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Cover: "Five years young!"

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CJRM celebrates its 5th anniversary with a poster of this issue's cover.

Available from the CJRM offices for \$12. Make cheques payable to CJRM and mail to: CRJM, Box 1086, Shawville QC J0X 2Y0.

President's message

Portable licensure: the law of the land!

Peter Hutten-Czapski, MD  
Haileybury, Ont.

CJRM 2001;6(2):93-4.

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Once upon a time in a land far, far away physicians were allowed to wander at will from one licensing jurisdiction to another. They freely crossed internal borders to work unhampered by any concerns about licensing. And it was good. There were as many competent doctors before such freedoms were granted as after. The licensing authorities (LAs) had less paperwork to do. Rural communities desperate for physicians could recruit beyond the limits of their internal borders, without fear of having a competent applicant blocked.

No matter how idyllically impossible it sounds, the country exists. It is Australia. By virtue of an internal trade law, physicians were granted portability of licensure in 1992.<sup>1,2</sup> What is relevant to Canadians is that a similar agreement has been passed here in Canada.<sup>3</sup> An interjurisdictional agreement in July 1995 guarantees that physicians can freely move from province to province to make a living.

The 1995 Agreement on Internal Trade (AIT) was written "to enable any worker [including physicians] qualified for an occupation in one part of Canada to have access to employment opportunities within that occupation in any other province or territory."<sup>3</sup> The AIT specifies that "occupational standards that have been established in those territories [provinces] shall, . . . be considered mutually acceptable . . .".<sup>4</sup>

Oh, is something wrong? Is a physician's competency, as assessed by one province, still being routinely challenged in another? Are you telling me physicians are still being prevented from even locuming in other provinces? Are physicians still taking out, or maintaining, multiple licences because they're unsure of getting them back if they let them lapse? Is no one aware of the law? These are concerns that rural physicians have passed on to us.

Our collective experience is that many restrictions remain. The Society of Rural Physicians of

Canada (SRPC) has had much correspondence with the Federation of Medical Licensing Authorities of Canada, listing our concerns over the last 5 years. As of their last writing, their intent is this: "Each LA will continue to review each applicant in the normal fashion. No new license would be approved automatically or solely on the basis of holding a licence in another jurisdiction."5

This is not what rural doctors have been asking for. The SRPC is establishing a Legal Defence Fund to defend the right of doctors to free mobility to the extent guaranteed by law.

If you are having difficulty getting status in another province, tell us, and we can put pressure on to help. If you wish to help in this good work, join the Society or renew your membership and mark an additional \$75 or more for the Legal Defence Fund (see the journal's carrier card for further membership information). We are protecting your right to earn a living.

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4. Labour mobility. Annex 708: Occupational qualifications and standards. Part 1. Recognition of occupational qualifications and reconciliation of occupational standards. In: [Agreement on Internal Trade](#). Ottawa: Industry Canada; 1995.
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Message du président

La permis d'exercice transférable : La loi du pays!

Peter Hutten-Czapski, MD  
Haileybury, Ont.

CJRM 2001;6(2):95-6.

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Il était une fois un pays lointain où les médecins pouvaient se déplacer à volonté d'un territoire d'autorisation à l'autre. Ils franchissaient librement les frontières intérieures pour travailler sans avoir à se préoccuper de permis d'exercice. Et tout était bien. Il y avait autant de médecins compétents avant qu'on leur accorde de telles libertés qu'il y en avait après. Les administrations du permis d'exercice avaient moins de paperasse à remplir. Les communautés rurales ayant désespérément besoin de médecins pouvaient recruter au-delà de leurs frontières intérieures sans avoir à craindre qu'un candidat compétent ne puisse se joindre à elles.

Aussi idyllique et impossible ce pays puisse-t-il sembler, il existe vraiment. C'est l'Australie. Une loi sur le commerce intérieur a accordé aux médecins la transférabilité du permis d'exercice en 1992<sup>1,2</sup>. Ce qui intéresse les Canadiens, c'est que le Canada a adopté un accord semblable<sup>3</sup>. Un accord interprovincial adopté en juillet 1995 garantit que les médecins peuvent circuler librement entre les provinces pour gagner leur vie.

