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Rural Health Care Providers' Educational Needs Related to Agricultural Exposures

J. J. Mazza, B. C. Lee, P. D. Gunderson, D. T. Stueland

Abstract

The wide spectrum of agricultural diseases and injuries, combined with the changes in health care delivery, underscores the need for rural health care providers to maintain competency in occupational medicine pertaining to agriculture. Educational needs and training preferences of rural health care providers were determined through mail survey research conducted among a random sample of Midwest physicians, physician assistants, nurses, veterinarians, and chiropractors. Data from 1,237 survey participants revealed the most common agricultural exposures experienced by their patients/clients include heavy lifting, environmental dusts or irritants, and hazardous machinery. Minimal clinical competency was reported for exposures to pesticides, noxious gases, and volatile organic chemicals. Textbooks and journals were the most commonly used reference sources of the providers. Family and professional obligations along with cost and difficulty acquiring practice coverage, were the major barriers to participation in continuing education programs. Survey results suggest methods to maximize professional education and training experiences relevant to agricultural exposures.

Keywords. Agricultural health, Occupational medicine, Rural health, Agricultural exposure, Needs assessment.

In rural settings, primary care providers often care for farmers, ranchers, family members, and employees who may be exposed to agricultural occupational hazards. These rural health care providers are faced with many unique and challenging opportunities related to preventive counseling, diagnosis, and treatment of patients/clients. The specialty practice of "agromedicine" has recently emerged as a unique field of clinical practice accompanied by its own journal, network of professionals, and communication linkages (James, 1994). As the body of knowledge regarding agricultural health and safety issues continues to expand, the needs and expectations of patients/clients seeking preventive, diagnostic, or therapeutic information related to agricultural health problems also continue to

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grow. Therefore, it is imperative that lessons learned from other areas of occupational medicine be applied so that rural health care providers receive appropriate education and training, as well as the opportunity for continuing education regarding the myriad of disease and trauma associated with changing practices and health issues of our agrarian society.

Current agricultural injury and disease statistics, as well as changing trends in health care, support the significance of this investigation. For more than a decade, farming has been rated one of the most dangerous occupations in the United States. In 1994, there were an estimated 140,000 agricultural work injuries and 890 agricultural work-related deaths. Of these, an estimated 60,000 injuries and 400 deaths involved farm residents engaged in farm work with the remainder occurring to non-resident farm workers (National Safety Council, 1995). The occupational death rate for persons in agriculture, 26 deaths per 100,000 workers, can be compared to the rate for all industries combined of 4 deaths per 100,000 workers (National Safety Council, 1995). This rate calculation does not include deaths to children younger than 14 years of age, yet they comprise a significant portion of agricultural fatalities (Purschwitz, 1990). In addition to traumatic injury, there are a considerable number of adverse health conditions associated with agricultural work and the farm environment. Although farmers consistently rank lower than the general population in cardiovascular disease, there is a high incidence of respiratory disease (not associated with smoking) (Schenker et al., 1991), back pain, repetitive motion syndromes, and certain types of cancer (Blair and Zahm, 1991). In addition, some studies have noted that farmers are at increased risk for depressive disorders as manifested by suicide (Gunderson et al., 1993).

Changing trends in American agriculture are reflected both in the population of farmers as well as the industrialization of farm practices. The 1992 Census of Agriculture reported a total of 1.9 million farms in the United States, reflecting a 7.8% drop from the 1987 census (U.S. Census of Agriculture, 1994). In 1992, an annual average of 3.2 million people 16 years of age and older were employed in agricultural production in the United States (U.S. Department of Labor, 1993). The actual number of individuals exposed to agricultural hazards is unknown since there are an estimated 3.6 million persons who are unpaid farm workers (i.e., children, friends) plus an unknown number of visitors to farm work sites.

