

The Impact of Rural Training Experiences on Medical Students: A Critical Review

Felicia A. Barrett, MLS, Martin S. Lipsky, MD, May Nawal Lutfiyya, PhD

Ms. Barrett is assistant health sciences librarian and assistant professor, Crawford Library of the Health Sciences at Rockford, University of Illinois - Chicago, Rockford, Illinois.

Dr. Lipsky is dean of the University of Illinois College of Medicine at Rockford and professor, Department of Family and Community Medicine, University of Illinois - Chicago College of Medicine at Rockford, Rockford, Illinois.

Dr. Lutfiyya is senior epidemiologist, Department of Community Health Sciences, University of Manitoba, and Division of Research and Learning, Research and Evaluation Unit, Winnipeg Regional Health Authority, Winnipeg, Manitoba Canada.

Correspondence should be addressed to Ms. Barrett, University of Illinois at Chicago, Crawford Library of the Health Sciences, 1601 Parkview Avenue, Rockford, IL, 61107; Phone: (815) 395-5660; Fax: (815) 395-5655; Email: fbarrett@uic.edu.

Abstract

Purpose

To address the growing shortage of rural physicians, several medical schools have developed rural training experiences for their students. However, little is known about the educational impact of these experiences. Thus the authors conducted a critical review of North American studies examining medical student outcomes associated with rural training experiences.

Method

A comprehensive search strategy was used to identify studies about undergraduate medical education in a rural setting searching Pub Med from 1966 to June 2009. The researchers evaluated titles and abstracts to identify publications that appeared to report measures associated with undergraduate medical school rural training experience. Only those studies with a measurable outcome such as career choice, practice location, clinical competency and student satisfaction were analyzed.

Results

The review identified a total of 72 studies. Most were single cohort studies or cohort studies with control groups, with career choice and practice location the most commonly reported measure. The majority reported that rural experiences influenced students towards primary care specialties and to consider rural practice. Studies using self-report found that students generally valued the experience and had a high degree of satisfaction.

Conclusions

This review shows that placement in rural settings is a positive learning experience that students and preceptors value. While the evidence supports that these rotations influence practice site and career choice, it is not clear whether they reinforce pre-existing interest or have the ability to motivate previously uninterested students to consider a career in primary care or rural medicine.

Despite an increasing number of physicians graduating from medical school, a shortage of rural physicians persists. Currently while 20% of Americans live in rural areas, only 9% of the nation's physicians practice there,¹ resulting in poor access to health care for millions of rural Americans. Similar disparities for rural residents also exist in Canada and other countries around the world. In 2005, less than 4% of U.S. and Canadian medical school graduates expressed an interest in rural or small town practice,² and experts project that this shortage will likely increase in the near future.³ Although several reasons exist for why so few graduates choose to practice in rural communities, one explanation may be the “lack of contact with rural communities, people and practitioners.”⁴ As a result many medical schools employ the strategy of offering medical students opportunities to spend time in rural settings as part of their educational experience.⁵ By placing medical students in rural settings and exposing them to rural physician role models, educators and policy makers believe more students will choose careers as rural health care providers

Even though the rationale for placing students in these settings intuitively makes sense, little is known about the outcomes and educational impact of undergraduate training in rural settings. Rural training experiences likely differ from the typical academic medical student training experiences and may offer unique opportunities that positively affect a student's education. For example, students may face less competition from other learners, encounter greater opportunities to evaluate patients at earlier stages of disease, and play a more significant role in the evaluation and treatment of patients. On the other hand, rural physicians may be less experienced teachers and the rotations less structured, perhaps adversely affecting a student's education. A study by

Baker et al in 2003 found that rural general practitioner preceptors “indicated both a need and a desire for educational skills development.”⁶

We thus sought to evaluate the effect of rural training experiences on undergraduate medical education by reviewing the literature for studies that examined outcomes associated with rural training experiences. Specifically, the goal of this review is to identify published studies with objective measures such as student performance, career choice, student perceptions of the training, and how rural learning opportunities might differ from a more traditional academic setting. By examining the current literature, we sought to evaluate the impact of rural training on a student’s education and to suggest direction for future research.

Method

We used a comprehensive search strategy to identify published studies about undergraduate medical education in a rural setting. The authors conducted a Pub Med search from 1966 to June 2009 using the following search terms: 1) “education, medical, undergraduate,” “education, medical,” “students, medical,” and “schools, medicine”; and 2) “preceptorship,” “mentors,” “clinical clerkship,” “curriculum,” “teaching,” and “hospitals, teaching”; and 3) “rural population,” “rural health services,” “hospitals, rural,” “rural health,” “medically underserved area,” and “health services accessibility.” In order to limit the search to North America, a final cross match was applied: “North America,” “Canada,” and “United States.” The search was limited to journals found in Index Medicus and articles written in English. The search retrieved 1,222 articles.

