ORIGINAL ARTICLE

Rural pharmacy in Canada: pharmacist training, workforce capacity and research partnerships

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ABSTRACT

Objectives. To characterize rural health care and pharmacy recruitment and retention issues explored in Canadian pharmacy strategic guidelines and Canadian Faculties of Pharmacy curricula; compare the availability of pharmacy workforce across Canadian jurisdictions; and identify models for potential collaborations between universities and rural pharmacies in the North.

Methods. Review of Canadian pharmacy strategic documents, Canadian Faculty of Pharmacy websites, Canadian pharmacy workforce data and relevant literature based on the search terms to identify university–rural community pharmacy initiatives.

Results. Three recent Canadian pharmacy strategic documents do not directly address issues related to rural and northern pharmacy practice, with recruitment and retention mentioned only in Canadian Pharmacists Association documents. Few Canadian Faculties of Pharmacy provide curricula on rural and northern health care issues or discuss rural recruitment and retention during training, with barriers to experiential rural practicums impeding placements. An innovative new partnership between the University of Waterloo School of Pharmacy and Gateway Rural Health Research Institute has the potential to enhance rural education, pharmacy services and community-based research. The number of pharmacists per 100,000 population in northern regions of British Columbia and the territories is low when compared with other Canadian provinces. In Australia, a model of university–rural pharmacy collaboration has been developed that may have the potential to inform future Canadian initiatives.

Conclusions. Development of a coordinated, multifaceted approach involving universities, pharmacy professional associations and community-based research organizations in rural and northern regions of the country has the potential to enhance pharmacist education, practice recruitment, practice retention and community-based health outcomes research.

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Keywords: rural pharmacy, pharmacy curriculum, northern pharmacy workforce capacity, rural pharmacist retention, community–academic collaboration
INTRODUCTION

Residents in rural, remote and northern communities in Canada have poorer health status, more limited access to health care services and greater disparities in access to physicians, nurses, pharmacists and other health care providers than those living in more urban settings (1). To address the health challenges of rural regions, the Romanow Report Building on Values: The Future of Health Care in Canada called for initiatives that could address the diverse health needs of specific communities through unique approaches to improving health and access to health care. The report highlighted that “pharmacists can play an increasingly important role as part of the primary health care team, working with patients to ensure they are using medications appropriately and provide information to both physicians and patients about the effectiveness and appropriateness of certain drugs for certain conditions.” The importance of conducting research was emphasized as a means of providing objective evidence to inform decision-makers in the development of policies, strategies and programs (1).

Concomitantly, the Canadian Institutes of Health Research in its report Strategic Initiative in Rural and Northern Health Research developed a focus on building healthy rural communities through support of research activities that would contribute to improvement in health status, health systems and health resource utilization in rural settings. Key guiding principles included utilizing multidisciplinary approaches to investigating rural health issues, encouraging the development of relevant research by utilizing participatory methods, increasing multi-university collaborations and building research capacity through student training opportunities. The recruitment and retention of multidisciplinary health professionals in rural settings was recognized as a pivotal component of sustaining rural communities (2).

Pharmacists are widely regarded as trusted, visible and accessible health care professionals (3). The World Health Organization (WHO) noted in the 2006 Handbook for Developing Pharmacy Practice that pharmacists can encourage the rational use of medicines by ensuring that “...patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements for an adequate period of time, and at the lowest cost to them and their community.” The WHO report also noted that, as easily accessible medication experts, pharmacists can conveniently participate in community-based activities such as health promotion, disease prevention and lifestyle modification in conjunction with other health professionals to serve community and public health goals (4).