About 85% of the farms in the United States are sole proprietorships and most of the remaining are a mix of corporate or partnership arrangements. The shifting of farm ownership practices has a direct influence on production practices and, this in turn, influences the types of illnesses, as well as the population of individuals affected by agricultural occupational hazards. The changing farm economy has resulted in an increased number of farm owner/operators maintaining off-farm employment. It is anticipated the trend towards a few, very large farms and many small "niche market" farms will continue. The potential result of this trend is that the majority of food and fiber products in the United States will be produced on a relatively small number of corporate farms which are mandated to adhere to safety and industrial hygiene standards consistent with American industry. On the remaining majority of farms which are small operations, a variety of specialty products will be produced using innovative production techniques, resulting in exposures to new types of health and safety risks. Given the economic value of off-farm employment for males, it is possible that increasing numbers of women and children may bear responsibility for the workload on these small farms (Zeuli, 1995).

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The persistence of agricultural disease and injury conditions, combined with changing trends in the agricultural population and changes in health care provisions and providers, suggests a need for continuing education and training systems that help rural health care providers maintain competency regarding new developments in occupational medicine pertaining to agriculture.

Purpose and Specific Aims

The overall goal of the educational needs assessment of Midwest rural health care providers was to improve the diagnosis, treatment, and consultation for individuals with agricultural health problems by identifying specific needs for timely, state-of-the-art disease, injury, and environmental education and training to rural physicians, physician assistants, nurses, chiropractors, and veterinarians. The specific aims of the survey were to: (1) identify rural health care providers' degree of interaction with patients/clients having specific agricultural disease or injury conditions; (2) identify physicians' perspective of personal competency in diagnosing and treating agricultural conditions; (3) assess availability of patient education and professional training resources regarding agricultural disease and injury conditions; (4) identify typical sources used by rural providers to obtain educational resource materials for patients/clients, or themselves; (5) determine preferred continuing education methods, sites, and length of time of rural health care providers; and (6) assess personal and practice barriers to rural health care providers' participation in continuing education.

Background

In order to conduct a comprehensive educational needs assessment without duplicating efforts of previous researchers, the literature was reviewed with respect to related studies. A survey of the continuing education needs of Ohio health care professionals was conducted in 1991 (Escovitz and Augsburger, 1991). This assessment of Ohio physicians, nurses, pharmacists, optometrists, and allied health specialists found that 96% were interested in continuing education, most preferred conferences, pharmacists preferred home study, and 41% preferred interdisciplinary conferences. In 1990, an agricultural safety and health information needs assessment was conducted among Minnesota cooperative extension agents, implement dealers, physicians, public health nursing directors, chiropractors, and veterinarians. Results indicated the most frequent health concerns of providers were injuries, back and muscle problems, and respiratory exposures. The preferred learning method for continuing education was professional newsletters and interaction with knowledgeable others (Greaves et al., 1994). An assessment of Maryland occupational health nurses revealed that 72% of nurses felt inadequately trained to recognize health effects of environmental hazards (Snyder et al., 1994). They desired advanced training in lead exposure, water and air quality, hazardous waste, and pesticides. Pierson and Murphy (1993) conducted an agricultural safety and health educational needs of equipment dealers, cooperative extension agents, agricultural teachers, chemical and fertilizer dealers, insurance company representatives, grain and feed dealers, and veterinarians. Survey results from their mailed questionnaire to a random sample of 826 education and industry professionals revealed that 82% share health and safety information with farmers, 70% desire continuing education

on the topic, and most preferred experiential learning methods. Results from these studies suggested that professionals dealing with farmers may be willing to participate in continuing education, yet there remained many questions regarding specific content, methods for learning, and barriers to participation that had not been explored.

