



## 12 Distributed Education and Distance Learning in Postgraduate Medical Education

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THE COLLEGE OF  
FAMILY PHYSICIANS  
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## Executive Summary:

In this commissioned paper we i) synthesize literature pertaining to postgraduate medical education within geographically distributed contexts in Canada, the United States (U.S.) and Australia; ii) discuss distributed postgraduate medical education (DPME) within specialties with a focus on regional campuses and urban DPME; iii) examine information and communication technologies (ICT) as an enabling infrastructure for DPME; iv) present a case study of and insights from a successful DPME system and; v) discuss the implications of our findings in the Canadian context.

We define distributed postgraduate medical education (hereafter, DPME) broadly, to refer to any instance where the education of medical residents occurs *outside* of the academic health science centre. Thus, while DPME encompasses teaching and learning occurring in sites which are geographically distant and/or remote from academic health science centres (AHSCs) including regional and/or rural hospital sites, it also includes PGME taking place in ambulatory care settings, outpatient clinics, community hospitals, and community-based clinics which are not necessarily distant or remote from an academic health science centre.

In preparing this paper, we reviewed literature, searched websites and conducted interviews with twelve key informants.

Based on our findings from the published literature and our key informant interviews we identify three significant implications:

1. Rather than stand-alone rural DPME activities, the medical education system across admissions, undergraduate, postgraduate and continuing professional development must conceptualize and develop pipeline programs intended to address workforce issues for which DPME has an enabling role, incorporating the new regional campuses as nodes for specialty postgraduate training to take advantage of the clustering of undergraduate and postgraduate trainees.
2. Concepts of “distributed” and “infrastructure” in DPME must be re-examined. Infrastructure has traditionally meant faculty, academic space, and funding, and indeed implicit infrastructure available in academic health sciences centres must be made explicit and extended to DPME sites. However, if DPME is to reach its full potential we need to consider, for example, full academic faculty clinician positions in DPME sites and the development and use of ICT to support residents - wherever they are - both in their learning, and in their social networks. To this end, we could benefit from examining successful and sustained DPME within other countries, such as the WWAMI program at the University of Washington.
3. We could benefit from a new conceptualization of urban DPME that incorporates large urban community-based hospitals and their surrounding communities and ambulatory care into an integrated network of urban academic teaching sites with specific intended learning outcomes (academic, clinical and social) which are derived from experiences in each setting.

## Introduction

This paper is one of 24 papers commissioned for the Future of Medical Education in Canada Postgraduate (FMEC PG) Project. In this paper we i) synthesize literature pertaining to postgraduate medical education within geographically distributed contexts in Canada, the U.S. and Australia; ii) discuss DPME within specialties with a focus on regional campuses and urban distributed postgraduate medical education (DPME); iii) examine information and communication technologies (ICTs) as an enabling infrastructure for DPME; iv) present a case study of a successful DPME system – the WWAMI program based out of the University of Washington and; v) discuss the implications of our findings in the Canadian context.

## Background

As Brown observes in his review of community-based education for the FMEC MD environmental scan, there is “no rigorous, universally accepted or used definition” for distributed medical education (DME), and terms such as “community-based,” “decentralized,” “rural” and “distance” are often used interchangeably (1). To ensure a comprehensive and thorough review of the literature, we define distributed postgraduate medical education (hereafter, DPME) broadly, to refer to any instance where the education of medical residents occurs *outside* of the traditional academic health science centre (AHSC). Thus, while DPME encompasses teaching and learning occurring in sites which are geographically distant and/or remote from AHSCs including regional and/or rural hospital sites, it also includes postgraduate medical education (PGME) taking place in ambulatory care settings, outpatient clinics, community hospitals, and community-based clinics which are not necessarily distant or remote from an AHSC. While the definition of AHSCs is currently in flux, at least partly as a result of successful DPME, The National Task Force on the Future of Canada’s AHSCs, defines the AHSC as “a set of formal partnerships created by health sciences universities, academic healthcare organizations and other provider organizations with the goal of improving patient and population health outcomes through mechanisms and structures that develop, implement and advance integrated health services delivery, professional education, and research and innovation” (2). For the purposes of understanding AHSCs within the context of DPME, we conceptualize the AHSC as the traditional, university integrated (as compared with university affiliated) teaching hospital that includes tertiary and quaternary care, accepts referrals from a provincial base, is staffed by medical school faculty, and includes research within its mandate. Given this conceptualization, we consider training occurring at large suburban hospitals as DPME from the point of view of both learners and clinician faculty.

Canada has led the way in North America in the development of regional campuses for undergraduate medical education. Currently seven medical schools have, or are developing, nine regional campuses. These campuses have often been constructed on sites of extensive DME, both undergraduate and postgraduate (e.g., Windsor, campus of Schulich School of Medicine based on Southwestern Ontario Rural Medicine Unit (SWORM) site), and are often placed in underserved regions (e.g, Northern Medical Program, the University of British Columbia (UBC) in Prince George, B.C.). Additionally, in 2003, Canada established its first new medical school in over 30 years. The Northern Ontario Medical School (NOSM) was developed around two regional sites of family medicine training linked to multiple other sites across northern Ontario, and operates as a distributed faculty. In this paper, we treat the two campuses of NOSM as two regional campuses, or regional sites of postgraduate training, while recognizing that the context differs from other regional sites in that there is no distant faculty of medicine. While all of these regional campuses have been established for undergraduate medical education, and little literature is yet forthcoming from this innovation, we may expect regional campuses in Canada to serve as loci for DPME. That said, we must also question the

concept of campus as it applies to DPME as denoting a centre or focus of activity. In a truly distributed model, there are no centres or campuses, only networks of interlinked distributed teaching contexts. We will return to this issue in our discussion.

While we have focused on Canadian experiences and literature, we have included American and Australian literature where useful, given similarities in context and postgraduate training. We present an American program as a case study because of its success in establishing, maintaining, and demonstrating leadership in DPME; we were unable to identify a Canadian program with a similar degree of success in terms of longevity, number of sites, and number of disciplines.

For the purposes of this review, we subdivide our discussion of DPME into 1) Rural and Regional PGME (both Family Practice and Royal College); 2) Ambulatory Care Settings; 3) Regional campuses; and 4) Urban DPME.

## **Methodology**

We ran separate searches in MEDLINE (1950-present), EMBASE (1980-present) and ERIC (1969-present) seeking articles that address PGME within geographically distributed contexts in Canada, the U.S. and Australia. The MEDLINE search yielded 587 hits from which 186 articles were culled for initial review. The EMBASE search yielded 341 hits from which six additional articles were selected for review and finally, the ERIC search yielded 245 hits of which 16 were selected for review. A total of 208 articles were thus identified for initial review. Articles were not selected for review if no abstract was provided and/or the article was unavailable either online or in print, or if the article's abstract failed to mention issues relating to postgraduate teaching and/or learning in distributed settings. To determine the extent of DPME in Canada, the Royal College of Physicians and Surgeons of Canada (RCPSC) and the College of Family Physicians Canada (CFPC) websites were reviewed and RCPSC specialty training requirements were searched for the words "community" and "rural". We also reviewed the Canadian Resident Matching Service (CaRMS) website to identify training programs that specified sites outside of the university teaching centres. Our discussion of the role of technology in DPME is based on previously published reviews and analyses and one of the author's (RE) personal experiences at the Northern Ontario School of Medicine and reviews and analyses she conducted in preparing commissioned paper 14 Information and Education Technology in PGME). We also undertook a focused search of the UBC library catalogue for books and a MEDLINE (PubMed) search with several combinations of "paediatric", "education", "rural", and "distributed, through which ten articles were identified. An additional seven articles were identified in a search for information on the WWAMI program of the University of Washington (UW). We then conducted interviews with 12 key informants representing a range of perspectives including residents, regional associate deans, vice deans and postgraduate program directors to address gaps we identified in the literature with respect to regional campuses and university-affiliated community hospitals (UACH) and to provide additional perspective on DPME in Canada. We received ethics approval for non-anonymized key informant interviews from UBC. In addition, the WWAMI case study was reviewed by Dr. M. Roy Schwarz, WWAMI's founding director and Dr. Doug Schaad, WWAMI's current Head of Medical Education.

## Impetus for DPME in Canada: why distributed postgraduate medical education?

In Canada, the trend towards DPME is driven by a number of influences including:

- The maldistribution of physicians geographically and across disciplines: DPME is being employed to increase the recruitment and retention of physicians to underserved rural, remote, and northern communities (3).
- The desire for greater social responsibility and accountability of the faculties of medicine and individual practitioners: DPME is seen as part of a strategy for better preparing students to respond to the priority health needs of their communities (4-5).
- Accreditation requirements: Both national accrediting bodies, the RCPSC and the CFPC, have recognized the importance of including community-based and rural training in postgraduate programs. The RCPSC General Standards of Accreditation refer to resources (B.4) that pertain to community-based and distributed education: *3.1.4. There should be an integration of teaching resources to include exposure to emergency, ambulatory, and community experiences.* Accreditation of family medicine training programs is based on four principles, one of which states that “Family Medicine is Community Based”. The family practice component of family medicine training programs, which accounts for at least eight months of the two-year program, will occur in community settings, albeit some of these may be affiliated with university hospitals and facilities. The CFPC reviewed the mandate for Rural Family Practice in 1999 and added a further requirement that “All family medical residents must spend a minimum of 8 weeks in a rural family practice as part of their core family medicine experience” (6).
- The shortage of physicians and the corresponding undergraduate and postgraduate expansion: The number of medical students entering MD programs in Canada (and, therefore, eventually postgraduate training) increased by 73% between 1995 and 2009, from 1576 to 2734 (7). PGME in Canada showed similar increases: At the University of Toronto (UofT), postgraduate resident first-year intake increased by 62% (141 positions) between 2000 and 2009. At UBC, first-year positions nearly doubled between 2003/04 and 2010/11, from 159 to 277. It is important to recognize that because of the impact of multiple training years, the increase in postgraduate year 1 (PGY1) positions results in an exponential increase in the total number of trainees in the system over time. At UBC, the total number of postgraduate trainees in the system increased from 556 in 2003/04 to 958 in 2010/11. Further increases are clearly on the horizon, given the continuing expansion of undergraduate medical education and pressure for international medical graduate (IMG) training. Expansion in the number of trainees in clinical settings has expanded the use of affiliated clinical sites.
- The reduction of inpatient acute care beds across Canada and the shift of care of acute conditions previously managed in hospital settings. Acute care beds decreased by 13.1% across Canada between 1995 and 2005 (8). This reduction, coupled with the expansion of trainees, has led to the “pedagogic saturation” of traditional large, tertiary teaching hospitals (5). Surgical interventions previously requiring hospitalization are now treated by day surgery, and patients previously requiring hospitalization because of the need for intravenous antibiotic treatment or for interventions such as dialysis are now being cared for in the community and at home.
- Unique learning opportunities: DPME provides trainees with exposure to a broader range of patients, closer relationships with preceptors, more hands-on experience, continuity of care experiences, and exposure to patients’ environments (9).
- Opportunities afforded by new ICTs: Improved technology allows teachers and learners to communicate and collaborate synchronously and asynchronously even when they are separated by great distances (10). Digital media also connect remote and distributed

learners and preceptors to learning and bibliographic resources and learning communities with the equivalent levels of access afforded their peers in urban centres.