L'Accord de 1995 sur le commerce intérieur (ACI) devait «permettre à tout travailleur [y compris les médecins] qualifié pour exercer un métier ou une profession dans une région du Canada, d'avoir accès aux occasions d'emplois dans les autres provinces ou territoires<sup>3</sup>». L'ACI précise que «les normes professionnelles qui ont été établies sur ces territoires [provinces] sont... considérées comme mutuellement acceptables [...]4».

Il y a quelque chose qui ne va pas? La compétence d'un médecin, telle qu'établie par une province, est-elle encore remise en question couramment dans une autre? Voulez-vous dire que les médecins ne peuvent toujours pas même faire du remplacement dans d'autres provinces? Les médecins doivent-ils encore demander ou garder de multiples permis d'exercice parce qu'ils ne sont pas sûrs de les obtenir de nouveau s'ils les laissent expirer? Personne ne connaît la loi? Ce sont là des préoccupations dont les médecins ruraux nous ont fait part.

Notre expérience collective révèle qu'il reste encore beaucoup de restrictions. La Société de la médecine rurale du Canada (SMRC) a échangé une correspondance abondante avec la Fédération des ordres des médecins du Canada pour lui faire part de nos préoccupations au cours des cinq dernières années. Dans sa dernière lettre, l'Ordre précise que : «Chaque administration continuera d'étudier normalement chaque demande. On n'accordera pas un nouveau permis d'exercice automatiquement ou uniquement parce que le candidat en détient un dans une autre province5».

Ce n'est pas ce que demandent les médecins ruraux. La SMRC est en train de créer un Fonds de défense juridique pour défendre les droits des médecins à la libre mobilité dans la mesure qui leur est garantie par la loi.

Si vous avez de la difficulté à obtenir un permis dans une autre province, dites-le-nous et nous pourrons intervenir pour vous aider. Si vous voulez participer à cette bonne œuvre, adhérez à la Société ou renouvelez votre adhésion et versez 75 \$ ou plus pour le Fonds de défense juridique. Pour des renseignements additionnels au sujet de l'adhésion, voir la liste des tarifs. Nous protégeons votre droit de gagner votre vie.

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## Références

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Successes and lessons learned

John Wootton, MD  
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The publication of this issue of CJRM is remarkable in several ways. It is the 20th issue of a journal that many felt had little hope of success. It has, however, not only succeeded but prospered, and we celebrate this achievement with a special cover. The thumbnails not only record the past but include the present and, like a hall of mirrors, stretch into the future.

CJRM's 5th Anniversary poster

A limited-edition poster has been created from this issue's cover and will be for sale from the CJRM editorial office and at Hockley Valley.

CD-ROM on hepatitis C

Another "first" is the inclusion with this issue of a CD-ROM on the practical management of hepatitis C. This CD-ROM has proved itself in Manitoba, where it demonstrably reduced the number of unnecessary consults with specialists and, for rural residents in particular, the amount of travel, disruption and associated expenses. With the support of the Hepatitis C Division of Health Canada, the Society of Rural Physicians of Canada (SRPC) is able to provide this CD-ROM free of charge to more than 5000 CJRM readers. This is one tangible example of the kind of innovative collaboration in support of rural Canadians that is possible between organizations and government.

Federal Office of Rural Health

This is also an opportune time to report on my term in the Office of Rural Health (ORH), where I have been Executive Director since September 1998. What have been the successes and the lessons learned?

The most striking lesson is the recognition that it is possible to introduce from-the-field-

perspectives at a high level and have them accepted and valued. In the 2½ years that I have been with the Office we have become more aware of the scope of the issues, the number of related communities of interest, and the avenues available for action. Some initiatives are well launched, and others are on their way, but in the larger scheme of things we have barely begun. The Federal Minister of Health has announced that he will form a Ministerial Advisory Council on Rural Health; this will help to maintain momentum and attention on rural health issues and it highlights the benefits of long-term engagement.