We then evaluated the titles and abstracts to identify those publications that might be relevant to the study. Since our focus was on medical student training, those articles discussing graduate medical education, continuing medical education, physicians in practice, or other fields such as nursing were eliminated. After applying the criteria, 149 studies remained. In addition, two authors (FAB, MSL) reviewed the references cited in the 149 publications and identified another 164 articles not previously retrieved from the original search. Together this yielded a total of 313 prospective publications about undergraduate medical education associated with some type of rural experience.

Next, we reviewed abstracts to exclude commentaries, opinion pieces, or letters to the editor and to identify studies that measured an outcome associated with a medical student training experiences. Examples of measurable outcomes included clerkship experiences, e.g., types and numbers of patients seen, and objective measures such as United States Medical Licensing Examination (USMLE) scores. Those articles without at least one clearly identifiable objective measure were excluded. Example of articles eliminated included those that gave only a description of the rotation or thought pieces that reflected an author's opinion rather than a measurable outcome. For example, a study with a documented career outcome measure such as the percentage of students choosing a primary care specialty was included, whereas an article where the authors only speculated on the influence of a rural rotation on career choice was excluded. If an article contained both speculation and a measured outcome, or outcomes related to medical students and an outcome associated to another type of student, only the relevant portion was included in the analysis. Figure 1 provides a summary of our selection methodology.

We then analyzed each study in its entirety to identify the following: the number and type of participants (sample size), the study setting, the study design, the source of data, the outcome(s) measures, and the results of each measured outcome. If a study included multiple outcomes, all those results related to medical students in a rural setting were included.

We also assessed the relative strength of the studies based on study design, sample size, and measure and assigned a quality assessment score for each study. Study design was rated from one point for a single cohort to three points for a randomized control. Cohort studies with a control group received an intermediate score of two points. Studies with a sample size fewer than 20 participants received one point, 21 to 50 participants received two points, and those with greater than 50 participants received three points. Outcome measures were rated on a two-point scale: one point for subjective measures such as student perception and two points for objective measures such as USMLE scores. Thus when scores from all three components were added together, the quality assessment scores could range from a low of three to a high of eight.

Results

After we reviewed each of the 313 studies and applied our inclusion criteria, 72 studies remained. Online supplemental Table 1 (available at <http://>) summarizes the 72 articles.

While most of the studies examined medical students (54%) still in medical school, some studies surveyed graduates to retrospectively evaluate their rural medical school experiences (31%).

Other sources included data collected from individuals such as preceptors, clinic directors, and practicing physicians (18%), data from alumni files, state licensure web sites, test score performances, and the AMA Masterfile. One study was based on a survey from 126 medical

schools.⁷ Three studies of the 72 involved more than one participant group.⁸⁻¹⁰ The studies varied widely in the number of subjects, ranging from as few as 21 students to over 1,400 medical students and for those examining graduates from 47 graduates to 3,729 graduates.

Most of the studies were either single cohort studies or cohort studies with control groups. Overall, the quality assessment of the studies ranged from three to eight with a single study scoring a three because it did not specify sample size and source of data while only two studies scoring the maximum of eight. The most common score was a six (32 studies- 44%). The distribution was relatively even for studies scoring five (16 studies - 22%) and seven (18 studies -25%). . The main reasons so many studies failed to rate higher in quality was because few were randomized controlled studies and most relied on subjective outcome measures such as self ratings.

The most commonly studied outcome was career choice. Out of the 72 studies, 37 (51%) listed career choice as the reported outcome measurement. Of these, the vast majority (89%) reported an association between a rural training experience and choosing a career in a primary care specialty such as family medicine. Practice location was the second most common outcome measurement. With 22 (31%) of the 72 studies reporting on practice location, most studies revealed that student experiences in a rural setting predicted future employment. In general, medical students completing rural rotations were three times more likely to practice in a rural community compared to the national average.¹¹

Another outcome measurement in 17 (24%) of the studies was grades or scores such as USMLE score¹²⁻¹³ or performance in clinical exams using standardized patients.¹⁴⁻¹⁵ National Board Step 1 and Step 2 scores were discussed in several of the studies. Some detected no significant differences in scores between students with rural training experiences compared to those without a rural experience,^{8,16} one study showed rural students scoring better on the USMLE exam,¹³ and two studies showed poorer Step 1 scores for rural students compared to a control group and better Step 2 scores.¹⁷⁻¹⁸

Skill or competency was stated as an outcome measurement in 13 (18%) of the studies. Students in self-report studies felt their skills significantly increased in areas such as chronic diseases management and ability to handle acute problems, with the largest gain in understanding health systems and the community during their rotation in a rural primary care clinic.¹⁹

Studies examining clinical encounters reported that students placed in rural settings saw more patients and generally had more opportunities for procedures than those in a comparable non-rural setting.⁽²⁰⁻²³⁾