Additional drivers have been identified in the American and Australian literature:

- Concerns around scope of practice: Range of learning experiences in teaching hospitals is reduced by focus on serious, less common patient presentations (11).
- Resident interest (12) (13).

### **DPME on the ground in Canadian postgraduate programs**

DPME “appears to be extensive” such that “virtually every resident, in either Royal College or College of Family Physician programs, [experiences] some distributed medical education, whether community-based ( i.e. ambulatory rotations) or regional” (14). These experiences can occur longitudinally throughout the course of the program or for defined periods of time within the program (rotations). In addition, all universities have developed programs in family medicine that are based in rural or regional sites, while a much smaller number of universities offer programs in general specialties in regional sites, often making use of reverse distribution to allow trainees to return to the academic centre for more specialized training rotations. In the majority of instances, trainees can choose these programs through CaRMS. According to a report by the Association of Faculties of Medicine of Canada (AFMC) on distributed clinical teaching facilities affiliated with faculties of medicine for undergraduate medical education, in 2010, there were over 950 affiliated sites for clinical training. The majority of these were relatively close to the parent university (less than 100 kilometres), suggesting extensive use of community-based ambulatory settings, as well as local UACHs (7). However, some are at a much greater distance, reflecting the focus on rural and northern training in Canada.

### **College of Family Physician programs**

All family medicine training programs offer ambulatory training by definition, so we focus here on rural and regional DPME. The development of extensive rural training can be traced through the literature beginning in 1999 with the publication of key recommendations to support rural family medicine training developed by a Working Group on Rural Family Medicine Education for the College of Family Physicians of Canada (15) (16) (17). As rural Programs have expanded and developed, the number of family medicine training sites has increased from 25 in 1998 to 86 in 2008 (18), and the number of rural family medicine positions has quadrupled from 36 in 1989 to 144 in 2003 (19). In fact, Krupa and Chan report that “Canada’s capacity to offer rural medical education to its family physicians in training” has expanded so dramatically since 1997 that “[t]he proportion of total family medicine residency positions that have a rural focus now equals the proportion of the Canadian population living in rural areas” (19). The growth in family medicine training sites between 1998 and 2008 is depicted in Figure 1. All 17 universities now offer family medicine training programs based outside the major cities or academic teaching centres (20), only some of which are self-designated as rural. For example, in the rural program at UBC - established in 1982 and the first of its kind in Canada - residents undertake core PGY1 training in a regional hospital and spend most of their PGY2 year in rural sites across the province (21). In contrast, at Memorial University, there is only one family medicine residency program and all trainees are expected to work in distributed rural sites (22). While none of the six family medicine programs at NOSM are self designated as rural, all state that “rural opportunities are extensive and diverse”, and only two are based around communities with populations greater than 70,000 (23).

Figure 1: Change in Family Medicine Learning Sites 1998-2008<sup>a</sup>



<sup>a</sup> Source: Bowmer IM, S. Banner and L. Buske. Physician Self Sufficiency. International Medical Workforce Collaboration Conference; 2008. Reproduced with Permission from Sandra Banner, CaRMS



## Royal College of Physicians and Surgeons of Canada

In a 2002 position paper on Community Learning Experiences in Residency Education, the RCPSC defined community learning as a learning opportunity occurring outside the conventional teaching service in a teaching hospital; recognized that in the classical teaching hospital, postgraduate trainees were focused on a filtered patient population not representative of the likely practice patterns of new graduates; and that changes in the practice of medicine warranted increased attention on ambulatory and outpatient care (24). It was also noted that “community” did not necessarily equate with “ambulatory” but would include rural or remote sites with qualified supervision.

As of 2003/04, all of Canada’s medical schools offered some specialty residency programs that included some rural training opportunities; the duration and requirements of these programs, however, vary across specialties. The number of programs with rural training also varies widely across specialty; 12 of 17 schools offer rural surgery training, 11 schools offer rural training for internal medicine residents, but only seven schools offer rural training for anaesthesiology residents, and only six provide rural training in psychiatry (17). Each of the almost 70 specialty programs accredited by the RCPSC has specialty specific training requirements (SSTRs) that guide curricular content. According to the current SSTRs, only 16 of the 66 specialty programs mention community-based training, while only four actually require community-based rotations (Emergency Medicine, Adolescent Medicine, Orthopaedic Surgery and Paediatrics) (Table 1).

**Table 1: Community Training Requirements for RCPSC Specialties<sup>b</sup>**

Specialty	Required	Suggested	Selective
Emergency medicine	1 month		
Adolescent medicine	Yes		
Colo-rectal Surgery			
Clinical Pharmacology			Yes
General Pathology		Yes	
General surgery			Yes
Hematology		Yes	
Internal Medicine		Yes	Yes
Medical Oncology			Yes
OB/GYN			Yes
Orthopedic Surgery	2 blocks		
Pediatrics	1-6 blocks**		
Physical Medicine			Yes
Psychiatry		Yes	
Urology		Yes	

\* Training must include care of the patient in the ambulatory setting, with special attention to the application of specialty care in the community.

\*\* or equivalent longitudinal experience.

<sup>b</sup> Source: Canadian Resident Matching Service, <https://w1c.e-carms.ca/pdws/jsp/pd.do?s=968p=4&m=1> accessed 27 August, 2010

Six universities have developed regionally based CaRMS matched programs in eight different RCPSC specialties (see Table 2), in which trainees are expected to complete all or most of their training in regional settings. Most of these, however, were only recently established. For instance, Psychiatry at Prince George and Internal Medicine at Saint John have existed for approximately three years, while Internal Medicine at Waterloo has only just been developed. NOSM is currently transitioning a number of programs previously run by the University of Ottawa and McMaster University to its own books as well as setting up new programs.

**Table 2: Regionally Based CaRMS Matched Positions for RCPSC Programs<sup>c</sup>**

Program	Universities	Location(s)
Anaesthesia	Ottawa	NOSM stream
Community Medicine	U of T	Barrie
	NOSM *	Northern Ontario
General Surgery	NOSM *	Northern Ontario
Internal Medicine	Dalhousie	Saint John
	Ottawa	Montfort
	NOSM *	Northern Ontario
	McMaster	Waterloo
Obstetrics & Gynaecology	Ottawa	NOSM stream
Orthopaedic Surgery	NOSM *	Northern Ontario
Paediatrics	NOSM *	Northern Ontario
Psychiatry	UBC	Fraser Region, Vancouver Island, Prince George
	Saskatchewan	Regina
	Ottawa	Montfort, NOSM stream

\* The Northern Ontario School of Medicine embodies distributed education in its mission, so while these programs are not strictly speaking 'distributed' from the medical school, they are included here.

Examples of Canadian DPME which have been described in the peer reviewed literature include the family medicine residency program at Dalhousie University (25), the Northern Family Medicine Program (NorFaM) at Memorial University (26), the Alberta Rural Physician Action Plan at the University of Alberta (27), the Southwestern Ontario Rural Medicine Education, Research, and Development network (SWORM) (28) and NOSM (29).

<sup>c</sup> Source: Canadian Resident Matching Service, <https://w1c.e-carms.ca/pdws/jsp/pd.do?s=968p=4&m=1> accessed 27 August, 2010

## Requirements for the establishment of rural and remote training sites

As resident training has moved into rural and remote settings across Canada, the U.S. and Australia, various requirements for establishing and sustaining a rural training site for PGME have been discussed in the literature. These include: the need for leadership, advocacy and support from physicians and hospital administrators; adequate and sustained funding; suitable infrastructure; sufficient volume and appropriate mix of patients; adequate staffing and appropriate faculty in terms of the number of physicians and their specialty areas; and interested and willing residents (13) (26) (30) (31) (32) (33) (34) (35) (36) (11) (37) (38).

### International models for rural and remote training

Canada is not the only country experimenting with DPME and in fact there is a “current worldwide trend towards distributed models of medical education” (5). A number of DPME programs have developed in the U.S. and Australia to address the maldistribution and shortage of physicians in rural and remote areas (39) (40) (41) (12) (42) (11) (43) (44) (45). In this section, we describe the more general frameworks and models for organizing and/or conceptualizing DPME which are discussed in this international literature.

Rural training tracks (RTTs) emerged in family practice residency programs in the U.S. in the late 1980s based on evidence that residents are more likely to practice in the region where they are trained (46); between 30 and 40 residency programs in the U.S. now have RTTs (KI10). RTTs are typically ‘one-two programs’ with residents spending their first year of training at urban tertiary care centres and transferring for their final two years to train in rural community practices (46) (30).

