



Impact of a Rural Interprofessional Experience in Rural Communities on Medical and Pharmacy Students

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BACKGROUND AND OBJECTIVES: The mission of the medicine and pharmacy programs at the University of Minnesota, Duluth campus is to prepare students for practice in rural communities. To support and encourage medical and pharmacy students to choose to practice in rural Minnesota, an interprofessional experience was developed to expose medical and pharmacy students to a variety of aspects of rural health care. The objective of this study was to determine the impact of the Rural Interprofessional Experience (RIE) on perceived knowledge and attitudes of medical and pharmacy students toward rural practice.

METHODS: Medical and pharmacy students were surveyed before and after their RIE to assess student perceptions of the value of the experience.

RESULTS: Analysis shows that both medical and pharmacy students demonstrated a positive change in perceived knowledge after their participation in the rural community experience. However, most attitudes toward rural community participation did not change significantly.

CONCLUSIONS: The RIE of medical and pharmacy students is associated with an increase in perceived knowledge in all categories related to rural health care.

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The institutional missions of both programs at the University of Minnesota Medical School, Duluth and the College of Pharmacy, Duluth support rural interprofessional experiences and the desire to improve primary health care in rural Minnesota.

The mission of the University of Minnesota Medical School, Duluth is to be a leader in educating physicians dedicated to family medicine, who will serve the health care needs of rural Minnesota and American Indian communities and to empower

clinicians to discover and disseminate knowledge through research. The University of Minnesota College of Pharmacy, Duluth emphasizes rural health care issues and the provision of pharmaceutical care in rural and tribal communities while providing services to these communities in Greater Minnesota.

Teamwork in health care has been an important consideration in providing quality primary care for patients.¹⁻³ By providing interprofessional activities for medical and pharmacy students early in their

academic careers, future physicians and pharmacists will gain knowledge and experience regarding successful team health care delivery.^{4,6} Interprofessional experiences have been shown to improve attitudes and understanding related to interprofessional care in various settings and disciplines.^{4,7}

Interprofessional educational experiences are supported by both the Liaison Committee on Medical Education (LCME) and the Accreditation Council for Pharmacy Education (ACPE). Both accrediting entities require competence in interprofessional delivery of health care for their respective schools.^{9,10} Redesign of medical and pharmacy education programs is needed to meet the accreditation criteria and the needs of students and patients.¹¹

As an opportunity to improve education and patient care, faculty and staff from the University of Minnesota Medical School, Duluth and the University of Minnesota, College of Pharmacy, Duluth have developed the Rural Interprofessional Experience (RIE) for first-year medical and pharmacy students to provide an interprofessional foundation on which other courses and experiential education can build. Through the RIE, medical and pharmacy students

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are fulfilling these academic requirements and expanding their foundations on interprofessional exposure.⁴ There is a need to document that required interprofessional experiences are valuable in changing practice knowledge, opinions, and attitudes of health care professionals' roles.^{6,12,14,15} It is important to understand health care professionals' roles to work together to better meet the needs of the patient.¹²

The goal of RIE is to provide quality interprofessional educational experiences to prepare medical and pharmacy students for their future role in an interprofessional health care team in a rural setting. Nurturing experiences in rural communities and formal education in rural health care have a beneficial effect on increased awareness, interest, and understanding in careers in rural communities for medical students.^{6,16-18} These same results have not been found for all health professions, including pharmacy students.¹⁷

By engaging the students in the RIE, we hoped to encourage interprofessional rural health care teams. In addition to the overall experience, student variables may be useful for identifying changes in the curriculum to enhance students' interest in rural careers.^{18,19}

Methods

History of RIE

The Medical School initiated the rural experience in 2002; in the years that followed it evolved into a collaborative Medical School and College of Pharmacy initiative. Medical and pharmacy faculty and staff developed the initiative to facilitate interprofessional curriculum goals. From 2007 to 2009 the medical and pharmacy students, faculty, and staff participated in the RIE in six rural communities. The medical and pharmacy students worked together to prepare and present interprofessional presentations together on the six communities. This article will present the evaluation of the data from 2007 to 2009. The main objective in developing the RIE was to lay a

foundation for the development of interprofessional collaboration between medical and pharmacy students early in their professional careers.