I have discovered that we have many friends from whom we can learn, and who can learn from us. At a recent visit to a policy conference put on by the National Rural Health Association in Washington DC, I was struck by the strength in numbers of that organization, which brings together many groups under the one rural health banner. Interestingly they perceive us, primarily as a result of the efforts of the SRPC, as having done a better job of getting rural service issues onto the agenda than have they.

Much remains to be done, but the successes to date bode well for the future of rural health in Canada and are indicative of the role that both the SRPC and the ORH can play.

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## Réussites et leçons apprises

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Rédacteur scientifique, JCMR  
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Ce numéro du JCMR est remarquable à bien des égards. Il s'agit du 20<sup>e</sup> numéro d'un journal qui, selon plusieurs, avait très peu de chance de succès. Pourtant, il a réussi et même prospéré et nous célébrons cette réalisation par une couverture toute spéciale. Les vignettes témoignent non seulement du passé, mais aussi du présent et, comme une galerie des glaces, elles se prolongent à l'infini.

## Affiche du 5<sup>e</sup> anniversaire du JCMR

La couverture du présent numéro a été transformée en une affiche à tirage limité qu'on pourra acheter au bureau du JCMR ainsi qu'à Hockley Valley.

## CD-ROM sur l'hépatite C

Une autre «première» : un CD-ROM sur la gestion pratique de l'hépatite C accompagne le journal. Ce CD-ROM a fait ses preuves au Manitoba, où il a réduit de façon manifeste le nombre de consultations inutiles de spécialistes et où, dans le cas des résidents ruraux en particulier, il a réduit les déplacements, les dérangements et les dépenses connexes. Grâce à l'appui de la Division de l'hépatite C de Santé Canada, la Société de la médecine rurale du Canada (SMRC) est à même d'offrir gratuitement ce CD-ROM à plus de 5000 lecteurs du JCMR. Il faut voir ici un exemple de la collaboration possible entre des organismes et le gouvernement pour aider les Canadiens et les Canadiennes qui vivent en milieu rural.

## Bureau fédéral de la santé rurale

Cet article est aussi l'occasion pour moi de faire rapport de mon mandat au Bureau de la santé rurale (BSR) à Santé Canada, où j'ai occupé le poste de directeur exécutif depuis septembre 1998. Quelles ont été nos réussites et quelles leçons avons-nous apprises?

La leçon la plus frappante a été de reconnaître la possibilité de présenter les perspectives des

régions en haut lieu et de les faire accepter et considérer à leur juste valeur. Au cours des deux ans et demi que j'ai passés au Bureau, nous avons pris davantage conscience de l'ampleur des problèmes, du nombre d'intérêts communs connexes et des possibilités d'action. Certaines initiatives sont bien lancées et d'autres sont en cours de préparation, mais d'un point de vue plus général, nous en sommes au tout début. Le ministre fédéral de la Santé a annoncé qu'il mettrait sur pied un Conseil consultatif ministériel de la santé rurale, ce qui contribuera à conserver notre élan et à retenir l'attention sur les questions de santé rurale, et souligne les avantages d'un engagement à long terme.

J'ai découvert que nous avons de nombreux amis qui pouvaient nous en apprendre et à qui nous pouvions en apprendre. Dernièrement, alors que j'assistais à une conférence sur la politique, organisée par la National Rural Health Association, à Washington (DC), j'ai été frappé par le grand nombre de membres que comptait cet organisme, qui réunit plusieurs groupes sous la seule bannière de la santé rurale. Il est intéressant de noter que ceux-ci considèrent, en grande partie à cause des efforts de la SMRC, que nous avons mieux réussi qu'eux à mettre les questions de service rural à l'ordre du jour.

Il reste beaucoup à faire, mais ce qui a été accompli jusqu'à maintenant est de bon augure pour l'avenir de la santé rurale au Canada et donne une idée du rôle que la SMRC et le BSR peuvent jouer.

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Don't take "geography" for granted!

