australia saw twice the number of relevant medical conditions and performed six times the number of relevant procedures compared with their urban hospital peers.
Xu et al. 1997a	Descriptive	Financial Admissions	The study design involved a randomly drawn sample (N=2955) from all physicians who graduated in 1983 and 1984 from 126 U.S. MD-granting and 14 DO-granting medical schools, who were not serving in the military and who identified their specialties as family practice, general practice, general internal medicine, or general pediatrics. 2199 questionnaires were completed, for an overall response rate of 75%	Purpose was to examine relationships between physicians' choice of practicing medicine in underserved areas and their background variables using data from a national sample of primary-care physicians. Background variables include physicians' personal and demographic characteristics, the physicians' financial aid obligations, and the characteristics of medical schools, special programs, and curricula. For the purposes of the study underserved areas included both rural and inner-city locations. The study findings indicate that 63 % of those working in underserved areas were family physicians, as compared with 24% who were general internists 12 % who were general pediatricians. Physicians' decisions to practice in underserved areas were associated with growing up in an underserved area, prior expressed interest (before medical school) in serving in an underserved area and their federal and/or state financial aid obligations. Clinical experiences during medical school, either required or elective, and experiences in residency, were not associated with their choice to practice an underserved area. The study findings suggest that physicians' personal and demographic characteristics, their financial aid obligations, and their expressed interest to practice in underserved areas prior to entering medical school where the most important factors influencing their choices of practice locations in underserved areas. These findings have important implications for medical schools. Since background characteristics were related to the physician's choice to practice in underserved areas, a school's admission policy is key to increasing the number of its graduates who will be more likely to practice in an underserved area. Effort should be directed to recruiting underrepresented minority applicants who grew up in underserved areas and who have shown interest in practicing in underserved areas. The study findings support the idea that financial programs have a positive impact on the recruitment and retention of physicians who choose to practice in underserved areas. Overall approximately 45% of the national sample for this study who had received financial support was currently practicing underserved areas.
Xu et al. 1997b	Descriptive	Financial	N/A	The authors previously analyzed (1997A) factors influencing physician's choice to practice in underserved vs. non-underserved location. In that study they did not distinguish between inner-city and rural locations. The purpose of this study was to present new findings as another analysis of the data separated rural and inner-city. The study findings indicate that the most significant factors in physicians' choices to practice in rural areas were: receipt of national health service corps funding ($p<.001$); interest expressed prior to medical school ($p<.001$); gender ($p<.004$). Men are more likely than women to practice in rural areas; and receipt of other financial support ($p<0.1$).
Yang	Comparative	Other (Recruitment and Retention Factors)	405 urban physicians; 405 rural/remote physicians	Purpose was to investigate some of the factors which influence physician settlement in British Columbia and to explore potential policy recommendations for the future, specifically, policies to

Author(s)/ Year	Study Design	Categories	Participants	Summary/Outcomes
2003			Response rate: Overall, 311 (38.4%) - Urban (28.6%) - Rural (48.1%)	promote urban-to-rural practice relocation. Surveys were faxed to both urban and rural physicians. Urban physicians were asked about the likelihood of their moving to a rural/remote location and their perceptions of working in such areas. Rural physicians were asked about factors that influenced their decision to practice in a small community. The study findings show that most urban physicians (71.7%) would not move to a rural area under any circumstances, including the provision of financial incentives. By contrast, it was the opportunity to acquire diverse medical experiences which attracted rural physicians to such a practice. Concludes there is a need to explore alternatives to financial incentives. Also, suggests that any long-term strategy must address the needs of a family, i.e. spousal employment and children's education.
Young 1990	Informed Opinion	Postgraduate Curriculum Interventions	N/A	Student selection, curriculum, training environment, and special inducements should be considered in the attempt to increase the availability of primary care physician services to rural populations. Rurally oriented students are more likely to choose primary care specialties than other students. It is possible that applicants from rural areas may be disadvantaged in competition with students from Canada's urban areas. Admission committees may need to give preference to rural students who need less rigorous standards of admission. There is a need to modify significantly the value sets, attitudes, and behaviours of medical school faculty in order to prevent the dissuasion of students from entering rural practice. Medical students are discouraged in both subtle and overt ways from entering primary care specialties and from practicing in underserved areas.
Zollo Kienzle Henshaw Crist Wakefiled 1999	Descriptive	CME	N/A	Explores issues involved in using interactive video (telemedicine) networks to transmit continuing medical education programming from academic centers to multiple rural hospitals. It is difficult to recruit and retain rural health care practitioners, partly because of the professional isolation resulting from diminished access to continuing education opportunities, professional development, and health information resources. Enhanced telecommunication links between community and academic hospitals show promise for reducing this isolation and enhancing lifelong learning opportunities for rural health care providers. The delivery of programs via telecommunications allows for the dissemination of new developments; provides current training opportunities for hospital staff and employees; and enhances educational experiences for primary care practitioners through consultations with specialists and virtual attendance at academic grand rounds. Telemedicine and tele-education have the potential to mitigate the geographic maldistribution of health professionals by eliminating some of the isolation felt by rural health care providers and their patients. Benefits to the hospital that receives the continuing education include: (1) Enhanced patient care resulting from the continuing education of health professionals; (2) Reduced costs and travel time associated with distant CE programming; (3) Minimize staff absences and lost productivity while traveling to academic centers or conferences for CE; (4) Improved hospital staff training; (5) Access to academic grand rounds and case presentations on state-of-the-art therapeutic advances and interventions; and (6) Increased recruitment opportunities for rural hospitals through the provision of access to the latest developments in the health sciences.