Description of RIE Program

The rural health care missions of each program provided the objective for uniting the first-year medical and pharmacy students in an interprofessional exploration of rural health care in Minnesota. Medical students in the Introduction to Rural Family Medicine Course and pharmacy students during pharmacy orientation combined to participate in the RIE during their first semester of their first year in the professional programs. The students participated in the RIE, comprised of didactic learning followed by rural community-based experiential education. The didactic experiences consisted of online readings, lectures, panel discussions, small-group

discussions, and an orientation session. The rural community assessment wheel (Figure 1) was taught in the classroom prior to the community visits to guide students in their learning of a rural community and to look beyond their own profession. The wheel assists students in their assessment of factors in the health care community and their health care profession. The students assessed the community core, physical environment, education, safety and transportation, politics and government, health and social services, communications, education, and recreation of the community visited. For each community visit, 10 medical and 10 pharmacy students were partnered together with faculty and staff members from both medicine and pharmacy. The rural community visits included a full-day visit to one of six chosen rural communities in Northeastern Minnesota.

Figure 1: Community Assessment Wheel



Community Core
Physical Environment
Education
Safety and Transportation
Politics and Government
Health and Social Services
Communications
Economics
Recreation

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The communities were selected for their hospital system, community leaders, supporting industry, and distance to travel to and from the university within a day. Within each of these rural communities, various aspects of health care were visited, including, but not limited to, child care programs, clinics, community pharmacies, domestic abuse centers, health care centers, hospitals, hospital pharmacies, senior centers, veterinary clinics, and other services unique to the community. During the community visits, students from both professions interacted with numerous health care practitioners and community leaders. Through tours, panel discussions, and question-answer sessions, the community members shared their expertise and knowledge about health care issues and rural life in their rural community with the medical and pharmacy students. Participants also met with seniors in the community to hear their life stories and their experiences related to health care issues. Following the community visit, each interprofessional team of students met to develop presentations on their assigned community. The interprofessional presentations were done jointly by medical and pharmacy students. They were presented to all of the students, faculty, and staff during the first semester (Table 1). The format was determined by the students. It was often a PowerPoint presentation with photographs, documents, and highlights from their rural community visited or a skit or

short play. A time for questions followed each of the community presentations to allow for additional learning.

Survey Design and Delivery

The purpose of the RIE program is to expose medical and pharmacy students to other health care professions and then measure the changes before and after the experience to systematically evaluate the benefits of their interprofessional understanding of rural health care.⁴ The Rural Healthcare Interprofessional Survey was developed by the authors to assess students' background and perceived knowledge of rural health care through the first semester of their professional education.²⁰ The survey was given to all incoming classes of students for 3 consecutive years. Each class of medical and pharmacy students completed a pre-rural experiences survey (A) and a post-rural experiences survey (B). This research has been reviewed and approved as exempt by the University of Minnesota Institutional Review Board. The survey also evaluated rural interprofessional opportunities and rural health care education in the curriculum of the University of Minnesota Medical School, Duluth and the University of Minnesota College of Pharmacy, Duluth. Medical and pharmacy students' perceived knowledge and attitudes were pretested and posttested by a 23-question online survey. The survey included quantitative and qualitative questions. A

5-point Likert scale was used. Qualitative questions were open-ended questions to gather additional more reflective input from medical and pharmacy students. Questions in the survey were related to students' perceived knowledge of rural health care communities, methods of community assessment (Figure 1), demographics, roles of family physicians and pharmacists, barriers to health care, health care policy or legislation, tertiary health care support, telemedicine, roles of interprofessional health care teams, infectious diseases, occupations injuries and illnesses, environmental health issues, mental health issues, chronic diseases, alternative or complementary medicine, prescription coverage and expenses for patients, and general health care issues of the elderly.

All registered first-year medical and pharmacy students at the University of Minnesota Medical School, Duluth and College of Pharmacy, Duluth were eligible to complete the pre- and post-rural experiences survey. Any student admitted to either program after the the beginning of the RIE was excluded. Students accessed the online surveys anonymously using a course-developed encrypted Web site before and after the RIE. Students were surveyed prior to starting their first professional year of the medical or pharmacy program. After completion of the initial survey, the students participated in the RIE. Following the RIE program, the medical and pharmacy students

Table 1: Elements of the Rural Interprofessional Experience Curriculum

Pre-curriculum Survey
Pre-orientation Reading: Rural Journal Articles
Orientation interprofessional presentation to pharmacy students
Orientation presentation to medical students
Rural Community Visits to one of six rural communities
Interprofessional working groups: medical and pharmacy students guided by medical and pharmacy faculty share their experiences and photographs from the community visit. As a group, they prepare a formal presentation to their classmates and faculty.
Interprofessional presentation to an interprofessional audience (PowerPoint, skit, or short program)
Post-curriculum Survey

completed the post-rural experiences survey.