To better meet the future needs of the health care system, the pharmacy profession in Canada has recently developed 3 key strategic documents to inform the evolution of pharmacy practice. The Canadian Pharmacists Association (CPhA) developed the Blueprint for Pharmacy, with a visionary emphasis on “patient-centred, outcomes-focused care to optimize the safe and effective use of medications.” Within the education and continuing professional development area, the focus is to “ensure that core pharmacy curricula address the knowledge, skills and values required for future pharmacy practice.” Moreover, pharmacists were encouraged to “lead and collaborate in research initiatives to evaluate the effect of pharmacy practice on patient health, population health, and health care services and the effect of changes in the utilization of pharmacy human resources” (5). The second document, Educational Outcomes for First Professional Degree Programs in Phar-
macy (Entry-to-Practice Pharmacy Programs) in Canada, from the Association of Faculties of Pharmacy of Canada (AFPC), establishes the educational outcomes for entry-to-practice pharmacy curricula necessary for the graduation of “Medication Therapy Experts” (6). The Canadian Society of Hospital Pharmacy (CSHP) created the third practice document, Canadian Hospital Pharmacy 2015, which outlines 6 goals of pharmacy practice in hospitals and related health care settings, including increasing the extent to which pharmacists help patients achieve the best use of medications, applying evidence-based methods to improve therapy and increasing “the extent to which pharmacy departments in hospitals and related healthcare settings engage in public health initiatives on behalf of their communities” (7).

Although decision-makers, funding agencies and professional organizations recognize the importance of providing patient-centred, outcomes-focused care for all Canadians, the ability of Faculties of Pharmacy in Canada to graduate pharmacy practitioners with an appreciation for rural and northern health care issues is unknown. Such background knowledge, skills and attitudes will be necessary if future graduates are to be successfully recruited and retained in the rural, remote and northern communities within Canada. This paper explores the rural health care content and pharmacist recruitment and retention issues described in the 3 professional guidelines and in pharmacy curricula; documents the variability of pharmacy workforce capacity across Canada with a focus on rural and remote jurisdictions; and explores the potential for a more systematic approach towards university-facilitated pharmacy education, practice and research to enhance optimal medication management for residents in rural and remote regions of the country.

MATERIALS AND METHODS

Three professional pharmacy guidelines (5,6,7) were searched for terms used in the Romanow Report (1) and the CIHR Strategic Research Initiative (2): Aboriginal; access to health care; determinants of health; ehealth; First Nations; health status; northern; recruitment and retention; remote; research; and rural. The website of each Faculty of Pharmacy in Canada was reviewed for: (a) type of entry-to-practice professional degree, availability of a post-baccalaureate PharmD degree and availability of an international pharmacy graduate training program; (b) undergraduate curricula and approved electives with a focus on rural and northern health issues or rural pharmacy practice; (c) an option for a rural experiential practicum; and (d) availability of online continuing professional education suitable for rural practitioners. Informal follow-up questions were distributed by email to colleagues in the 10 Canadian Faculties of Pharmacy to clarify points noted during the website review.

The Canadian Institute for Health Information (CIHI) document Pharmacists in Canada, 2009 provides a useful starting point for understanding pharmacy workforce issues in Canada (8). However, as CIHI data from Manitoba, Yukon, Quebec and Nunavut are not available for 2008, and Quebec and Nunavut for 2009, pharmacist demographics cannot be evaluated at the national level. In the 2005–2009 Strategic Plan for the University of British Columbia’s Faculty of Pharmaceutical Sciences, the shortage of graduates entering practice in rural settings was identified as an area of concern (9). To gain additional insight into pharmacist availability in rural, northern regions in British Columbia and adjacent territories, detailed demographic data were obtained through collaboration with phar-
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Pharmacy regulatory bodies for British Columbia (10), Yukon (11) and Northwest Territories (12). Information was not available for Nunavut. Similar to CIHI methodology, pharmacists who identified a jurisdiction as their place of residence and provided a location for pharmacy employment were included (8). As Canadian territories do not have universities that train health care professionals, pharmacists in the territories must initially train in another jurisdiction, and maintain licensure and mandated continuing professional education requirements in the province of licensure (11,12).

To locate successful university-pharmacy collaborations involving rural settings, MEDLINE and EMBASE databases were searched for relevant English-language publications using the search terms rural pharmacy practice, rural pharmacy workforce, rural health services, rural academic collaboration and university–community collaboration.