Methods

A descriptive, correlational research design was employed for this investigation, using mail survey research techniques. The sample was comprised of physicians, physician assistants, public health nurses, nurse practitioners, chiropractors, and veterinarians whose practice mail address was a rural zip code in the United States Federal Health Region V, consisting of Ohio, Indiana, Michigan, Illinois, Minnesota, and Wisconsin. Rural zip codes were selected after determining agricultural production data for the areas that were secured from each state's Department of Agriculture. Specifically, each zip code area was selected on the basis of its overall dependence on six agricultural enterprises: corn, soybeans, dairy, truck farming, beef or poultry. Public health nurses were reached through respective public health agencies with non-metropolitan zip codes. Individuals in the other disciplines were reached via state or regional listings of licensed or registered individuals. Except for physician assistants and nurse practitioners, a proportionate sampling of the total number of rural health care providers was utilized for the survey sample.

The survey instrument was developed by the project team and was subjected to pilot testing and content validity review. The instrument was adapted to reflect unique aspects of practice for each provider group, e.g., veterinarians were queried regarding the frequency of questions posed to them from farmers regarding specific agricultural exposures, while physicians were asked questions related to the diagnosis and treatment of those same types of agricultural exposures. The questionnaire consisted of 136 items with Likert-type response options related to each of the project objectives, as well as demographic characteristics of the participant and his/her practice.

Data were collected using Dillman's (1978) standard mail survey research methods. A notification postcard regarding identification of the individual as a randomly selected participant in the study was issued. Approximately one week later, a packet containing an explanatory cover letter describing the purpose of the project and informed consent, the survey instrument, and a stamped return envelope was provided. A follow-up thank you/reminder postcard was mailed one week later. For non-responders, a second and third survey instrument was mailed in three week intervals following the initial distribution of the survey. Data entry was conducted using the statistical package for social sciences (Norusis, 1992) and standard quality assurance measures.

Results

Study results revealed information regarding characteristics of rural health care providers, their perceptions of the health problems of their patients, issues related to their current educational needs and training preferences along with personal practice barriers to continuing education. Complete survey results were received from 1,237 rural health care providers in six Midwest states. Physicians, veterinarians, and chiropractors comprised 80% of thos physician assistants made up the rema nurse participants were male and the of 30 and 49 years (table 1).

Survey response rates ranged fror assistants. Generalization of study res Further efforts to solicit informatior were not conducted.

Thirteen agricultural health condi care providers were selected for incl experience at the Marshfield Clinic, Survey respondents were queried rega of patients/clients seen in their prac heavy lifting, followed by exposure hazards were the most common adver to zoonotic diseases and substance a exposures of farming patients/client health conditions reviewed.

Data revealed that physicians (n competency in their diagnostic skills physicians felt most competent in diag followed by back pain (83.7%). In co diagnosing maladies related to exposu volatile organic chemicals (23.4%), or competency in treating these types of in their treatment skills than in their d

Nurses, physician assistants, and availability of patient education mat conditions. There was wide variability of access to, and availability of, patien all nurses reported adequate resourc nearly three-fourths of the chiroprac Most study participants reported adeq dependency and skin cancer, while

Table 1. Characteristics and resp physician assistants, ch

	MDs	RNs
N =	355	137
% male	89.5	28.6
% age 30-49 yr	57.7	73.6
% solo practice	39.9	---
% full time	86.6	69.2
% response rate	36.0	NA*

Key: MD = physician; RN = nurse practitioner/p practor; DVM = veterinarian.

* The distribution of survey forms to public health departments and data on the specifi were not secured (therefore, no denominator

† Includes average of MDs, DCs, DVMs only.

‡ Excludes RNs.

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garding characteristics of rural health care problems of their patients, issues related to ng preferences along with personal practice ete survey results were received from 1,237 vest states. Physicians, veterinarians, and chiropractors comprised 80% of those responding to the survey, while nurses and physician assistants made up the remaining 20% of the sample. The majority of non-nurse participants were male and the majority of respondents were between the ages of 30 and 49 years (table 1).

Survey response rates ranged from 36% for physicians to 53.3% for physician assistants. Generalization of study results is limited by virtue of the response rates. Further efforts to solicit information from non-responders (after three mailings) were not conducted.