The hub and spoke model developed at the Midwest Center for Rural Health in Indiana is an alternative to the one-two program used by RTTs in which the core residency program represents the hub, and the rural training sites are the spokes (47). Residents select the rural stream after their first year of training, at which point they begin following a curriculum based on: i) rural rotations at sites which are remote, within driving distance of the hub, international, at Indian Health Service and/or migrant health sites; ii) access to technology and iii) a model rural family practice training site, located 30 miles from the hub, where PGY3 residents work one day per week (47).

Norris emphasizes the importance of rural training in PGME and its connections with medical school admissions and undergraduate medical education (UGME) by likening rural medical education to an agricultural irrigation system (48). He suggests that while attracting rurally-oriented students to medical school and rurally-oriented undergraduate programs is akin to drilling and pumping for water, rurally-oriented graduate programs represent the **pipelines** which ultimately channel students into rural practice or sprinkle water onto the fields. WWAMI, our case study, is one of the “earliest and most widely recognised pipeline programs” (49).

### Resident training in ambulatory care settings

Resident training in ambulatory settings is a particular feature of some specialties, such as family medicine and paediatrics. However, given the shift of treatment to the community as well as the increased prevalence of chronic disease management, most specialties now have some expectation of ambulatory-based education.

## Current experience in Canadian programs

Family medicine is an ambulatory-based discipline, and, as such, requires a minimum of eight months over two years of family medicine ambulatory training; this has been an accreditation requirement since 1999 (6). Prior to national institution of a two-year training requirement for licensure in 1994, much of general practice training was based on a one-year rotating internship. Family medicine residencies at that time were primarily academic family practice teaching units (FPTUs) attached to the AHSC. Since the changes to licensure in 1994, extensive capacity building for community-based family medicine training has occurred across Canada. New models for training sites include community-based clinics as well as private offices of family physicians in the community. Family medicine has thus developed faculty development, policies and processes for ambulatory and community-based training which are now inherent in the discipline. Some RCPSC disciplines also require training in ambulatory care settings. This usually means that the faculty and staff of the AHSC supervise residents in ambulatory settings. The setting may be an ambulatory or follow-up care clinic associated with the teaching hospital, or may be in private offices of the full-time or part-time faculty in the community.

## Challenges for resident training in ambulatory care settings

### General Challenges:

Several of the challenges to resident training in ambulatory care settings identified in the U.S. and Australian literature are similar to those addressed in the rural and regional context including the need for: leadership and physician commitment (50); the financing required for resident training (51) (52); and the appropriate faculty-to-learner ratio in private practice settings (53) (50). This literature, however, also addresses the extent to which patient perceptions can serve as a barrier to training residents in private offices (54) (55) (56) (57) and contends with the unique challenges presented by teaching and learning in ambulatory settings.

### Teaching and Learning Challenges:

Though teaching in ambulatory settings offers unique educational opportunities, it presents challenges for learners including competition between trainees for cases; inconsistencies in terms of educational quality and content; variability in cases, conditions and treatment; and differences in terms of physician roles and responsibilities (58). Irby conducted an extensive review of the literature published between 1980 and 1994, concluding that teaching and learning in ambulatory care settings are characterized by “variability, unpredictability, immediacy and lack of continuity (59).” Others address particular challenges or aspects of teaching and learning in ambulatory care settings including issues around the role of learners (60) (58); role modelling (60) (61); curricular needs (62) (61); balancing time for teaching with the demands of patient care (63); preceptors’ characteristics, behaviours and teaching strategies (64) (65) (63) (66) (53) (67) (68); and preceptors’ use of time (69) (70) and their motivations for teaching (71).

## Strategies and Methods for Teaching and Learning in Ambulatory Care Settings

There appears to be consensus in the literature that in order for the move of PGME into ambulatory settings to be effective, educational strategies and practices to suit ambulatory settings need to be developed. Informed by various pedagogical theories and reviews of the literature, researchers have proposed various strategies and recommendations for teaching and learning in ambulatory care settings which seek to address the challenges identified in the previous section (60) (72) (73) (74) (75).

## **The effects of DPME in Canada**

Although the literature on the impacts and effects of DPME in Canada is limited, formal evaluations indicate that, while family medicine residents in community-based centres are more likely to see different members of the same family, believe they know the community they are serving and report making more house calls than their traditionally trained urban counterparts (76), based on summative exam scores, remote training appears to be educationally equivalent to traditional urban training for family medicine trainees (77). Key informant 9 (KI9), a family practice resident training in Sault Ste. Marie, confirmed this finding. Efforts to evaluate the effect of rural exposure during family practice residency on recruitment indicate that, while such exposure did not significantly affect the practice location of family medicine residents graduating from Queen's (78), type of practice, spousal preference and postgraduate rural experience were significant influences for rurally-trained family practice residents from UBC, 51.2% of whom located in rural areas (79). An emergent and growing literature documenting the positive impacts of distributed UGME on northern communities (80) (81) and recent work which demonstrates the value of a residency training site to the surrounding host community (82) indicate that DPME has an important role to play in the social and economic development of underserved communities.

## **Potential Benefits of DPME**

Our key informants identified a number of DPME's potential benefits for residents. Training in distributed sites exposes residents to new role models and has the potential to alter trainees' career aspirations (KI1, KI11) and shape future practice patterns (KI1, KI9). Without the many "layers" of trainees characteristic of tertiary sites, residents at distributed sites benefit from one-on-one relationships with preceptors (KI5, KI9), are given greater responsibility and autonomy (KI3, KI5, KI11) and are afforded experiences which more closely approximate practice (KI1, KI3, KI9). Other KIs suggest that DPME allows trainees to experience continuity of care (KI9) and offers a broad and integrated specialty experience rather than the narrow and deep experience of subspecialty medicine training offered at the AHSC (KI2). Residents also gain insight into the management of a patient population across the health system (KI2, KI9), learn the "practical" skills associated with setting up and managing a community-based practice (KI9, KI11) and learn how to foster interprofessional relationships (KI11).

## **Challenges presented by DPME**

DPME experiences can be "lonely," "isolating" (KI9) and "disruptive" (KI3) and can pose pedagogical challenges for residents who are accustomed to training in the "layered" teaching environment of urban tertiary hospitals (KI1, KI9). Travelling long distances for face-to-face time with the home program can also wear on residents, and they are reimbursed for their travel expenses and accommodation (KI9), which can be costly for residency programs (KI3, KI4). The physicians at distributed sites influence the character of residents' experiences, and it is, therefore, important to recruit and retain physicians who are supportive of visiting residents and who are interested in their education (KI7, KI8, KI9, KI11). Similarly, community preceptors need to be included in university faculties and receive support from academic institutions in the form of faculty development, faculty appointments and remuneration (KI4, KI5, KI6, KI7, KI8). In shifting education into communities, postgraduate deans are challenged by entrenched beliefs and assumptions about where medical education should occur and by RCPSC accreditation requirements which have led to a privileging of teaching and learning in urban tertiary care centres (KI2, KI3, KI5). It is thus a challenge to ensure that regional, rural and community-based residents do not think of themselves as "lower class residents because they are not at the major centres" (KI3).

## **Regional campuses**

The regional campus is a new phenomenon in Canadian medical education. Since 2004, seven faculties of medicine have opened nine regional campuses, some of which are close to their home campuses while others are located at a distance in underserved settings. For example, while McMaster University's regional campus in St Catharines is located 47 kilometres from the Hamilton main campus, Université de Sherbrooke's Moncton campus is located in a different province, 554 km away from the main campus. Students enrolled at regional campuses complete all, or nearly all, of their undergraduate medical programs at the regional campus, which has a degree of delegated autonomy for curriculum and student management. Between 2005 and 2009, regional campus student enrolments increased from 152 enrolled medical students to 734, and further increases are anticipated (7).

Although presently focused on UGME, regional campuses have, for the most part, been established at sites made fertile by distributed family medicine training programs. Graduates of regional campuses, however, are not all focused on family medicine training and other postgraduate training opportunities, especially in the general specialties, will need to be developed to capitalize on the potential pipeline afforded by students graduating from regional campuses. The first students from undergraduate regional campuses graduated in 2008 and entered postgraduate training, but increasing numbers of students will be graduating in the coming years. Given the recent emergence of regional campuses, however, there is no literature available that documents postgraduate training in these settings. We have thus relied on our key informant interviewees to provide perspective on this matter (KI2, KI3, KI4, KI5, KI8).

## **Planning, management and coordination**

There has been coordinated and detailed planning for the distribution of UGME to regional campuses involving government, local physicians, local universities, faculty of medicine associate deans, basic science and clinical department heads, and students and residents. This planning required considerable funding, commitment, and organization. DPME at regional campuses, however, has not been similarly planned or coordinated. The lack of coordination can present difficulties at sites and between disciplines. For instance, a psychiatry regional training program in Prince George was developed without much consultation with the family medicine training program such that "bringing another rotating PGY-1 into the system just about destabilized" the site (KI2).

In UGME at regional campuses, regional associate deans have been delegated a degree of autonomy which allows for the development of clinical training that capitalizes on local opportunities, suits the local clinical care context and healthcare system, and allows problems to be addressed locally while still meeting accreditation standards. In contrast, PGME remains centrally managed, with little regional autonomy (KI2). For example, at UBC, the family medicine resident selection is centralized, which can result in tension between the selection for urban sites (where there is competition for positions) and recruitment for northern and rural sites (where there is competition for residents) (KI2).

In PGME, the regional dean and regional staff are required to interact with multiple postgraduate training programs, and dealing with each program's unique "way of doing things" managerially and culturally can present "challenges" (KI3). The PGME office at the regional campuses can turn into a "property management office", with accommodation being sought for multiple different residents at short notice and with little overall coordination (KI3).