Some methodological issues in measuring geographic distribution of physicians

Raymond W. Pong, PhD

J. Roger Pitblado, PhD

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Geographic maldistribution of physicians is a major health services delivery issue in Canada. Most discussions of geographic distribution of physicians are based on population-to-physician ratios because such ratios are easy to construct and understand. However, simple head counts of physicians and people within an area often obscure the underlying complexity of the situation. This paper discusses some of these inadequacies through an extensive review of the literature. The objective was to examine the problems inherent in using an arbitrarily defined geographic area, problems such as the mobility of physicians and patients and the lack of consensus on what "rural" means. Various methods for overcoming these difficulties are discussed

La mauvaise répartition géographique des médecins constitue un problème majeur pour la prestation des services de santé au Canada. La plupart des discussions sur la répartition géographique des médecins sont fondées sur des ratios médecin:habitants parce que ces ratios sont faciles à établir et à comprendre. Un simple dénombrement des médecins et de la population d'une région fait toutefois oublier souvent la complexité qui sous-tend la situation. Cette communication décrit certaines de ces lacunes au moyen d'une recension détaillée des écrits. L'étude visait à examiner les problèmes inhérents à l'utilisation d'une région géographique arbitraire, soit, notamment, la mobilité des médecins et des patients et l'absence de consensus sur la signification du mot «rural». On discute de diverses façons de surmonter ces difficultés.

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Geographic maldistribution of physicians is a major health care issue in Canada. Most discussions on this topic are based on population-to-physician ratios because they are easy to understand and construct. However, the ratio's simplicity sometimes obscures the complexity of the problem. This paper outlines some of the problems and inadequacies of the system.

This paper is the first of two<sup>1</sup> articles that seek to lay the conceptual foundation for understanding physician distribution. It is based on a study<sup>2</sup> that examines the geographic distribution of physicians in Canada. Our analysis has shown that the spatial distribution of physicians is a much more complex issue than it appears and that the problems associated with the geographical aspect of physician distribution are commonly overlooked. The commonly used measures of physician availability in a specific area, such as the population-to-physician ratio, can be unsatisfactory at best and misleading at worst, if researchers do not pay due attention to the geographical aspect.

This article is based on an extensive review and a critical assessment of the literature, including research studies, health service planning reports and Internet documents. We examine how the geographic distribution of physicians has been measured by researchers, identify the problems they have encountered and assess the attempts to overcome these problems. An extensive literature search and review process was conducted.<sup>2</sup>

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#### The nature of the problem

Geographic distribution of physicians is just a short way of describing what is of interest to most people. Information solely about where physicians are located is of limited use. Instead, people are mostly interested in the spatial distribution of physicians relative to the spatial distribution of the population. This is why the population-to-physician ratio is the most commonly used measure in research and health service planning. It is a ratio that relates information on physician distribution to information on population distribution. Besides being fairly easy to construct and understand, it is the basis on which more elaborate indices of spatial distribution, such as location quotient and Gini index, are built.<sup>3</sup>

The population-to-physician ratio is used by many researchers and health service planners because of its simplicity and minimal data requirements. A survey conducted by the National Ad Hoc Working Group on Physician Resource Planning<sup>4</sup> of the Canadian Medical Association found that 9 of the 10 provinces employed this ratio in their planning activities. Health services planners in Canada have used population-to-physician ratios extensively in medical workforce

planning, beginning with the 1964 Royal Commission on Health Services.<sup>5</sup> However, pictures presented by population- to-physician ratios may be oversimplified or even misleading. The first step in advancing this area of research, as well as in supporting policy formulation and program planning, is to enhance our ability to describe the spatial distribution of physicians more precisely.

A typical population-to-physician ratio contains 3 pieces of information, both implicit and explicit: the geographic area within which the physicians and people are located, the number of physicians and the number of people. The number of people residing in an area need not necessarily be the total population. For instance, if the denominator is the number of geriatricians, the numerator could be the number of people aged 65 years and over in the area. Similarly, if the denominator is the number of obstetricians/gynecologists, the numerator could be the number of women in the area. Refinements of this deceptively simple ratio are attempts to conceptually clarify these 3 variables and to measure them more accurately. As noted earlier, this paper deals with only 1 of the 3 variables, namely, geographic area. The other 2 variables will be discussed in greater detail in a future issue of this Journal.