RESULTS

Content of professional guidelines
Search terms in the CPhA, AFPC and CSHP strategic guidelines related to rural and northern health care needs, pharmacist recruitment and pharmacist retention are summarized in Table I. The terms Aboriginal, determinants of health, First Nations, northern, remote and rural were not mentioned in the professional guidelines. Access to health care is noted as a component of the pharmacist’s role as a care provider (AFPC); support for pan-Canadian ehealth standards is described within information and communication technology (CPhA); and health status is noted in relation to managing medication therapy (AFPC, CSHP). The ongoing need to address pharmacist recruitment and retention issues is also mentioned (CPhA). Research is a core component of the Blueprint for Pharmacy and is mentioned 5 times within the document. In the AFPC educational outcomes, research is discussed within the scholar role of the pharmacist.

Academic professional training
Pharmacist licensure in the 10 Canadian Faculties of Pharmacy requires a bachelor’s degree, with the exception of the Université de Montréal, which graduated the first entry-to-practice PharmD class in 2011 (Table II). Université Laval will begin admitting students into an entry-to-practice PharmD program in the fall of 2011, with several other faculties awaiting notification of provincial funding support for similar credentialing. Post-baccalaureate PharmD-level clinical training programs are currently available at the University of British Columbia and the University of Toronto. These 2 universities also offer International Pharmacy Graduate training programs to help new immigrants to Canada bridge the transition from prior international pharmacist qualification to Canadian licensure.

The University of Waterloo School of Pharmacy program recently established a partnership with Gateway Rural Health Research Institute with a focus on rural collaborative programs in education, research and patient care (Table II) (13). At Waterloo, rural and remote issues are incorporated into the Introduction to the Profession course, and technology to reach patients in areas without human support is discussed in the Pharmacy Business Curriculum. At least 1 of 4 co-op experiential rural placements must be in an under-served region. Waterloo faculty members are involved with community-based rural health research initiatives aimed at developing pharmacy services within rural primary
| Search term                          | CPhA blueprint for pharmacy (5) | AFPC educational outcomes of entry to practice curricula (6) | CSHP 2015 goals and objectives (7) |
|-------------------------------------|---------------------------------|--------------------------------------------------------------|-----------------------------------|
| Aboriginal                          | No                              | Care Provider: 1.3 Assess if a patient's medication-related needs are being met. 1.3.1 evaluate the safety and effectiveness of a patient's medications with consideration of the patient's values and preferences, characteristics, conditions, functional capabilities, other medications and access to health care / monitoring; | No                               |
| Access to health care               | No                              |                                                              | No                               |
| Determinants of health              | No                              |                                                              | No                               |
| eHealth                             | Information and Communication Technology “ensure that pan-Canadian health standards are implemented by jurisdictions in a coordinated, phased approach and that pan-Canadian messages are sustained on a national level, to support integration and data access across health care domains” | No                              | No                               |
| First Nations                       | No                              |                                                              | No                               |
| Health status                       | No                              | Medication Therapy Management Services: 1. Performing or obtaining necessary assessments of the patient’s health status | No                               |
| Northern                            | No                              |                                                              | No                               |
| Recruitment and retention           | Pharmacy Human Resources: “address recruitment and retention issues associated with traditional and emerging practices” “apply the CIHI national database of pharmacists for population needs-based health human resources planning” “ensure that pan-Canadian health human resource planning is an ongoing process that includes pharmacists and recognizes the complexity of the profession” | No                              | No                               |
| Remote                              | No                              |                                                              | No                               |
| Research                            | Vision for Pharmacy: “conduct practice research and contribute to evidence-based health care policy and best practices in patient care” Pharmacy Human Resources: “lead and collaborate in research initiatives to evaluate the effect of pharmacy practice on patient health, population health, and health care services and the effect of changes in the utilization of pharmacy human resources” Education and Continuing Professional Development: “conduct and utilize research to develop, evaluate and improve education and continuing professional development programs” Information and Communication Technology (ICT): “research and utilize Canadian pharmacy business case(s) to inform and promote adequate funding for implementation and maintenance of ICT” Financial Viability and Sustainability: “conclude research to evaluate the impact of health care policies on pharmacy practice and to contribute to the development of future pharmacy-related policy. This research will examine policy impacts on financial viability and sustainability of pharmacies, patient outcomes and system outcomes” | No                              | No                               |
| Rural                               | No                              |                                                              | No                               |
care and utilizing an expanded scope of practice. Two other Faculty websites mention relevant, pharmacy-faculty-approved undergraduate electives (Table II). None of the faculties provides undergraduate training in community-based or participatory research methods. While all university programs provide rural experiential placements for students, barriers related to travel and accommodation may limit the number of students able to participate in these learning opportunities (Table II). A faculty member at the University of Manitoba shared that “we have a terrible time even getting the students to go on rural rotations even though we know they are going to have a great experience.” Another commented,