Thirteen agricultural health conditions commonly encountered by rural health care providers were selected for inclusion in this investigation based on clinical experience at the Marshfield Clinic, as well as current literature on this subject. Survey respondents were queried regarding their perception of agricultural exposures of patients/clients seen in their practice. Data revealed that of the 13 conditions, heavy lifting, followed by exposure to machinery and livestock, and respiratory hazards were the most common adverse exposures of rural patients/clients. Exposure to zoonotic diseases and substance abuse were perceived to be the least common exposures of farming patients/clients. Refer to table 2 for a complete listing of health conditions reviewed.

Data revealed that physicians (n = 355) reported varying levels of personal competency in their diagnostic skills associated with agricultural exposures. Rural physicians felt most competent in diagnosing traumatic agricultural injuries (86.9%), followed by back pain (83.7%). In contrast, few physicians reported competency in diagnosing maladies related to exposures to pesticides (34.9%), noxious gases (33%), volatile organic chemicals (23.4%), or zoonotic illnesses (31.9%). When asked about competency in treating these types of conditions, most physicians felt less competent in their treatment skills than in their diagnostic skills (fig. 1).

Nurses, physician assistants, and chiropractors were queried regarding the availability of patient education materials related to the 13 different agricultural conditions. There was wide variability across the three disciplines in the perception of access to, and availability of, patient education materials. Fewer than one-half of all nurses reported adequate resources regarding work-related back injury, while nearly three-fourths of the chiropractors reported these resources were adequate. Most study participants reported adequate resources regarding alcohol and chemical dependency and skin cancer, while virtually no resources were readily available

Table 1. Characteristics and response rates of sample: physicians, nurses, physician assistants, chiropractors, and veterinarians

	MDs	RNs	PAs	DCs	DVMs	Total
N =	355	137	70	287	388	1,237
% male	89.5	28.6	60.0	88.4	83.4	70.0
% age 30-49 yr	57.7	73.6	73.8	66.2	65.8	67.4
% solo practice	39.9	---	19.7	78.9	33.4	64.0†
% full time	86.6	69.2	86.2	90.8	83.3	83.2
% response rate	36.0	NA*	53.3	50.0	36.6	44.0‡

Key: MD = physician; RN = nurse practitioner/public health nurse; PA = physician assistant; DC = chiropractor; DVM = veterinarian.

* The distribution of survey forms to public health nurses was managed by the director of public health departments and data on the specific number of surveys distributed to eligible participants were not secured (therefore, no denominator data).

† Includes average of MDs, DCs, DVMs only.

‡ Excludes RNs.

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Table 2. Rural health care providers' (n = 1,237) perception of agricultural exposures of patients

Exposure	% Providers Reporting as Frequently Experienced by Patients
Heavy lifting	53.3
Machines/livestock	49.6
Respiratory hazards	47.9
Repetitive motions	46.0
Excessive sunlight	38.8
Noise	33.4
Heat/cold	26.6
Pesticides	18.3
Psychological disorders	16.2
Noxious gases	12.1
Volatile organic chemicals or fuels	12.1
Zoonoses	9.2
Substance abuse	6.1