## Family medicine

Regional family medicine programs have often provided the foundation for the subsequent development of Canada's regional campuses. However, as undergraduate medical students entered clinical clerkships and as RCPSC trainees began arriving at regional sites, family medicine trainees began competing for case mix, especially in procedures, obstetrics, and at smaller sites. This has meant that family medicine has had to extend beyond the regional training site to find new settings that allow for a broad scope of practice and the development of skills. Given that 40% of overall postgraduate expansion occurs in family medicine programs (83), this has created intense pressure on and the destabilization of family medicine postgraduate training as new trainees compete for the case mix previously available to family

## RCPSC training

Several interviewees identified multiple issues relating to the development of RCPSC specialty training at regional campuses. One interviewee, who had chaired a RCPSC specialty program committee, identified a systems issue: while all training program committees were expected to include at least one member from the community, few in fact did, leading to the development of programs that focused on training objectives only achievable in AHSCs. This is perceived as unhelpful to the development of regional training and generalist training. K11 and K111 suggested that exposure to interesting careers in generalist specialties is only available at regional or community-affiliated training sites because of the focus at AHSCs on subspecialty medicine.

Except in Québec where Le Collège des Médecins du Québec (CMQ) has mandated rotations in regional hospitals for residents in internal medicine, general surgery, gynaecology, paediatrics, anaesthesiology, and psychiatry, regional specialty programs appear to have started serendipitously creating a proof of concept, which has led to innovative models of pedagogy. With students graduating from regional campuses, there is an opportunity to keep residents at their home regional campus at least for PGY1. However, regional specialty trainees require significant time and attention in their early years of training in their specialties, and it is frustrating for the regional campus to lose the more senior residents to the central campus just as they are able to contribute to clinical care.

A hidden curriculum appears to be creating a barrier to DPME. One month rotations in five-year specialty training programs are perceived by the local regional site as "tokenistic" and capable of causing more harm than good (K12). Residents sent to regional sites may bring inappropriate attitudes which serve to demean family medicine and specialists outside of the AHSCs. Rotations shorter than three months have been found to be problematic (K13), and consideration should be given to a site-specific CaRMS match where the resident commits to train between a specific regional campus and the central site. There must be preparation for the change in culture, support, and scope of practice that the resident will experience. At the same time, it is not seen as effective to force residents to go to regional campuses based on moral grounds, although K11 suggested that distributed rotations should be mandated for all residents.

## Urban DPME training

Medical schools provide much of their undergraduate and residency medical education in fully-affiliated AHSCs. However, in large urban areas in Canada, medical schools also deliver clinical education through a network of UACHs. The use of these hospitals to deliver clinical education has expanded with an increase in the number of learners. For example, in 2009, U of T identified 29 community-affiliated hospitals and teaching sites. Longstanding community-

affiliated hospitals (n=7) delivered 17,000 to 20,000 learner days. New family medicine teaching units were being developed at five community-affiliated hospitals to accommodate expansion in family medicine. Similarly, UBC identifies seven UACHs within the greater Vancouver region. These sites deliver undergraduate clinical teaching as well as postgraduate family medicine and some specialty teaching.

Trainees in university-based teaching hospitals see a filtered sub-population of patients, often with complex clinical problems requiring sub-specialized care. Clinical learning experiences in UACHs are quite different, and provide an opportunity for residents to both see general caseloads, and expand the continuum of care into the local community. However, specialty programs appear to have undertaken little examination of the potential for explicit educational objectives which can only be met in UACHs, offering these rotations as electives.

Several methods can be used to explore the educational objectives that can be met in UACHs. Administrative hospital databases can help identify differences in case mix and help program directors identify potential DPME sites to match specific learning objectives to patient care opportunities. This technique has been employed successfully during the distribution of clinical clerkships in UBC's faculty of medicine undergraduate program (84) and continues to be used to identify training capacity at new sites.

While the growth of clinical education at UACHs has been rapid, coordination across disciplines is lagging. UACHs receive residents who have been sent out by the central program, often at short notice and with little regard for capacity. When resident numbers contract, residents are withdrawn to the AHSC to provide needed coverage. As a consequence, UACHs do not feel like valued partners in the education of the next generation of physicians.

### **Technology as enabler, barrier and medium in DPME**

While DPME has existed in Canada for decades, the practicalities of working with remote learners and preceptors has served as a barrier to making this a major part of PGME. However, with the development and widespread adoption of ICTs, DPME has become possible on a much larger scale. Although DPME is clearly not about technology, it has been made possible by technology, and, as such, it has changed the values we place on different models of educational organization.

The enabling and constitutive role of technology in DPME to a large extent defines it: it makes possible communication, collaboration and information flow between distant sites and participants. Its capacity to compress often tremendous spatial distances across provinces, however, lays bare infrastructural and access inequities that may have a deleterious effect on both the local learning environment, and, by extension, the health of the overall program. While the distance in DPME might usually be considered in terms of the distances between Vancouver and Fort St. John or between Thunder Bay and Kenora, similar levels of isolation can occur across large cities or between suburban centres with similar technological enablers.

While the question of technology is being considered in a parallel environmental scan (commissioned paper 14 Information and Education Technology in PGME) there are number of key issues to raise in the context of Canadian DPME:

- network infrastructure: connecting learners and sites depends on good network connectivity, and, while this is less of a major problem in urban and suburban areas, it can be a major challenge in rural districts. Some provinces have established an integrated health network, such as Ontario Telehealth Network (OTN), that can be used

- to connect multiple clinical sites across the province. However, if DPME programs have to establish their own infrastructure, it can involve significant capital and operating costs.
- **teaching site infrastructure:** videoconferencing is currently the most common technology employed to connect DPME sites and while it enables group-to-group participation, it is limited as a medium for any more than room-to-room conversations and onscreen presentations. More importantly it depends on bulky television and camera equipment to run. Webconferencing (Elluminate, Connect, Skype), on the other hand, can be run from standard computers but supports individuals connecting rather than group-to-group meetings. Infrastructure may also include virtual worlds such as Second Life, although this has not met with the widespread adoption afforded video- and web-conferencing.
  - **personal technologies:** despite the provision of some onsite facilities, learners are increasingly independent technology users with multiple variations on laptops and mobile devices enabling and extending their abilities to work in any location and stay in touch with peers and tutors wherever they may be. While this is eroding the need for teaching site infrastructure, the provision of good wifi network access is ever more important.

The move to increasingly independent digital learners has implications for the tools the institution needs to provide and for the ability to oversee their learners' activities. More importantly, it emphasizes the need to guide and model good behaviours around "the digital" as well as provide appropriate professional frameworks. At present, there are no common standards or requirements for or around the use of "the digital" in PGME. This is exacerbated by a broader neglect of "the digital" in Canadian healthcare and across Canada as a whole (85).

This lack of engagement is reflected in PGME in both the relatively low levels and consistency of resident skills and the highly variable levels of engagement in technology both as a medium for training and for practice.

There are a number of themes of ICT use within contemporary DPME along with suggestions to optimize its effectiveness:

- ***Logistics and Coordination:*** The coordination of learners and preceptors at a distance can be particularly challenging. There is a patchwork of systems that book and track placements, arrange accommodation and conduct evaluations and audits. For example, the PaNDA system at NOSM manages and tracks all undergraduate and postgraduate placements. However, there is a marked reluctance to share infrastructure as placements are guarded as a precious institutional resource, which results in uneven central management and coordinated knowledge of what is happening in distributed settings.
- ***Reach:*** ICT enables communication and collaboration over significant distance and time through tools such as discussion boards and telephone, video and web conferencing. Infrastructure issues are particularly important for videoconferencing as it needs dedicated equipment and connections. For example, although Ontario allows residents and preceptors to use the private OTN, sessions need to be prescheduled and run in rooms set up for the purpose. On the other hand, web conferencing can be used on a more ad hoc basis, although variability in network capacity can limit its utility.
- ***Tracking:*** User actions in a network environment are typically tracked and recorded. Logging patient encounters is a key part of DPME with One45 and T-Res products the most popular in the field. Although this supports unparalleled forms of potential for the analysis of learner behaviours, there are challenges about what is done with such data. We suggest that encounter tracking be more integrated to the electronic medical record

- (EMR) and clerking process, which with preceptor feedback can transform reporting activity into a learning opportunity.
- *E-Learning*: The current use of online and instructional technologies is low as the majority of teaching is bedside and preceptor and apprenticeship-based. Knowledge acquisition and reference is somewhat ad hoc. DPME learners more typically use conferencing tools to connect to teaching sessions at the AHSC or use simulation technologies. We suggest online simulation and integrated simulation can afford significant opportunities to DPME learners, particularly around integrating knowledge management and practice.
  - *Evidence-based Medicine (EBM)*: Technology is essential for EBM, as DPME learners may be able to access library resources only remotely with potentially limited support. Library services need to be able to support DPME learners and faculty at the same level as those training and practicing in AHSCs.
  - *Integration with e-health*: The lack of engagement between PGME and the development of e-health at a provincial and national level create another significant problem. At present, we are sending the message that e-health is superficial and of limited relevance to the practice of medicine. As a result, tomorrow's doctors are less and less likely to be active participants in shaping the healthcare system in which they will work. This is a particular issue for DPME, where access to e-health systems is more varied, and there is likely to be no local informatics lead.

Independent of the particular forms that are being used (or those that form a null curriculum by being excluded), technology constructs and directs what we do as much as it follows and enables our wishes (86). Thus, it is important to recognize that implementing one technology or retiring another alters the medical learning environment as assuredly as reconfiguring learning objectives or methods of assessment.

Overall, DPME needs to move towards better integration of digital technologies within the academic mission rather than considering them as external and other. DPME is technology enabled. However, without paying attention to the existing use of digital media and technology and the opportunities to address the many inconsistencies in areas such as digital professionalism (87), the stability and quality of DPME as a whole is at significant risk.

### Summary of case study

We undertook a critical history of the University of Washington's distributed medical education WWAMI program, focusing specifically upon paediatrics, to explore factors that lead to the creation, sustainment, and disbandment of distributed sites. Despite its non-Canadian context, this program's experience was thought valuable to our project given its longevity, available data and commentary, and geographic parallels to current population distributions in most provinces.

Through our exploration of the development and success of distributed postgraduate compulsory paediatrics rotations in the context of the University of Washington's WWAMI program (see Appendix 4) we have identified the following insights and themes that are critical to and result from a successful program:

- ***Moving beyond either/or***: DPME must be conceptualized as an enriching complement to traditional AHSC-based postgraduate education, not a threat.
- ***Intra-professional egalitarian culture***: The development of a culture between the traditional centre and distributed sites that understands all as equal partners with unique and valuable contributions is crucial to a sustainable and successful enterprise.