The "geographic area" that is implicit in any population-to-physician ratio presents 2 major problems. First, the geographic areas tend to be artificial and do not necessarily reflect the natural geographic patterns of health care delivery and consumption. This has a lot to do with data availability. As Taylor and colleagues<sup>6</sup> have pointed out, "finding data at the level of aggregation desired for identification of the underserved area is often very difficult...decisions regarding the definition of a concept or term that is key in research are often driven by the availability of data."<sup>6</sup> It explains the attractiveness of using province, county, health region or census division (CD) as the geographic unit of analysis since most population, manpower and health data are reported at the province, county, health region or CD level. Second, and somewhat related to the first point, is the assumption that all health care consumption and delivery activities take place within the defined geographic area. Such an assumption is often untenable.

### 1. Geographic units used

As Northcott<sup>7</sup> has observed, one of the major issues in discussing equity in the distribution of health services or practitioners rests with the unit of analysis. Geographic unit of analysis refers to what geographic area is to be adopted in determining the numbers of people and physicians to be included in the population-to-physician ratio. Various units have been used by researchers. For instance, at the sub-provincial level, both Anderson and Rosenberg<sup>8</sup> and Coyte and coworkers<sup>9</sup> used counties as the unit of analysis in their examinations of the distribution of physicians in Ontario. Pitblado and Pong<sup>10</sup> on the other hand, examined variations among public health unit districts in access to physicians and dentists in Ontario. Northcott<sup>7</sup> employed 2 geographic units of analysis in his study of physician availability in Alberta: CDs and incorporated cities, towns and villages. Contandriopoulos and Fournier<sup>11</sup> used health planning regions to examine access to medical services in Quebec. It is also very common to compare rural with urban areas. Because of the importance of this unit of analysis, "rural" is discussed separately and in greater detail

below. At the sub-national level, health planning reports and health workforce data documents typically use province and territory as the unit for comparison.<sup>12,13</sup>

At the international level, Deliège<sup>14</sup> and Mejia<sup>15</sup> compared countries with respect to population-to-physician ratios. Ray,<sup>16</sup> on the other hand, compared groups of countries at different levels of economic development with respect to the numbers of physicians and nurses per 100 000 population.

The major problem of using geopolitical or administrative areas, such as counties, or statistical enumeration areas, such as CDs, is that they are artificial and not necessarily the most appropriate units of analysis. Some units, like provinces, are simply too large and tend to hide regional variations. For example, in 19962 the overall Canadian population- to-physician ratio was 1022 for general practitioners/family physicians (GPs/FPs). Computed by province/territory, this ratio ranged from 769 in Yukon to 1359 in Prince Edward Island. The figure of 1022 for Canada clearly masks the provincial/territorial differences. Similarly, the provincial/territorial figures mask the population-to-GP/FP ratios when the ratios are computed using CDs as the unit of analysis. Whereas the range of the provincial/territorial population-to-GP/FP ratios is from 769 to 1359, the ratios computed at the CD level range from 392 to 8901! If a smaller unit of analysis (e.g., census subdivision) were used, the range would be even greater.

Other geopolitical or administrative areas may not reflect the planning, distribution or organization of health services. Even "health regions" may not be an appropriate unit of analysis. Take Ontario as an example. Although regional health services are supposedly planned and coordinated by the district health councils (DHCs), the recent DHC amalgamation exercise, driven mostly by government downsizing and budgetary constraints, has resulted in some mammoth planning regions discernible in such names as the "Durham, Haliburton, Kawartha and Pine Ridge District Health Council" or the "Algoma, Cochrane, Manitoulin and Sudbury District Health Council." Analysis of medical service provision or consumption, using DHCs as the unit of analysis, would not be very revealing. Similarly, Plain<sup>17</sup> has pointed out that in Alberta, the "administrative boundaries that have been drawn up for RHAs (regional health authorities) are not based on health care catchment boundaries or health market service market criteria." For these reasons, both Jacoby<sup>18</sup> and Kindig and Ricketts<sup>19</sup> have urged the adoption of units of analysis that are more appropriate for the study of physician services, such as "physician market area" or "health service trade area."