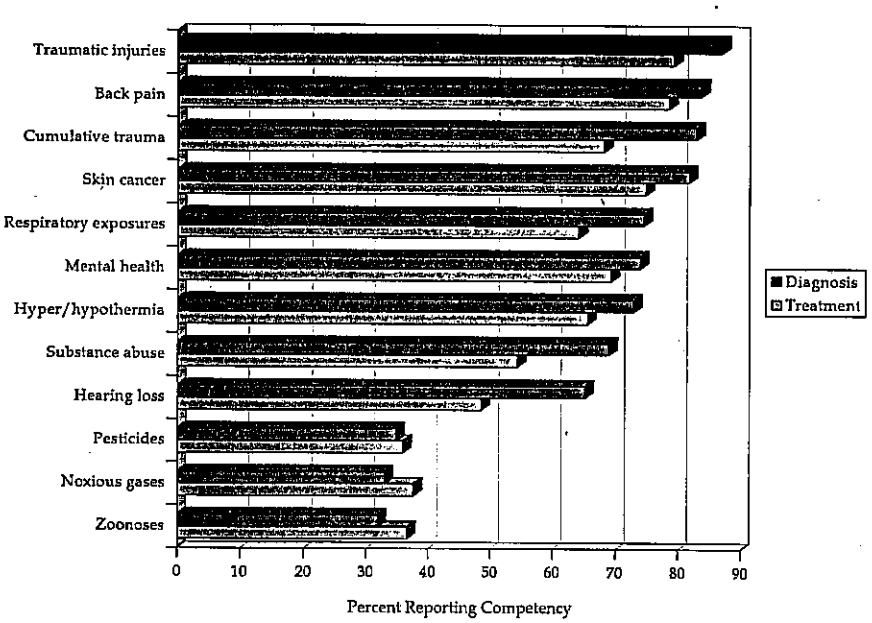

Figure 1–Physicians (n = 355) reporting competency in diagnosing and treating agricultural conditions. The dark shaded bar represents percent physicians reporting competency in diagnosis. The light-shaded bar represents percent physicians reporting competency in treatment. On a 4-point scale (1 = extremely competent, 2 = competent, 3 = minimally competent, 4 = not presently competent), data reflect those indicating they are extremely competent or competent.

regarding exposure to noxious gases and volatile organic chemicals. The public access sources most frequently used for obtaining patient or professional education material regarding agricultural exposures were the Centers for Disease Control, Occupational Safety and Health Administration (OSHA), and state cooperative extension services. For most providers, professional journals and textbooks served as primary

Table 3. Preferences for contin

N =	
Professional conferences/convention	
Professional journals	
On-site lectures	
Newsletters	
Video education tapes for home or office viewi	
Audio cassettes	
Clinical rounds	
Computer software	
Teleconferences	

Key: MD = physician; RN = nurse practitione ropractor; DVM = veterinarian.

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In order to plan for future contin health care providers, an assessment For all disciplines, conferences and co 50% of the respondents. Nearly one- professional journals as a readily avai continuing education in agricultura programs and teleconferences (table 3)

When queried about preferred si physicians, clinical nurse specialists, strongly preferred a hotel convention their place of employment or home campus. Physicians, nurses, chiropract event, while physician assistants prefer the most desirable days of the week, v to attend conferences and educational

Rural health care providers expe barriers that limit their participation minimal variability regarding person disciplines. Personally, many prefer to have home management obligations t education events. Practice barriers education were primarily long distance at the work site. For nurses, the expen practice barrier (table 4).

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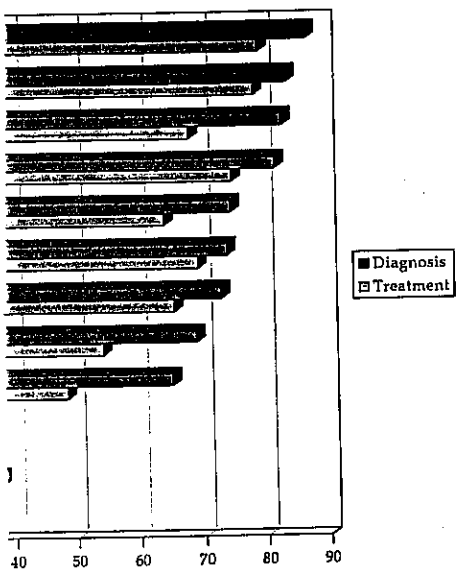

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Table 3. Preferences for continuing education activities (% strongly prefer)