- ***Equal partnerships between medicine and society:*** The recognition of the multiple stakeholders in the development of a successful distributed site and the simultaneous establishment of an egalitarian culture that incorporates all perspectives (medicine, university, local-provincial-national-international politics, community leaders, community members, community organizations) is required.
- ***Visionaries and champions:*** It is of critical importance to have leaders willing to imagine and to invest themselves and their institutional resources and social capital into innovative and novel approaches that address social asymmetries, of which the profession of medicine is well-positioned to ameliorate
- ***Local autonomy and systemic membership:*** It is important to recognize that both training programs and individual sites thrive with the freedom to implement program and site-specific solutions, while at the same time benefitting from regular access to innovations and perspectives from across the entire network. The delocalization of the identity of the overarching program is not a threat to its integrity, but rather a creative flexibility that allows it to respond to evolving political, social, financial, and cultural climates.

## Implications

We have presented the peer reviewed literature, the grey literature, a case study, and material and insights gleaned from key informant interviews, all related to DPME and postgraduate medical education. We identify four significant implications for this paper.

First, rather than discrete and stand-alone rural DPME activities, the medical education system across admissions, undergraduate, and postgraduate (and continuing professional development) must conceptualize and develop pipeline programs intended to address workforce issues for which DPME has an enabling role. Regional and rural postgraduate programs offered have difficulty filling without a pipeline approach which at the time of graduation delivers into residency a cohort of students who wish to train in regional and rural settings. Family medicine experienced and has worked to address this issue by offering or mandating rural experiences in family medicine at the undergraduate level. However, regional specialty programs still struggle to fill the available places, and we are anticipating an expansion of regional specialty programs without which the undergraduate expansion cannot be accommodated. To what extent do faculties, specialties and the accreditation bodies endorse DPME sites as full program sites?

Second, concepts of “distributed” and “infrastructure” in DPME must be re-examined. Infrastructure has traditionally meant faculty, academic space, and funding, and, indeed, implicit infrastructure available in AHSCs must be made explicit and extended to DPME sites. However, if DPME is to reach its full potential, we must think differently about infrastructure and consider, for example, full academic faculty clinician positions in DPME sites and the development and use of ICT to support residents - wherever they are - both in their learning, and in their social networks. Moreover, we need to consider the growing role of digital media and technologies in constructing and enabling DPME. Multiple factors lead to sustainability of a DPME site, including leadership and stability of healthcare system in regional sites. The huge increase in part-time faculty since 2003 has occurred primarily in those disciplines that are commonly taught in ambulatory settings, requiring major faculty development initiatives focused on ambulatory teaching.

Third, we could benefit from a new conceptualization of urban DPME that incorporates large urban community-based hospitals and their surrounding communities with its ambulatory care into an integrated network of urban academic teaching sites with specific intended learning outcomes (academic, clinical and social), which are derived from experiences in each setting

(K15). This is particularly relevant for the education and production of general specialists, where scope of practice and role models differ significantly between the two settings. The inclusion of the ambulatory care setting in the surrounding community allows the resident to move between the community, community-based hospital, and AHSC to follow patients in their journey.

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## **List of Key Informants**

KI 1: Dr. Stephane Voyer: General Internal Medicine Resident, UBC

KI 2: Dr. David Snadden: Regional Associate Dean Northern BC, UBC

KI 3: Dr. Oscar Casiro: Regional Associate Dean Vancouver Island, UBC

KI 4: Dr. Sarita Verma: Vice Dean Education, (formerly Associate Dean PGME) Faculty of Medicine, University of Toronto

KI 5: Dr. Carol Herbert: Former Dean Schulich School of Medicine and Dentistry, University of Western Ontario

KI 6: Dr. Jon Fleming: Associate Head of Education and Director Postgrad Education, Psychiatry, UBC

KI 7: Dr. Jill Kernahan: former Program Director Family Medicine Postgraduate Program Faculty of Medicine, UBC

KI 8: Dr. Pierre Leblanc: Vice Dean for Clinical Affairs, Université Laval

KI 9: Dr. Lorraine Sharp: Family Medicine Resident (PGY-2)-NOSM, Sault Ste. Marie

KI 10: Dr. Tom Norris: Vice Dean for Academic Affairs, University of Washington School of Medicine

KI 11: Dr. Peter Weerasinghe: General Internal Medicine Resident, UBC

KI 12: Dr. Richard Almond: Postgraduate Family Medicine Program Director, NOSM

## Appendix 1: About the Authors



### **Joanna Bates, Director, Centre for Health Education Scholarship**

Dr. Bates graduated from McGill University in 1976. She completed a rotating Internship at St. Paul's Hospital in 1977, became a Certificant of the College of Family Physicians of Canada (CCFP) in 1983 and a Fellow of the College in 1994. In 1997, she was appointed to the Faculty of Medicine as Assistant Professor in the Department of Family and Community Medicine. She was promoted to Associate Professor in 2002 and to Professor in 2008. She has contributed to postgraduate education in Family Medicine both as postgraduate program director at UBC, and with the College of Family Physicians of Canada. Her career has included active participation as a member of the medical staff at St. Paul's Hospital, and senior roles within the College of Physicians and Surgeons of British Columbia and the Medical Council of Canada. In addition to medical education, she has continued to build a research program in telehealth.

Prior to becoming the Director of the newly established Centre for Health Education Scholarship in the University of British Columbia Faculty of Medicine, Dr. Bates was Senior Associate Dean, Education and prior to that, Senior Associate Dean, Undergraduate Medical Education, and Associate Dean Admissions. During her tenure in these roles, Dr. Bates led the doubling of the UBC Undergraduate program, and its distribution to two new campuses in BC using a technology infrastructure. She has received many awards, including an honorary doctorate from the University of Sherbrooke in recognition of her impact on medical education in Canada.



**Heather Frost, PhD** is a qualitative research assistant at the Centre for Health Education Scholarship (CHES) and recently completed doctoral studies in Social and Cultural Geography at the University of British Columbia. She has enjoyed her introduction to medical education so much that she is hoping to become more immersed in the field by joining CHES as a postdoctoral fellow. She is committed to qualitative research and is interested in the processes of identity formation and how identities are informed and shaped by socio-cultural context.



**Brett Schrewe, MD** is a Clinical Educator Fellow at the Centre for Health Education Scholarship at UBC. He received his MDCM from McGill University and completed his core pediatrics residency at the Montréal Children's Hospital. Stories, their authors, and the language that comprise them are his academic passion. He is currently a master's of arts candidate in Interdisciplinary Studies at UBC, positioned at the intersection of medical anthropology, sociolinguistics, medical education, and conversation analysis. His future plans include a fellowship in biochemical genetics and doctoral work expanding upon his master's thesis. His experience with this paper has again taught him that the potential of group dialogue to weave together a text is far more powerful than anything accomplished alone

**Jean Jamieson, MD MHSc**, works for the Postgraduate Office at the UBC Faculty of Medicine. She has worked as a general practitioner, medical health officer, and health administrator. Her research interests are community based education and health human resource planning. She currently lives in Squamish, B.C. with her husband and two teenaged children.



**Rachel Ellaway, PhD**, is the Assistant Dean for Informatics at the Northern Ontario School of Medicine in Sudbury. She is also an Associate Professor and the Acting Director of Simulation for the School and is currently Chair of the Undergraduate Medical Education Committee. She sits on the boards of eHealth Ontario and the journal Medical Teacher and is Chair of the AFMC Informatics Resource Group. Her research covers a range of technology-related educational themes including simulation, virtual patients, imaging, systems, interoperability, critical and theoretical approaches to technology, education informatics theory and practice and education systems and environments. Dr Ellaway is also the Theme Lead for Theme 3.4: Information and Educational Technology in Postgraduate Medical Education

## **Appendix 2: Annotated Bibliography**

**Hanlon N, Ryser L, Crain J, Halseth G, Snadden D. Establishing a distributed campus: making sense of disruptions to a doctor community. Med Educ. [Article]. 2010 Mar;44(3):256-62.**

Article addresses the impacts of Northern Medical Program at UBC on the community of 180 doctors practicing in Prince George. Although the findings are not specific to PGME, the article is useful for expanding our thinking about the possible impacts and outcomes of DPME in Canada.

**Norris TE. Education for Rural Practice: A Saga of Pipelines and Plumbers. The Journal of Rural Health 2000;16(3):208-12.**

In this article Norris explains the pipeline metaphor which is often alluded to in DPME literature.

**Ramsey P.G., Coombs, J.B., Hunt, D.D., Marshall, S.G., & Wenrich, M.D. From Concept to Culture: The WWAMI program at the University of Washington School of Medicine. Acad Med, 2001;76:765-75.**

This paper offers a concise history of the development of the WWAMI program from initial concept to critical and constitutive part of the medical educational curriculum across the five-state region it serves.

**Woollard B. Many birds with one stone: opportunities in distributed education. Med Educ. [Editorial Material]. 2010 Mar;44(3):222-4.**

An important piece because it is one of the few which speaks to the drivers for DPME within Canada as well as its potential impacts.