Researchers have experimented with other geographic units of analysis. Makuc and colleagues<sup>20</sup> have attempted to define national "health service areas" in the US. A health service area is an area with one or more counties that are relatively self-contained with respect to the provision of routine hospital care. Using cluster analysis, the authors were able to group all counties into 802 health service areas. These areas are more self-contained with respect to the provision of hospital services, thereby providing a more appropriate geographic unit than the county for measuring the availability of health care. Makuc and colleagues found that the median number of patient-care

physicians per 100 000 population was 84 for non-metropolitan health service areas and 132 for metropolitan health service areas.

Krasner and coworkers<sup>21</sup> have advocated the use of "zipcode sectional areas" as a geographic unit for analyzing the distribution of physicians in the US. These areas are identified by the first 3 digits of the 5-digit zipcode number. Because zipcode areas are established on the basis of local transportation patterns, they tend to approximate trading areas. Krasner and coworkers have examined the distribution of dermatologists in the US based on this unit of analysis. Using a similar rationale, Morrow<sup>22</sup> has promoted the use of Office of Business Economic (OBE) areas as the unit of analysis. OBE area designations are based on factors describing commuting patterns exhibited by people travelling to receive or sell their services and products in the US. According to Morrow, OBE areas are better approximations of health care market areas. In Canada, Roos and colleagues<sup>23</sup> have used "physician service areas" to study the needs for generalist physicians in Manitoba.

## 2. "Rural" as a geographic unit of analysis

One of the most commonly used geographic units of analysis in physician-distribution studies is "rural." In such studies, the unit of analysis is rural versus urban or rural versus nonrural. Instead of comparing physician availability in many units, researchers typically present physician distribution data for rural and urban regions with a view to emphasizing the disparities. In addition, some researchers have introduced the concepts of "frontier" and "remote" to distinguish the sparsely populated rural areas from those that have more inhabitants.<sup>24,25</sup> The Rural Committee of the Canadian Association of Emergency Physicians defines "rural remote" as rural communities that are 80–400 km, or about 1 to 4 hours' travel in good weather, from a major regional hospital; and "rural isolated" as rural communities that are more than 400 km from a major regional hospital.<sup>23</sup> In the US, the National Rural Health Association defines frontier counties as counties with less than 6 persons per square mile.<sup>24</sup>

However, there are almost as many definitions of "rural" as there are researchers. To make a bad situation worse, it is not uncommon for authors to use the term without specifying what it means. Bosak and Perlman<sup>26</sup> reviewed 178 rural mental health and sociology articles and found that 43% of them did not include a formal definition of rural. More recently, Ricketts and Johnson-Webb<sup>27</sup> have reviewed articles on physician practice locations and physician recruitment and retention issues published in the *Journal of Rural Health* between 1993 and 1995 and have found wide variations in how rural was defined. Furthermore, the concepts of rural and urban are not constant. Bollman and Biggs,<sup>28</sup> for instance, have documented the changing definitions of rural and urban as used by the Canadian Censuses of Population.

In its report, the Canadian Medical Association Advisory Panel on the Provision of Medical Services in Underserved Regions<sup>29</sup> defined rural communities as those with a population of 10 000 or less. This definition appears to be similar to the definition of "rural and small town Canada" used by Mendelson and Bollman.<sup>30</sup> "Rural and small town Canada" refers to the

population living outside the commuting zones of larger urban centres -- especially outside census metropolitan areas (CMAs) (i.e., areas with a population of 100 000 or more) and census agglomerations (CAs) (i.e., areas with a core population of 10 000–99 999). Statistics Canada<sup>31</sup> classifies areas into 5 categories: urban core (CMAs/CAs), urban fringe, rural fringe of CMAs/CAs, urban outside CMAs/CAs and rural. While agreeing that the Statistics Canada definition of rural is useful, the National Liberal Rural Caucus,<sup>32</sup> in its report titled "National Rural Health Strategy," maintained that communities with more than 10 000 people should be considered rural if their economic foundation is based on primary production and processing activities, rural culture or nature tourism.