	MDs	RNs	PAs	DCs	DVMs
N =	355	137	70	287	388
Professional conferences/convention	59.7	59.7	72.5	69.8	60.4
Professional journals	44.0	40.5	56.5	48.2	43.3
On-site lectures	32.2	43.0	32.4	16.7	10.8
Newsletters	26.8	42.3	39.7	39.2	38.7
Video education tapes for home or office viewing	20.5	39.2	28.4	31.2	18.2
Audio cassettes	17.2	16.8	23.9	21.5	9.2
Clinical rounds	10.8	10.2	18.8	9.9	8.5
Computer software	8.8	7.8	7.2	5.2	8.1
Teleconferences	5.3	11.5	7.5	0.8	1.1

Key: MD = physician; RN = nurse practitioner/public health nurse; PA = physician assistant; DC = chiropractor; DVM = veterinarian.

reference sources for immediate access to agricultural disease and injury information. Given the dearth of coverage on these topics in many of the professional conventions and continuing education programs, there is much less frequent use of other sources of information by rural health care providers.

In order to plan for future continuing education and training options for rural health care providers, an assessment was conducted of preferred learning methods. For all disciplines, conferences and conventions were strongly preferred by more than 50% of the respondents. Nearly one-half of the rural providers strongly preferred professional journals as a readily available resource. The least preferred sources for continuing education in agricultural health and safety were computer software programs and teleconferences (table 3).

When queried about preferred site for participating in continuing education, physicians, clinical nurse specialists, physician assistants, and chiropractors most strongly preferred a hotel convention center, while public health nurses preferred their place of employment or home office and veterinarians preferred a university campus. Physicians, nurses, chiropractors, and veterinarians preferred a one-full-day event, while physician assistants preferred two-day events. Friday and Saturday were the most desirable days of the week, while February was the most preferred month to attend conferences and educational seminars.

Rural health care providers experience a number of personal and practice barriers that limit their participation in continuing education activities. There was minimal variability regarding personal and practice barriers across the different disciplines. Personally, many prefer to spend time with family and friends and may have home management obligations that limit their time for attending continuing education events. Practice barriers limiting the participation and continuing education were primarily long distance travel to programs and inadequate coverage at the work site. For nurses, the expense of continuing education was also a major practice barrier (table 4).

Discussion

This study queried health care providers from a six-state area of the upper Midwest and underscores the inadequacies expressed by providers in their practice environment. Self-reported competency in the diagnosis and treatment of some of the more unique health problems encountered was inadequate for virtually all study participants. This was particularly evident in maladies resulting from exposures to

Table 4. Personal and practice barriers to participation in continuing education programs

	MDs	RNs	PAs	DCs	DVMs
N =	355	137	70	287	388
Personal Barriers — Percent Reporting This as Frequent Barrier					
Prefer time with family and friends	50.6	38.4	50.0	51.1	44.8
Home management obligations	29.1	34.9	34.9	27.8	27.0
Limited childcare options	10.0	17.7	23.0	12.8	10.0
Responsibilities for other dependents, e.g., elderly parents	2.8	12.2	8.2	2.3	2.2
Practice Barriers — Percent Reporting This as Frequent Barrier					
Long distance to programs	56.5	75.0	66.2	62.9	56.5
Expense of continuing education	37.9	65.1	49.2	38.5	33.6
Inadequate clinical coverage during my absence	33.9	44.5	39.7	61.2	46.1
Limited time allotted for education by employers	8.8	30.5	23.4	3.6	15.0

Key: MD = physician; RN = nurse practitioner/public health nurse; PA = physician assistant; DC = chiropractor; DVM = veterinarian.

pesticides, volatile organic chemicals, noxious gases, and zoonotic diseases, with fewer than 40% of rural physicians admitting competency.

The spectrum of health care problems confronting the rural health care provider poses unique and challenging situations requiring special diagnostic and treatment skills. Changes in agriculture technologies are altering the types of disease and injury conditions experienced by workers and bystanders. Additionally, there may be gradual changes in the age and gender of persons exposed to agricultural occupational hazards. Thus, rural health care providers are in a pivotal position to provide preventive counseling and guidance at an individual or community-based level.