### Appendix 3: Summaries of Literature & Interview Findings

**Table 3: Requirements for the Establishment of Rural/Remote Training**

(Articles are organized chronologically and Canadian studies are indicated with an asterisk \*)

Requirements	Author(s)/Date	Key Findings
<b>Leadership:</b>	*S. Gray 1997	Success of the Northern Family Medicine Education Program in Newfoundland and Labrador credited to strong support from the board of the local hospital and the community more generally.
	Damos et al. 1998	RTTs require “[a]t least one family physician must be willing to serve as onsite coordinator and program advocate.”
	Catalano 2000	“Absolute will” of the rural hospital’s CEO was “imperative” to success of RTT in New York.
<b>Finances:</b>	Bridges 1994	For rural psychiatric training, it is “vital to select a training site staffed with individuals who are reimbursed by public funds for the time” they invest in teaching.
	Damos et al. 1998 & Catalano 2000	RTT family practice residency sites should not be viewed as part of a strategy to revive a “dysfunctional care system” and should only be established in “well functioning, full service” practices in communities with a financially viable hospital.
	Acosta 2000	A lack of continued funding is the main reason cited by program directors for the decline of rural fellowship programs in the U.S
<b>Infrastructure &amp; Logistical Issues:</b>	Damos et al. 1998	RTT training sites used in family practice residencies should be located no more than 1.5 hours drive from the core program and near to hospitals providing a full range of services including maternity care, and emergency and intensive care.
	Catinella 2003	Highlight the importance of sufficient outpatient facility space to accommodate learners (e.g. a minimum of at least 10 exam rooms to support a 4-4-4 family medicine residency program.
	Grace & Bradford 2007	In a discussion of community and rural rotations for junior medical officers in South and Western Australia, authors highlight the importance of providing

Requirements	Author(s)/Date	Key Findings
		physical capacity in the form of properly resourced consulting rooms and housing for junior doctors and their families.
	Thomson et al. 2009	Based on Australian research which cites a lack of practice infrastructure and teaching space as barriers to teaching junior doctors in general practice, authors survey 167 GP teachers to test their hypothesis that additional teaching space and a rural location would positively influence GP willingness to teach as interest in teaching was not affected by either variable. Their findings contradict this hypothesis, indicating instead that practice size is influential with medium sized practices having fewer teachers willing to host junior doctors.
<b>Patients:</b>	Damos et al. 1998 & Catalano 2000	The volume and mix of hospital inpatients must be sufficient to provide trainees with appropriate experience and the number of outpatients should be sizeable enough to support both residents and practicing physicians.
<b>Faculty and Staff:</b>	Damos et al. 1998 & Catalano 2000	Training sites in family practice RTTs should have at least 4 full time equivalent family physicians and that on-site family physicians be engaged in full service and committed to teaching.
	Damos et al. 1998	RTT training sites should be situated in a town which provides most medical and surgical subspecialty services required for training.
	Catinella et al. 2003	Commitment from a core group, in the case of rural family practice training sites in Utah, of at least 5 family physicians and hospital administrators, and the participation of a "sufficient number and mix of subspecialty physicians."
<b>Residents:</b>	Foley 1994	To attract family practice residents to rural sites, programs must address residents' needs alongside those of the communities and the training programs.
	Abercrombie 2000	Author surveyed 71 residents enrolled in family practice RTTs to explore the factors influencing their choice of RTT. Top six concerns regarding rural residency training were: not enough

Requirements	Author(s)/Date	Key Findings
		patients or pathology, missing conferences at home program, lack of exposure to peers, rural hospital politics, not enough attending teaching time or willingness to teach and too much call relative to their peers at home program. Residents' top cited reasons for choosing rural training included the geographical location of the residency (50%) and future practice in rural areas (83%).
	Malaty 2000	Author reports that 22 % of 23 operating RTTs in U.S. had at least one unfilled first year position for all 3 years between 1996 and 1998 even when programs sought residents outside of the National Resident Matching Program. Those positions most likely to be filled were located in "desirable" living locations as defined by Money magazine.
	Eley and Morrissey 2007	Based on a survey asking 147 third year medical students about their expectations and perceptions of interning in a rural/regional hospital rather than an urban/metropolitan hospital, authors report that most students felt that training in an urban/metropolitan setting would be better for their career prospects while being trained in a regional setting would mean greater patient responsibility and supervision by senior staff.
	Grace and Bradford 2007	Authors note that the development of additional rural placements for junior doctors in Southwestern Australia is limited more by a lack of available trainees than by funding restrictions.
	Doty et al. 2009	In the case of rural general surgery training programs, authors find that "many programs claiming that they aim to produce rural surgeons are not clearly identifiable to potential residents" and that the extent of rural training opportunities for surgery residents in the U.S. remains unclear.

**Table 4: Challenges for Resident Training in Ambulatory Care Settings**

<b>General Challenges</b>	<b>Author(s)/Date</b>	<b>Key Finding(s)</b>
<b>Leadership</b>	Halperin and Kaufman 1990	Authors summarize that successful UGME and PGME programs that incorporate education in ambulatory settings in North America are unified by the “presence of strong leadership by individuals willing to take risks.”
<b>Finances</b>	Xakellis and Gjerde 1995	Authors argue that teaching in ambulatory settings in the U.S. require a “fundamentally different configuration of faculty resources than does inpatient teaching” given that “each additional learner [...] adds cost” and the extent to which learners are able to offset these costs is site specific.
	Boex 2000	In the United States the “financial structures supporting ambulatory care education can best be characterized as nascent” in large part because there remains a “lack of understanding of the costs of ambulatory care education” for primary care residents.
<b>Faculty &amp; Staff</b>	Parenti and Moldow 1995	Authors cite the importance of “substantial dedication” on the part of both community preceptors and practice staff to the success of community-based rotations for internal medicine residents and suggest that over the longer term some form of “incentives and rewards” may be required to sustain their commitment.
	Lamb 1996	Faculty-to-learner ratio must be small enough to allow for individual attention.
<b>Patients’ Perceptions</b>	Bane & Criscione 1983	Based on a survey of 106 residents in internal medicine and 35 preceptors (21 private and 14 institutional) in New York, authors find that despite having initial concerns, all of the preceptors reported that patients responded favourably to residents.

General Challenges	Author(s)/Date	Key Finding(s)
	Norris and Flaherty 1993	Authors surveyed patients at family practice sites involved in a family practice residency satellite program who had been seen by either their regular physician (n=43) or a resident (n=65) or by their doctor and a resident (n=70). They report that not only were patients' mean satisfaction scores above satisfactory for all three groups but that the scores did not differ significantly between groups.
	O'Malley et al. 1997	Authors sought to determine the effect of teaching on patient satisfaction in ambulatory settings by surveying patients following their visit with a preceptor and learner (either student or resident). They find that patients are at least as satisfied with the care they received during these encounters as they are with the care received in non-teaching care encounters and would be willing to receive care from a preceptor and learner on future visits. They also find no difference with respect to satisfaction and trainee level.
	Levinsky 1998	In 1997, the directors of departments of internal medicine of all U.S. medical schools were surveyed regarding changes in ambulatory training in their residency programs and while all directors noted significant barriers to expansion including insufficient number of training sites or patient volumes, inadequate number of instructors, costs to the medical schools or to the department of medicine, the resistance of patients to the involvement of training was only a factor for 19% of the 91 respondents.

**Table 5: Benefits of DPME for Residents Based on KI Interviews**

Benefits	Sample of Supporting Quotes from KI Interviews
Exposure to new role models	<p>As a resident at McGill “I’d never really thought of doing general internal medicine or any kind of generalism because I didn’t have any good role models, really. And then I spent these two months in the Magdalen Islands and the internist there was doing everything. He was managing very complex, rheumatological patients and doing full-service cardiology, essentially everything but interventional cardiology. Neurology, dermatology, gastroenterology, those-- just the whole spectrum of general internal medicine. To the extent that he seemed like-- he seemed unreal. He seemed like superhero of some sort. And I was inspired...” (KI1).</p> <p>The one month rotation in Nanaimo, “allowed me to kind of look at what general internal medicine would look like outside of a quaternary care centre and what general internal medicine looks like outside of clinical teaching unit [...] And as well, I was exposed more to what actual lifestyle would look like of a community physician in terms of their balance between work and inside and outside of the hospital” (KI11).</p>
Alter Career Aspirations	<p>As a resident at McGill, “I spent one month at the community hospital in Gatineau, but I spent two fantastic months in the hospital in the Magdalen Islands. And I would say that as a result of those two experiences I abandoned earlier plans to sub specialize and decided to choose a career in general internal medicine, essentially on the basis of having a fantastic mentor there” (KI1).</p> <p>A one month rotation in Nanaimo “was such an overwhelming positive experience it actually resulted in me doing general internal medicine, well, single handedly because of that rotation [...] So before that actually, I think I was victimized [?] to being in kind of the tertiary quaternary centre model where sub-specialty care is kind of the gold standard and the-- I was feeling a lot of pressure to pick a sub-specialty even though one didn’t necessarily call my name” (KI11).</p>
Influence Future Practice Patterns	<p>“a lot of what I do now, a lot of my practice patterns are shaped by just the few months that I worked in the community. And so I think that’s really important [...] And I think it helps you become a better practitioner in the city (KI1)</p> <p>“I think having trained in the community which I now plan to practice in, has really shaped my practice. Because I’ve been able to, I guess, as a learner, go through multiple different offices in the community and see how each preceptor has built their office, built their style of practice, what type of patients they’ve taken on, whether they’ve expressed a special interest in a certain area or not, has helped me decide how I think I can best fit into the community as a family physician. I think I’m looking forward</p>

Benefits	Sample of Supporting Quotes from KI Interviews
	to taking more learners on in my practice now that I've seen the way that this community, at least community of doctors, has come to take on a lot of the medical students and residents" (KI9).
One-one-Relationships with Preceptors	"The main strength would be that you're able to really get to know a lot of your preceptors, because the learning environment here is not layered in the sense that more often than not they're your preceptor and then you're the only student. Occasionally there are medical students around, but certainly for the majority of the time it's one-on-one learning with your preceptor. And so definitely you're forced to pretty much be on your game and learning directly from your staff 100 percent of the time" (KI9).
Greater Responsibility and Autonomy	<p>"We don't have as many layers or as many people here. So they are more involved at every level, and they tend to have more responsibility [inaudible] they do have more responsibility, patient care responsibility" (KI3).</p> <p>"more kind of autonomy over directing which sub-specialists become involved. And having more of an ownership early on in terms of patients with complex problems or multiple medical issues" (KI11).</p> <p>"I think you also become more comfortable dealing with certain things on your own so that you and your trainees can then, like, kind of-- I guess enjoy having more comfort and more autonomy with different medical problems without involving a sub-specialist necessarily very early in the case, per se" (KI11).</p>
Authentic Experiences	<p>"I think what makes [DPME] good, at least in the two places that I've been, what makes it good is that their residency much more closely approximates what's going to be asked of them when they're done. So they're in these very kind of legitimate situations. They don't have, you know, many levels of training above them who are taking on more responsibility. They're kind of-- they're right there at the-- on the frontline in their residency, more so than I think residents are in the city. Because there are fewer of them and because there aren't the same kind of deeply entrenched hierarchies that there are in the city" (KI1).</p> <p>"So communities are different but in general, I think that the cases are more bread and butter if you move away from the larger centres in the province" (KI3).</p> <p>"And then finally I think you just get to experience medicine at more of a grassroots level, you know, where learning from, you know, patients as well as our preceptors at more of how the health system works. Sometimes you're in places that don't have, you know, C.T. machines. I've been in places where the x-ray only works during normal business hours and, you know, it's just a very different, and I think the majority of Canada practices medicine in that way" (KI9).</p>