| Province: British Columbia | B.Sc.(Pharm.) | No | None | Yes | Extensive online courses | Extensive online courses | Post-BSc rural hospital pharmacy residency. International Pharmacy Graduate bridging program provides rural and northern course content. PharmD (Post-BSc) proposed for 2012. |
|----------------------------|---------------|----|------|----|--------------------------|--------------------------|--------------------------|
| University of British Columbia | http://www.pharmacy.ubc.ca/ | | | | | |

| Province: Alberta | B.Sc.(Pharm.) | No | None | Yes | Some online courses | Online courses | Entrepreneurship and human resources curricula. |
|------------------|---------------|----|------|----|---------------------|--------------|---------------------------------|
| University of Alberta | http://www.pharm.ualberta.ca/ | | | | | |

| Province: Saskatchewan | B.S.P. | No | Native Studies | Yes | Some online courses | Accommodation and attempts to address travel barriers to rural placements. |
|------------------------|-------|----|---------------|----|---------------------|--------------------------|
| University of Saskatchewan | http://www.usask.ca/pharmacy-nutrition/ | | | | | |

| Province: Manitoba | B.Sc.(Pharm.) | No | None | Yes | Some online courses | Faculty position with focus on rural collaborative partnerships in education, research and patient care. PharmD 1992 (Post-BSc). International Pharmacy Graduate bridging training program. Entry-to-practice PharmD graduates Spring 2011. |
|--------------------|---------------|----|------|----|---------------------|--------------------------|--------------------------|
| University of Manitoba | http://umanitoba.ca/pharmacy/ | | | | | |

| Province: Ontario | B.Sc.Phm. | Yes | None | Yes | Some online courses | Promotion of online resources, partnerships, and programs. |
|-------------------|----------|-----|------|----|---------------------|--------------------------|
| University of Waterloo | http://pharmacy.uwaterloo.ca/ | | | | | |

| Province: Ontario | B.Sc.Phm. | No | None | Yes | Some online courses | Promotion of online resources, partnerships, and programs. |
|-------------------|----------|----|------|----|---------------------|--------------------------|
| University of Toronto | http://pharmacy.utoronto.ca/ | | | | | |

| Province: Quebec | Pharm.D. | No | None | Yes | Some online courses | Promotion of online resources, partnerships, and programs. |
|------------------|---------|----|------|----|---------------------|--------------------------|
| Université de Montréal | http://www.pharm.umontreal.ca/ | | | | | |

| Province: Quebec | Pharm.D. | No | None | Yes | Some online courses | Promotion of online resources, partnerships, and programs. |
|------------------|---------|----|------|----|---------------------|--------------------------|
| Université Laval | http://www.pha.ulaval.ca/ | | | | | |

| Province: Nova Scotia | B.Sc. (Pharm.) | No | None | Yes | Some online courses | Promotion of online resources, partnerships, and programs. |
|-----------------------|----------------|----|------|----|---------------------|--------------------------|
| Dalhousie University | http://pharmacy.dal.ca/ | | | | | |

| Province: Newfoundland and Labrador | B.Sc.(Pharm.) | Some | None | Yes | Some online courses | Promotion of online resources, partnerships, and programs. |
|--------------------------------------|--------------|-----|------|----|---------------------|--------------------------|
| Memorial University | http://www.mun.ca/pharmacy/about/ | | | | | |

Table II. Characteristics of faculties of pharmacy in Canada related to training in rural issues.