More than 25% of individuals residing in America live in rural communities as opposed to urban or city dwellers (U. S. Bureau of Census, 1990). With respect to health care services, this rural population is, and has been for many decades, considered to be medically underserved. The remoteness and inaccessibility of small rural communities appear to lack appeal for many health care providers to pursue their professional practices. A number of federally and privately funded initiatives have been attempted to enhance recruitment and retention of rural health care providers. The availability of continuing education in the emerging field of agromedicine may be an additional incentive to achieve this goal.

A constant dilemma exists in developing comprehensive, professional education programs and materials for rural health care providers because of the myriad of medical, cultural, socioeconomic, ethical, occupational, environmental, and behavioral issues that influence both the patient/client exposed to agricultural hazards, and the rural health care provider. The lack of a sophisticated database and a readily available repository of agricultural disease and injury references for providers is noted. In addition to initiatives that expand agricultural disease and injury training within each discipline, concurrent training involving more than one discipline of rural health care providers should be explored and strongly encouraged. Potential interdisciplinary training regarding preventive options, assessment, and treatment of agriculture-related conditions is especially important in these times of changing rural health care delivery systems and new technologies in production agriculture.

In conclusion, study results drew attention to the limited availability of professional educational materials, as well as professional training resources. Results justify the need for interventions emanating from state and federal organizations to provide expanded and comprehensive resources and educational opportunities for rural health care providers through
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articipation in continuing education programs

	MDs	RNs	PAs	DCs	DVMs
	355	137	70	287	388
Reporting This as Frequent Barrier					
	50.6	38.4	50.0	51.1	44.8
	29.1	34.9	34.9	27.8	27.0
	10.0	17.7	23.0	12.8	10.0
parents	2.8	12.2	8.2	2.3	2.2
Reporting This as Frequent Barrier					
	56.5	75.0	66.2	62.9	56.5
	37.9	65.1	49.2	38.5	33.6
	33.9	44.5	39.7	61.2	46.1
	8.8	30.5	23.4	3.6	15.0

ublic health nurse; PA = physician assistant; DC = chi-

noxious gases, and zoonotic diseases, with itting competency.

ms confronting the rural health care provider is requiring special diagnostic and treatment ies are altering the types of disease and injury bystanders. Additionally, there may be gradual s exposed to agricultural occupational hazards. in a pivotal position to provide preventive l or community-based level.

ling in America live in rural communities as S. Bureau of Census, 1990). With respect to lation is, and has been for many decades, l. The remoteness and inaccessibility of small eal for many health care providers to pursue of federally and privately funded initiatives ruitment and retention of rural health care nuing education in the emerging field of ntive to achieve this goal.

oping comprehensive, professional education lth care providers because of the myriad of l, occupational, environmental, and behavioral lient exposed to agricultural hazards, and the sophisticated database and a readily available injury references for providers is noted. In ultural disease and injury training within each more than one discipline of rural health care ngly encouraged. Potential interdisciplinary ssessment, and treatment of agriculture-related se times of changing rural health care delivery tion agriculture.

w attention to the limited availability of well as professional training resources. Results nating from state and federal organizations to resources and educational opportunities for

rural health care providers throughout the country. It would be relatively easy to suggest a variety of continuing education programs or structured remedial courses containing updated information or materials pertinent to improving the knowledge base and skills of rural health care providers. However, consideration must be given to the intangible barriers and practical logistical problems that confront each group of providers in their quest to provide more current practice methods and information to their clients. The differences in priorities, practice modes and location, along with the variation in clientele as expressed via the survey data, make the task of providing generic programs and materials virtually impossible. Conference programs, seminars, computer software, as well as published journals, periodicals, and newsletters, all have important roles in providing continuing education to the providers but these means of extending educational information must be better organized, made more available, and updated on a regular, frequent basis.

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