Data Analysis

Responses were compiled and analyzed using the PASW Statistics Base 18 statistical program (Chicago, IL). The data were analyzed using a paired sample *t* test. The student groups as a whole were compared before the RIE and after the RIE in two surveys. Student surveys with complete answers on all pre-rural experiences and all post-rural experiences questions were included. The responses of 23 survey questions were assessed for 3 different years of combined medical and pharmacy, evaluating their perceived knowledge, attitudes, and interests in rural interprofessional health care. Paired *t* tests were conducted on the pre- and post-RIE evaluations. Additionally, separate *t* tests were conducted on the pre- and post-survey RIE evaluations of medical and pharmacy students to evaluate data. Descriptive statistics were generated for various groups to address variations within and/or between classes. An α level $P < .05$ was selected to indicate statistical significance.

Results

Of the 346 students who participated in the RIE for medical and pharmacy students, 292 students (84.39%) completed all questions on both pre-RIE and post-RIE surveys. Survey respondents were equally distributed between medicine and pharmacy (Table 2). Table 2 provides the socio-demographic of the students that participated in the survey. Post-test means were significantly greater than the pretest means for all 18 perceived knowledge questions (Table 3). In all perceived knowledge questions, there was a statistically significant increase in perceived knowledge (all had $P < .0005$). There was no statistically significant increase in attitude questions before and after the RIE (Table 4). There was an actual decrease in students' interest in rural health following the

Table 2: Sociodemographic Characteristics of Participating Students

	#	%
Total students participating	346	100
Program enrolled		
Medicine	177	51.4
Pharmacy	168	48.6
Gender		
Female	201	58.1
Male	145	41.9
Size of your hometown community (population)		
Up to 2,499	83	24
2,500 to 7,499	82	23.7
7,500 to 19,999	62	17.9
20,000 to 49,999	36	10.4
50,000 to 99,999	44	12.7
Greater than 100,000	21	6.1
Unanswered	18	4
Year in the College of Pharmacy, Duluth/Medical School Duluth		
2007	112	32.4
2008	118	34.1
2009	116	33.5
Completed all questions, pre- and post-rural experience	292	84.39

RIE (question 19 of attitude questions).

Discussion

The main findings of this study demonstrated the value and impact on the RIE on changes in perceived knowledge of medical and pharmacy students related to all questions surveyed. Attitudes did not change, which may require a longer time and variety of experiences to be modified. Attitudes may not have changed due to the fact that many of the medical and pharmacy students had an interest in rural health care prior to RIE, which is displayed in the student demographics and the admission criteria and/or preference for each program.^{13,14,21} More than half of the students' (57.7%) hometown communities were less than a population of 7,500.¹⁴ There was a slight decrease in interest in rural health

health care following this RIE. This may or may not be related to the initial interest, but with increased exposure, this interest may be muted.¹³ The rural interprofessional perceived knowledge increased as a result of this experience. Variables that may affect our results include (but are not limited to): different admission criteria for the Medical School, Duluth and the College of Pharmacy, different diversity of the two programs, and different declaration of future plans by students upon admission.²¹ As part of admission criteria, the students at the Medical School, Duluth declared that they were planning to practice in rural family medicine. The students at the College of Pharmacy may or may not have a preference for rural pharmacy practice.