<b>Benefits</b>	<b>Sample of Supporting Quotes from KI Interviews</b>
Continuity of Care	<p>“I think one of the other advantages is that in some of the more distributed sites, the staff and specialists are quite well known to each other and then well known to the family doctors. So sometimes the environment that the learner is in is very conducive to you following a patient from a family doctor’s office, to their specialist appointment, occasionally to some of their testing. I followed a patient all the way from my office to the bone marrow biopsy to the pathologist and then again to the oncology department when she had her appointment there. So certainly the continuity of care with patients, the learner gets a chance to actually be involved in a lot of the different steps. And that sometimes hasn’t happened in the more academic sites” (KI9).</p>
Learn How to Set up and Manage an Office	<p>“more exposure in terms of, like, the business model of what a practice would look like and more frank discussion about finances and-- more practical issues about how an office should be set up and choosing secretaries and nursing aides. All these things that were never really discussed at all were kind of discussed with me the first time in this community setting (KI11).</p>
Interprofessional Relationships	<p>“I think in terms of, just in general, working in different sites and working with different people you kind of get a better idea of how to develop those professional relationships with the nursing staff, with the administration, et cetera “(KI11).</p>

**Table 6: Challenges to Distributing Postgraduate Medical Education**

Challenges	Sample of Supporting Quotes from KI Interviews
<p><b>Lonely, Isolating and Disruptive for Residents</b></p>	<p>“I think for me it was a difficult transition. I think it was difficult because I was used to having a lot of learners around me and I found a lot of comfort in being able to share some of the difficulties with medical school with other medical students. Being in Sault Ste. Marie and quite a few of the, at least Northern Ontario School of Medicine residency distributed sites, have only a very small handful of residents per site. So the transition from having 150-something medical students in my class whom I saw every single week, all over the hospital, no matter what rotation I was on, going from that to where it's only me and my preceptor and not a lot of residents to see outside of, you know, in or outside of work hours, was a big transition in terms of just-- I guess probably how lonely you were. Sometimes it was, you know, you feel a little bit isolated from your previous learning experiences where there was always tons of other learners around you, you know, to bounce ideas off of and just see how things were going [...] And that was something that within about a year of living in the city, of course you just start to meet people that are outside of medicine and create your own group of colleagues and group of friends in the city itself which actually has turned out to be an advantage to get to know people outside of work and really kind of start to get involved in the community. So I felt that that was a big transition for me” (KI9).</p>
<p><b>Pedagogical Challenges</b></p>	<p>I think that the other practical issue is that, at least in my own department, the culture of teaching isn't very strong. And so they do-- residents who are going through the internal medicine rotation probably aren't exposed to the very academic aspects of internal medicine that they would be exposed to in the city. There are now kind of-- there isn't a regular grand rounds. There are no fellows sort of traipsing through to give them the-- to show them the sort of most up to date things that they should know about. And so, yeah, there's-- so that's a bit of a limitation right now, at least at that site, in that department” (KI1).</p> <p>“But that exposure to kind of that really authentic exposure to real care is also a bit of a double-edged sword that I think they often feel thrown in to situations that there are more or less capable of handling and they don't feel as though they have the same supports” (KI9).</p> <p>“And the learning style was a little bit different. McMaster we had a lot of small groups, spent a lot of time in the hospital in layered learning, you know, senior resident, junior resident, and then we were medical students. And that certainly has changed in the distributed site where you're often the only learner on any rotation and you're dealing directly with your preceptor and you're acting as the junior/senior or medical student because you're the</p>

Challenges	Sample of Supporting Quotes from KI Interviews
	only one" (KI9).
<b>Travel</b>	<p>"And I guess if I had to critique, although I find getting together with residents in person is somewhat valuable, I think the amount of-- the number of hours I spent in a car is a little bit, you know, I wonder if there's a better way to maximize the amount of learning time. I think one of the ways that we're starting to do that is that with the, I guess, explosion of podcasts in the medical field we're able to kind of, I guess, subsidize some of that driving time with podcast learning. But it does take away a little bit from either home study time or lectures because you're really doing a commute every month. So I think just the amount of travel we're required to do as part of the residency program, I think sometimes can take away from the learning time. And then I think, you know, the other thing would be too, I think, with time more residents will be placed in distributed sites" (KI9).</p>
<b>Funding for Residents</b>	<p>"I would hope that the amount of funding that residents have to either visit family or to travel, I hope that that funding would remain there, just to make sure that residents are being appropriately reimbursed for travel time, reimbursed for hotel stays or meals if they are required to travel long distances. And then, you know, we're lucky at the Northern Ontario School of Medicine, there's a Resident Well Being fund that we're given each year that's devoted to allowing us to go travel back if we have family in southern Ontario" (KI9).</p>
<b>Physician Community</b>	<p>"What it takes more than anything else is a local champion in the community [...] Somebody who wants residents there, wants to oversee the site, and knows local medical environment, the family physicians, the hospital and the specialists. I don't think you could do that centrally at all. You have to recruit locally" (KI7).</p> <p>"So I think that it was really the community that played a big role in helping us settle in because there weren't the residents around for us to form our own group, I think it was really pivotal that the kind of physicians that were already present in the community helped the residents, just really integrate in with them. And they never made us feel like they were our staff and we were the residents [...] And then as well, it's been the community of physicians and the younger ones especially, that have really made us feel welcome outside of work." (KI9)</p> <p>"But it was obvious that the bulk of the attendings just weren't interested in participating. And that was painfully obvious, I think, in a lot of different ways in terms of how involved they were, in terms of how engaged they were in teaching. How pleasant they were to be around. The list goes on and on, but it was overall just a terrible experience, I would say. Probably one of the worst, actually, of my training period, actually" (KI11).</p> <p>"I think I understand in a way, that a lot of these physicians are away from the teaching centre because perhaps they didn't</p>

Challenges	Sample of Supporting Quotes from KI Interviews
	<p>necessarily want to be involved in teaching. They didn't want to be involved in having to supervise trainees. They didn't want to have to sacrifice some degree of their autonomy or control and now they're being forced in this position [...]" (KI11).</p>
<p><b>Support for Community Preceptors</b></p>	<p>"I think we should have an environment, I'm going to be very blue-sky here, in which we should stop thinking of places of being quaternary and community based. I think, you know, there isn't one hospital that doesn't have a learner in it. And I think every, you know, both inpatient and ambulatory experience is valuable. They should have support. I mean, it doesn't have to be stipend or remunerative support but support from the academic institution - might be academy or the university - that reaches out and reaches in and creates a sort of matrix that supports education" (KI4).</p> <p>"I believe this fundamentally, is-- so the guy who's doing the teaching, the person teaching caesarian section in a regional or rural setting has got to have a formal appointment in the department of obstetrics. Because if they're good enough to teach that, then they should be regulated and recognized both by the department [...]one of the early things I did was insist that there be appointments for people teaching in the regions and-- appointments in their department" (KI5).</p> <p>"[A]lthough I don't think our faculty are feeling that they're on the outside, I don't think they feel that they're totally on the inside. And so there's certainly a difference between a UBC faculty person in Vancouver compared to a UBC faculty person on the outside. So that's not as aligned or in mesh as it probably could be. But we, again, try to do as much as we can to do that. We have a clinical faculty meeting aligned with our research day; people are invited to come over. We have awards that are across the system, so you get a teaching award specifically for Victoria but also you could win a teaching award because you're within the whole system. These are the sorts of things that you can do to be much more inclusive" (KI6).</p> <p>"And the other challenge is that you have to keep your faculty or your-- the doctor who are in these centres, interested to teaching and there is a lot of rotation in these areas. People are moving to Montréal, to Québec or elsewhere. So to have permanent people interested in teaching, I think it's the challenge. And in most of these places, the number of people is always minimal. So it's fragile. You lose one person, there is one maternity leave and it makes the program very fragile. So I think it's the challenge that we have and you have to be very careful and be very close of your faculty members in these hospitals, to get sure that they are happy and they remain interested in teaching and receiving residents" (KI8).</p>

Challenges	Sample of Supporting Quotes from KI Interviews
	<p>“All our faculty in our distributed sites are clinical faculty, clinicians in practice. So you need to buy some of their time to create a resident education committee. One person [...] sitting for example in Terrace, really can’t run a program well by themselves. They need a core nucleus of people who get together once a week or once every month to talk about all the resident issues with support for us and carry the various educational roles” (KI7).</p>
<p><b>Beliefs/Assumptions re: Medical Education</b></p>	<p>“So if we’ve got an environment which is-- in which the-- everybody believes the only good medicine is happening in a tertiary care centre, I think that’s really troubling. ‘Cause I don’t understand how these folks growing up in that milieu will even contemplate becoming a specialist in small-town Canada. So I think that’s a really important fix. And when I speak to the program directors and I look at the accreditation stuff in post-grad, the constraints around, you know, what has to be in a program is another difficulty. So the actual makeup of the programs now is so based around things that can only happen in a tertiary care centre, that it makes it really difficult to contemplate how you would, for example, recruit someone into specialty training program that was from a rural area. And actually get them into that program and have that program tailored in such a way that they could gain most of their experience there. And we’re so far away from being able to do that because of what I would consider to be institutional constraints. And I can’t even see much discussion going on about whether this is an issue or not, and from where I’m sitting that is a really big issue” (KI2).</p> <p>“Anyway, but the Royal College has not been very helpful and they are the specialty community [...] But so I know that there is some expect-- you know, regulation or policy at Royal College that the committees, the composition has to include “x” percentage, I can’t remember what percentage, of community based physician. But I also know that that doesn’t really happen. So when you look at the accreditation standards, or the-- what rotations does the residents, in the specialties, you know, we’re not talking of the sub specialties, need to complete and I’m more familiar with paediatrics. Well, you can’t do it unless you’re in a very specialized centre. So I think that that has an effect on the ability to distribute. The Royal College-- I think it’s trying to catch up with these [...] But still training is seen as the domain of the quaternary, tertiary quaternary teaching hospital. And I’m not saying that this is wrong, but I think there has to be more balance. And that will allow us to develop programs in smaller centres, located in smaller communities. So then there are the issues of the program directors who, you know, and the faculty who think that you can only learn at the Children’s Hospital here or there or what-- the major teaching hospital and they put down</p>