- **Faculty Entry-to-Rural Practice health mentioned on experiential professional degree course pharmacy website placements education content**
- **Rural health course content**
- **Relevant electives mentioned on pharmacy website**
- **Rural experiential placements**
- **Continuing professional education**
- **Comments**

Province: British Columbia
University of British Columbia
http://www.pharmacy.ubc.ca/

Province: Alberta
University of Alberta
http://www.pharm.ualberta.ca/

Province: Saskatchewan
University of Saskatchewan
http://www.usask.ca/pharmacy-nutrition/

Province: Manitoba
University of Manitoba
http://umanitoba.ca/pharmacy/

Province: Ontario
University of Waterloo
http://pharmacy.uwaterloo.ca/

Province: Ontario
University of Toronto
http://pharmacy.utoronto.ca/

Province: Quebec
Université de Montréal
http://www.pharm.umontreal.ca/

Province: Quebec
Université Laval
http://www.pha.ulaval.ca/

Province: Nova Scotia
Dalhousie University
http://pharmacy.dal.ca/

Province: Newfoundland and Labrador
Memorial University
http://www.mun.ca/pharmacy/about/
“The major barrier is the logistics of arranging for rural and remote placement sites...some health authorities...have put efforts into addressing these barriers by providing accommodations, etc. These efforts are limited and have not really fully addressed the issue for pharmacy students.”

For graduates of the BSc(Pharm) program, the University of British Columbia offers 2 positions annually for a 1-year accredited rural-hospital pharmacy residency program located in the Northern Health Authority (14). In addition to learning enhanced problem-solving skills related to the provision of rural and northern pharmaceutical care, residents also design, conduct and present a rural-focused research project during their residency. The International Pharmacy Graduate Program at the University of British Columbia includes course content on pharmacy practice in rural settings.

To retain licensure as a practising health care provider, pharmacists are required to maintain their competence through ongoing professional development activities. Increasingly, electronic technologies, including online distance learning (15), telehealth networks (16,17) and podcasts (18), are being utilized by both rural and urban pharmacists and other health care professionals to maintain and enhance professional knowledge and skills (Table II).

**Human resource capacity**

The CIHI report *Pharmacists in Canada, 2009* documents a gradual increase in the number of pharmacists per 100,000 population in most jurisdictions for the years 2008–2009 (Table III) (8). During this time, British Columbia consistently had the second-lowest number of pharmacists per 100,000 population among the provinces, behind Ontario, with fewer pharmacists in northern regions of the province compared to urban settings. The British Columbia Northern Health Authority geographically represents more than half of the province, and the regions of BC Northwest and Northeast are contiguous with Yukon and the Northwest Territories to the north and with Alaska to the west (Fig. 1). The aggregate data provided by the British Columbia (3,753 pharmacists) and Northwest Territories (20 pharmacists) pharmacy regulatory bodies correspond to the 2008 Pharmacists Workforce data in the CIHI report. Due to apparent limitations in CIHI’s methodology, the detailed Yukon (22 pharmacists) data in these findings are from the pharmacy regulatory body rather than CIHI (which lists 39 pharmacists in Yukon).

The number of pharmacists per 100,000 population in these northern regions of western Canada are relatively low in the jurisdictions of the BC Northeast Health Authority (55) and Northwest Territories (46) when compared with Canada (87), British Columbia (85), BC Northern Interior Health Authority (78), BC Northwest Health Authority (68) and Yukon (66) (Table IV). The majority of pharmacists in these rural and northern regions practice in the community (range 71.2– 86.3%) (Table IV). The mean age of pharmacists in the Northern Health Authorities (overall mean 38.9 years) is younger than the British Columbia provincial average (42.5 years) and that for Yukon (43.7 years), and similar to that of the Northwest Territories (mean 38.4 years). The training location of licensure varies by Northern Health Authority region: international pharmacy graduates with current Canadian licensure represent 6.3%, 19.6% and 27.0% of pharmacists in BC Northern Interior, BC Northwest and BC Northeast regions, respectively.
University–pharmacy collaborative rural models

Extensive research has been conducted on factors related to recruitment and retention of rural pharmacists in Canada (19,20), the United States (21,22), New Zealand (23) and Australia (24), and the lack of consensus on ways of addressing these issues highlights the complexity of the problem. In Australia, recognition of the need to systematically provide infrastructure support for rural pharmacists has led to a nationally funded model known as the Rural and Remote Pharmacy Workforce Development Program that utilizes educational, professional, economic and research strategies and that has received international recognition (25). Within this national program, an academic network named the Pharmacist Academics at University Departments of Rural Health began in 2001, with a focus on integrated rural education, clinical practice roles and community-based research (26,27,28). While program objectives emphasize activities to
support rural practitioners, the network of pharmacy academics has also developed an orientation package for undergraduates and newly recruited pharmacists, established a national online preceptor training program (29), created continuing professional education materials with a rural focus (30), encouraged participation in community-based research studies (31) and recently developed a rural pharmacy practice-and-research network to provide a supportive infrastructure for rural interns (32).