We had a strong participation rate of 84.39%, reflecting the opinions of

Table 3: Students' Perceived Knowledge Responses Before and After the Rural Interprofessional Experience

Question	Pretest Mean	Posttest Mean	Change in Mean	SD	t Value	P Value
1. Methods of Rural Community Assessment	2.16	3.41	1.250	0.871	-24.524	<.0001
2. Demographics of Rural Minnesota Health Care	2.60	3.49	0.887	0.815	-18.598	<.0001
3. Community Roles of Minnesota Rural Family Physicians	2.88	3.70	0.822	0.943	-14.895	<.0001
4. Community Roles of Minnesota Rural Pharmacies	2.51	3.44	0.925	0.967	-16.333	<.0001
5. Barriers to Health Care in Rural Minnesota	3.00	3.82	0.818	0.840	-16.648	<.0001
6. Rural Health Care Policy and Legislation	1.79	2.66	0.866	0.790	-18.732	<.0001
7. Tertiary Care Support of Rural Family Physician	1.77	3.00	1.236	0.924	-22.852	<.0001
8. Tertiary Care Support of Rural Pharmacists	1.50	2.73	1.233	0.974	-21.626	<.0001
9. Uses of Telemedicine in Rural Health Care	1.71	3.00	1.291	1.012	-21.792	<.0001
10. Roles of Interprofessional Rural Health Care Team	2.26	3.62	1.366	0.945	-24.712	<.0001
11. Rural Infectious Diseases	2.18	2.78	0.592	0.890	-11.375	<.0001
12. Rural Occupational Injuries and Illnesses	2.63	3.51	0.880	0.913	-16.465	<.0001
13. Rural Environmental Issues	2.60	3.37	0.771	0.900	-14.633	<.0001
14. Rural Mental Health Issues	2.41	3.15	0.736	0.887	-14.193	<.0001
15. Chronic Diseases in Rural Health Care	2.44					
16. Alternative and Complementary Medicine in Rural Health Care	1.91	2.66	0.753	0.964	-13.360	<.0001
17. Pharmaceutical Coverage and Costs for Rural Patients	2.08	2.87	0.795	0.984	-13.800	<.0001
18. Elderly Health Care Issues	2.55	3.45	0.897	0.932	-16.446	<.0001

a majority of the students. Limitations of the study include the survey design itself. The survey only measured changes in perceived knowledge; actual knowledge was not assessed. The survey was not validated and did not include questions related to parents and other role models for health care careers, spousal career choices, rural loan forgiveness, and a variety of other factors that influence work community selections. This study was done at a single academic institution that has a defined rural emphasis in each program. The RIE was possible as a result of interprofessional leadership, teamwork, and education coming together to provide a quality learning experience.

The RIE's successes were attributed to a number of factors: rural

emphasis of both programs, students' predisposition to rural locations, support of faculty, supportive rural communities, supportive community leaders, and the geography of the state of Minnesota. Duluth medical students are admitted to the Medical School, Duluth with requirements of rural backgrounds and the intent for rural family medicine. The Duluth pharmacy students' admission criteria did not have this requirement or intent. The two programs have two different admission processes that are unique and mission driven. This could explain some of the differences in students' characteristics and attitudes related to sites for future practice.¹⁴ This could also explain differences seen by other rural programs. The results described in our study may not represent attitudes

and perceived knowledge changes that may be found in other communities.

Conclusions

The rural interprofessional experience that was offered was a highly valued experience. Our study revealed that this experience resulted in a change in students' perceived knowledge. We will continue to track the selection of experiential sites in rural communities versus urban areas for these students. There is potential value in continuing this study longitudinally to evaluate the location of the first employment position of the medical and pharmacy students as well as future sites of practice years later. This evaluation has been duplicated in similar studies.^{4-8,12,21}

Table 4: Students' Attitudes Responses Before and After the Course

Question	Pretest Mean	Posttest Mean	Change in Mean	SD	t Value	P Value
19. I have an interest in rural health care	4.36	4.27	-0.096	0.554	2.958	.003
20. I am interested in experiential education in a rural community (RPAP, APPEs)	4.12	4.20	0.079	0.749	-1.797	.073
21. I plan to practice in a rural community	3.93	3.91	-0.021	0.631	0.556	0.578
22. I plan to practice in Minnesota	4.44	4.40	-0.038	0.594	1.084	0.279
23. I am interested in joint educational opportunities between the College of Pharmacy, Duluth and the Medical School Duluth	4.04	3.96	-0.082	0.825	1.703	0.090

With health care changes and health interdependence, more research is needed on the value and impact on interprofessional educational experiences as health care teams evolve into the future.¹¹ The value of expanding programs like the RIE is the potential influence on the rural health care interprofessional teams' attitudes and knowledge to improve patient care in rural communities.¹⁴ Additional research would be beneficial with surveys that follow medical and pharmacy students as they select their first employment positions and their positions after 5 years. This data would have an impact on rural clinical practice and their health care communities.

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