Challenges	Sample of Supporting Quotes from KI Interviews
	<p>everyone else who is, you know, a few kilometres away” (K13).</p> <p>“So the traditional teaching hospitals over the last 40 years, last 20 years in particular, have become increasingly disgruntled at the fact that others don’t seem to recognize that they’re special and, in fact, they’re the only place where education can occur. And, you know, we, I mean, I’m being a bit cheeky there but, I mean, I actually heard that directly in the distant past and the more recent past not so much [...] Certainly-- and up until relatively recently it was believed that was where family practice would be taught as well. And it had to do with, again, this belief about themselves that they were the seat of learning and-- from a government point of view they would say, well, and we put the money there. That’s where we paid for teaching, you know, yeah, it should go on there. And, of course, it’s been a bit of a struggle to get across that learning needed to go on at other places. And then that if you were going to do learning in other places, that teaching and learning at other places, that resources need to go to those other places, too” (K15).</p>

## Appendix 4: Case Study

We chose the University of Washington WWAMI program as a case study because of its long and successful history of providing DPME. We undertook a critical history of the University of Washington's distributed medical education WWAMI program to explore factors that lead to the creation, sustainment, and disbandment of distributed sites. Despite its non-Canadian context, this program's experience was thought valuable to our project given its longevity, available data and commentary, and geographic parallels to current population distributions in most provinces.

In 1948 the Children's Hospital of Los Angeles (CHLA) established a two-month rural paediatrics rotation in Imperial County, California, with senior residents dividing their time equally between the county hospital and out-patient services. The program enjoyed multiple successes – among them, the enthusiastic participation of the local medical community with increased academic participation, increased resident awareness of rural paediatrics, improved practices in the nursery and on the ward, and a small drop in infant mortality. However, three years later, the program was discontinued; despite the derivation of a “great deal of medical benefit” for the community, it was “somewhat difficult” for the hospital to continue the program. Notably, the resident reaction towards the utility of the rotation was mixed, and the lack of a permanent on-site paediatrician – despite regular visits from Los Angeles – was deemed fatally problematic (88).

Two decades later, the WWAMI program began at University of Washington (UW). The WWAMI program has grown to an undergraduate and postgraduate program that encompasses training for and in the states of Washington, Wyoming, Alaska, Montana, and Idaho. From a group of nine medical students undertaking basic science studies in Fairbanks, Alaska (89), the program as of 2003 had provided nearly 6000 student clerkship rotations, over 2200 resident rotations, and had established a continuous presence across the educational spectrum from primary school to continuing medical education (90). As of 2009, UW's primary care programs were ranked first nationally for the sixteenth consecutive year, its family and rural medicine programs retained their top position, several specialties as well as its research programs were ranked in the top ten, and it continues to amass nearly-unparalleled amounts of funding from the American National Institutes of Health (NIH) (91). The two-month WWAMI rotation in the second year of the postgraduate paediatrics training program is an inviolable cornerstone. We explore now what contexts and factors have contributed to this rotation's success over the last 40 years (92) against the aforementioned unsuccessful example in southern California in the late 1940s.

While the birth of WWAMI is anecdotally attributed to the moment rural general practitioner Pres Bratrude uttered, “Send me the residents and I'll teach them,” during a social hour at a Washington State Medical Society meeting in September 1969 (93) (89), it was underlying political, structural, cultural, individual, and financial considerations that midwived the program into existence. The 1960s American political climate foregrounded social activism, including in medicine (89). In 1965, Dr Jack Lein's tour throughout the state revealed exactly one graduate (of 646) from the last ten years was practicing rural general medicine (89) while an internal report at UW emphasized needs for flexibility, diversity, and primary care, sparking the dean's office on a trajectory focused upon ambulatory care and regional and local services (94). Three years later, the medical school overhauled its curriculum to include increased elective flexibility, earlier exposure to patient care, and heightened attention to social medicine (94). Dr Ted Phillips was hired in 1969 to head the new division of family medicine, and his philosophy that it was “absolutely essential for students to go out where medicine was being practiced” (89) struck a chord with the pre-clinical students. As one student put it, “Phillips is the real thing,” while those planning family practice careers skyrocketed to half the class (89). New facilities were set

for completion at the medical school in 1972, allowing for increased enrolment and curricular flexibility (94).

From an institutional culture standpoint, Dean John Hogness involved community physicians from the outset, suturing shut the “town-gown” divide (93). Financially, Dean Robert van Citters’ leadership and Associate Dean Gus Swanson’s initial proposal cemented critical start-up funds from the Commonwealth Fund in New York in 1970 (89). Proffered as an experiment, it also had full support from the university’s president, who, cognizant of the coming storm of controversy, instructed the group: “Don’t ask the faculty to vote on it. Just go do it” (89). The first nine students spent a semester learning basic science in Fairbanks along with weekly clinic exposure and shadowing health aides in the Alaskan bush (89). Buoyed on by Dr Dick Lyons, the enthusiastic geneticist who taught them, the students exhaled with the news Dr Roy Schwarz brought to them from Seattle at the end of the term: not only had they had done as well as their traditional colleagues on their exams, they had out-performed them in anatomy (89).

Despite this success, financial stress and macro-institutional opposition nearly killed WWAMI in its infancy. The head of the American Association of Medical Colleges (AAMC) stated “UW is ruining medical education as we know it” (89). However, thanks to intense lobbying efforts by Jack Lein across the region, life support funding in federal legislation was secured by Senator Warren Magnuson of Washington (89). News of the program began to spread across the country, including to Harvard, where resident Dr Roger Rosenblatt was attracted west by the idea of a socially responsible medicine. Hired by Magnuson to develop new physician offices, Rosenblatt recruited exhaustively, pulling other colleagues with social activism interests into the program and establishing in only two years 25 new practices in towns without physicians (89). By the three-year point, the faculty reached a consensus based on results that regional education quality was as high as it was in Seattle. Five years in, the university voted to continue the program. In a stunning reversal and following the longest review in its history (95), the AAMC accredited the program. At the ten-year mark, Rosenblatt showed that students in the program were choosing primary and rural careers at rates double those of any other school (89). WWAMI was thus secure and now seen as an integral part of the educational mission.

From the subsequent three decades, several developments are worth noting. The original program’s primary objectives of: improving the health of citizens in the region through decentralized medical education; increasing the number of publicly supported medical school positions and the number of primary care physicians; addressing the maldistribution of physicians; broadening the educational experience by the use of community clinical resources; and improving and expanding continuing medical education programs have all been met (94). Self-sustainment of the sites has been an unexpected benefit; over 170 are now operating, and only one has ever closed. The vast majority have been maintained by a perceived satisfaction gained by community physicians in teaching (94) (95). Communication in the form of site visits and regular meetings between the medical school faculty and the community physicians has been a maintained priority (94). Continued rigorous attention to educational equivalency has played a critical factor in the success of the program and the growth of an egalitarian culture between Seattle and the regions. Since WWAMI’s early years, “rather than invoking Seattle as the gold standard...the standard was determined to be the standard achieved by the entire system” (94).

Through interviews, Dewitt et al delineated characteristics of three exceptional rural family medicine residency sites in WWAMI (96). Themes of a successful micro-culture providing an excellent training experience emerged, including: an experience early enough in residency that career decisions could be affected but far enough advanced to accept responsibility and know when to ask for help; daily behavioural feedback and support for self-evaluation; the avoidance

of site, preceptor, and trainee burnout; enthusiastic renowned preceptors committed to teaching and serving as an excellent role model; treating the residents as true colleagues; and allowing sufficient professional and personal support to the residents.

Many specialty residency programs have also made WWAMI rotations an integral part of their training. Links established by obstetrics-gynaecology, psychiatry, internal medicine, and paediatrics have remained strong over time (94) and have continued to navigate changing political climates (97). Interestingly, the incarnation of each speciality residency's WWAMI component has been permitted to develop in its own unique way. Paediatrics maintains autonomy to develop its own educational plan (92) yet its experience reflects a micro-culture that harmonizes with the larger discourses of the WWAMI framework. The WWAMI paediatric residency experience began as an elective in 1971 but became mandatory in 1973 and entrenched around the four same sites since 1984 (94) (92). One leading educator at UW states: "It also helps to guarantee...the paediatric resident of having an educational experience...that is far more community based in nature, than one typically gets in an academic medical centre in a large city with a children's hospital" (97). Similar to Dewitt's findings, residents are heavily involved and treated as junior partners in the practice, assigned their own patients, and are involved in business and operations meetings (92). Over half of paediatric residents have entered into community-based careers since 1985, and two-thirds of them have remained in the regions in which they trained (92). Illustrating the successful weaving of unique program culture that resonates with the larger mission of the university medical system of which each program is a critical constitutive component, Tom Norris suggests, "It's been working for the Department of Paediatrics for quite a long time and has been a great model for them," (97) while Stapleton and Pendergrass offer that "the commitment of pediatric faculty to a shared educational responsibility with our region's community pediatricians has been its stabilizing force" (92).