**DISCUSSION**

Pharmacists in rural and northern regions of Canada are integral to the provision of accessible, high-quality, patient-centred health care services. Recent pharmacy strategic-action documents offer strong support for the pharmacist’s role in providing optimal medication management and conducting practice research to contribute to improvements in the delivery of health services and to the evaluation of outcomes.
of care. Of concern is that the strategic plans do not specifically address the substantial challenges of providing accessible health care in a timely manner to residents living in rural and remote geographic regions with limited pharmacy workforce capacity (Table I). To better understand pan-Canadian workforce capacity, it may be useful for the CIHI pharmacy human resources database to document the number of pharmacists at a regional (e.g., health authority) level as documented for northern British Columbia in Table IV (8). The CPhA document strongly supports the core role of research in the vision for the profession (5), which is reinforced by the AFPC educational outcome of “scholar” for entry-to-practice graduates.

Entry-to-practice certification in Canada is currently in a process of transition, with 2 of the 10 schools now entering students into PharmD programs. The lengthier and content-enriched PharmD programs may enable rural and remote health care issues and community-based research methods to be incorporated into pharmacy curricula. The innovative university-community-research partnership at the University of Waterloo has the potential to utilize participatory community-based research for investigating initiatives such as expanded scopes of practice within rural primary care (e.g., screening, disease management, use of telepharmacy clinics, etc.), and holds promise as a template for other rural jurisdictions. While all faculties provide rural experiential placements, support for travel and accommodation is not consistently available. With the amount of experiential learning changing from 16 weeks (baccalaureate degree) to 41 weeks in the new PharmD program, Université Laval faculty, for example, are working with a rural health agency to “facilitate (practically and financially) the lodging” of their students. With widespread access to high-speed internet in most rural northern communities (16), the availability of videoconferencing, webinars and ehealth libraries can facilitate clinical care, promote lifelong learning and nurture research (33,34). By basing continuing professional education programs on the best available research evidence, universities can contribute to closing the knowledge-to-practice gap in providing optimal care in remote and rural clinical practice settings (35).

Pharmacist shortages in rural settings impact access to health care. The numbers of pharmacists per 100,000 population in the Northwest Territories (46), BC Northeast (55), Yukon (66) and BC Northwest (68) are relatively low and are roughly comparable to those found in Australia in 1999 (32 in remote areas and 60 in small rural areas), at the time that nationally funded rural pharmacy programs began to be initiated (26). Community attributes that enhance pharmacists’ personal satisfaction and quality of life can contribute to both the selection of a pharmacy practice site and staying in the community long-term (19,20,36). Such professional and community-based characteristics to enhance the appeal of rural pharmacy practice have the potential to be addressed through innovative university and community interactions.

Presently, there is no cohesive approach in Canada to foster pharmacy practice and university research collaborations with rural, remote and northern regions. As noted in the Romanow Report, “unique rural health problems require urgent attention and unique rural conditions need to be taken into account in addressing those problems” (1). To enable sustainable rural and remote health care services, there are lessons to be learned from programs such as the Pharmacist Academics at University Departments of Rural Health in Australia: long-term commitment is necessary; funding must be appropriate; and
the evaluation of outcome measures should be reasonable (26,36).

Development of a coordinated, multifaceted approach involving universities, pharmacy professional associations and community-based research organizations in rural and northern regions of the country has the potential to enhance pharmacist education, practice recruitment, practice retention and community-based health outcomes research. Using lessons learned internationally (26), university-based programs with long-term funding, infrastructure support and a specific champion of program development and implementation have the potential to make a difference.

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Conflicts of interest
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