Eight studies (11%) examined student satisfaction. Overall, students expressed satisfaction with the rural exposure to community providers.²⁴⁻²⁷ Closely related to student satisfaction is the perceived subjective value of the rural experience, which was measured in 6 (8%) studies. Students appreciated the opportunity to function as a junior partner during their rural training experience.^{10,28}

Rural retention was discussed in only 4 (6%) of the studies. One study that surveyed over 200 primary care physicians found no difference in rural retention between those who completed a rural rotation as a medical student or during residency and those who did not complete a rural rotation.²⁰ Another study found that graduates who had a rural clerkship were more likely to remain in a rural practice longer.²

Discussion

Based on the premise that placing an undergraduate medical student in a rural setting might lead to more physicians choosing careers in rural medicine, many medical schools offer students rural based educational opportunities. Although these experiences could potentially enrich learning by exposing students to an alternative setting, they could also compromise learning or even discourage a student from rural practice. To explore the impact of these educational experiences, we reviewed the published literature for articles reporting measurable outcomes associated with undergraduate rural training experiences.

The most commonly studied outcome was career choice and practice location. Since educators frequently develop these experiences with the intent to increase the number of primary care physicians and rural based practitioners, it is not surprising that these are the most commonly researched outcomes. An important and reassuring finding is that a majority of studies showed that rural experiences did positively influence students to consider a primary care specialty and to either consider or choose rural practice. These findings are consistent with a recent systematic review of comprehensive medical school programs designed with extensive rural training experiences²⁹ which reported that all these programs produced an increase in rural physician

supply. One potential concern about these studies examining career choice and practice location is that students typically were not randomized to either a rural or non rural experience. Usually only those students with an interest in rural medicine were placed at a rural site, making it difficult to distinguish whether these programs only reinforce pre-existing interest or whether they might influence someone to actually consider a rural practice who might otherwise not have taken this option into account.

An important question about rural training experiences is their impact on a student's acquisition of the skills, knowledge, and attitudes expected of a graduate physician. While some believe a rural setting might benefit trainees by offering a greater opportunity to see a wider array of patients and experience more continuity of care with less competition from other learners,³⁰⁻³¹ others have expressed concern that students at a rural site might encounter a less academic environment that could compromise their clinical maturation.^{25,32} A key finding of our review is that students in rural rotations appear to do as well as, and often better than, their urban counterparts. In those studies that used objective measures such as exam scores, USMLE scores or performance on clinical skills testing, students with rural experiences generally did equally as well or better than their counterparts. Bianchi and colleagues found that students with rural experiences had higher clinical exam scores¹⁴ while Power and colleagues found that rural students did equally well on OSCE stations using primary care problems but slightly worse on stations assessing specific content taught in traditional clerkship curriculum.¹⁵ While a 1983 study showed slightly lower grades and NBME scores for rural program students,³³ more recent studies showed either no difference on test scores^{8,17} or found lower USMLE Step 1 scores for rural students but higher USMLE Step 2 scores.¹⁹

Studies using student perceptions and self ratings of the experience as their data source generally found that students reported high satisfaction with their clinical experience and significant improvement in their clinical skills. Faculty preceptors likewise reported positively about the students and the rural experience. Finally, those studies reporting on patient volume generally reported that students saw more patients and had an opportunity to do more procedures.²⁰⁻²³

(Felicia –please leave this in. I added something to page 6 in methods and to results on page 9 – to address the editor’s concerns but these changes will mean adding those references to the footnotes there which will change the numbering and repeating those citations here. I think this is a critically important result and should be included and not deleted) This suggests that it might be beneficial for schools to expand rural training opportunities for reasons other than to influence career choice and practice location.

One limitation to our review is that the studies were often of moderate or poor quality. Several studies only evaluated small numbers of students and most were either retrospective or cross sectional in design. Several studies used self reported survey data, which has the potential for bias, especially since most of the study groups consisted of students likely to embrace rural medicine. In addition, this review looked only at North America studies and the findings might not extend to other countries. Finally, our search strategy might have missed some relevant studies. However, strength of the review is that while the studies varied in methodology, quality, and type of experience, in aggregate they consistently reported beneficial outcomes related to rural experiences.

Conclusion

In conclusion, our study provides evidence that placement in rural settings is a positive learning experience that students value and that preceptors find gratifying. These findings should be of interest to educators responsible for training medical students. As new medical schools come on line and existing schools increase in size, the clinical resources at academic health centers may be challenged to meet future training needs and the findings reported here indicate that rural settings represent a potentially untapped training resource that appears to offer both a different yet high quality experience that might benefit all students. While the evidence supports that these rotations influence practice site and career choice, it is not clear whether they merely reinforce pre-existing interest or have the ability to motivate previously uninterested students to consider a career in primary care or rural medicine. Future directions for research include assessing the quantitative affect on career choice and defining the most effective methods of rural training, optimum rotation length and timing of the experience. Finally, exploring how technology such as web-based learning might benefit rural training is another potential area of exploration.

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