In their study, Sanmartin and Snidal<sup>33</sup> defined Canadian rural physicians as those living in areas with a "0" (zero) as the second character (first number) in the postal code (e.g., K0A 2Y0). An agreement between the Ontario Ministry of Health and the Ontario Medical Association defines communities that have fewer than 10 000 people and are at least 80 km from an urban centre with 50 000 population or more as "specified" or "isolated" communities.<sup>24</sup> This is often used as a definition of rural in health service planning in Ontario.

Each of these definitions has its attractiveness and limitations. As an illustration, Wilkins<sup>34</sup> has discussed the potential of using the postal codes of patients and health care providers in the spatial analysis of health care provision. On the other hand, the shortcomings of the Canada Post definition of rural (i.e., areas with a "0" (zero) as the second character in the postal code) have been noted by Wootton.<sup>4</sup> Furthermore, although Wilkins' approach may have been useful in the past, it is becoming less so. Indeed, Canada Post has indicated that in the future this method of distinguishing between rural and urban areas will be extremely unreliable (Heather Kinsley, Manager, Address Management Data and Systems, Canada Post: personal communication, 1997).

Some of the major Canadian definitions of rural are summarized in [Table 1](#).<sup>24,31,33–40</sup>

To overcome the problems of using the conventional definitions of rural, Weinert and Boik<sup>25</sup> have designed the Montana State University Rural Index. This index assigns a value (degree of rurality) to each household on the urban/rural continuum using only 2 variables: population of the county of residence and distance to emergency care. In addition, Fickenscher and Lagerwey-Voorman<sup>41</sup> have differentiated 4 types of rural areas: adjacent rural areas, urbanized rural areas, countryside rural areas and frontier areas.

Leduc<sup>39</sup> is right when he opines that "[a] widely accepted and validated definition of 'rural' in the context of medical practice has not yet been developed in Canada." Perhaps, as Halfacree<sup>42</sup> has suggested, the search for a single, all-purpose definition of rural is neither desirable nor feasible. How "rural" should be defined depends on the task at hand. Thus, rural as a geographic unit of analysis is quite restricted in its utility. As it appears in most studies, the concept is either implicit or not consistently defined. Also, because rural covers a vast territory (about 90% of the land

mass in Canada can be considered rural) and is not sufficiently differentiated to reflect varying degrees of rurality, it tends to mask intraregional variations in physician availability and population dispersion. However, a rural–urban comparison can be effective in highlighting the gross unevenness in physician availability. Its imprecision notwithstanding, the term "rural" is unlikely to disappear from everyday parlance or health service planning discourse because it is such a convenient label and is so ingrained in our consciousness.

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### Complicating factors in choice of units

#### 1. Patient and physician mobility

The choice of geographic units of analysis is further complicated by a related factor -- patient and physician mobility.<sup>20–22,43,44</sup> As peripatetic creatures, patients and physicians are not necessarily constrained by administrative or geopolitical boundaries in seeking or delivering care. Trips to another community to seek or deliver care are common. Kleinman and Makuc<sup>45</sup> found that the percentage of physician visits that involved county-border crossing in the US varied from 7% for people in greater metropolitan core counties to 45% for those residing in rural counties. Similarly, Contandriopoulos and Fournier<sup>11</sup> have documented the substantial interregional mobility of physicians and patients in Quebec. In their study of physician visits by older persons in a retirement community in northern Ontario, Pong, Salmoni and Heard<sup>46</sup> found that, whereas more than 95% of the visits to GPs/FPs occurred within the community, over two-thirds of the specialist visits took place in other cities, which required patients to travel long distances.

What are the implications of border crossing? As mentioned earlier, the conventional population-to-physician ratio is based on the assumption that provision and consumption of medical care take place within a defined geographic area. This assumption is often untenable due to patient and physician mobility. The simple population-to-physician ratio may provide inaccurate information because the physicians represented in the denominator of the equation for a particular geographic area typically serve more people than those counted in the numerator. On the other hand, the people counted in the numerator may receive care from physicians outside the area where they reside.

Researchers inevitably find themselves caught in a Catch-22 situation when deciding what geographic unit of analysis to adopt. If the chosen unit of analysis is small, the measures of physician availability are likely to be distorted by patients' and/or physicians' cross-border travels. On the other hand, if the unit of analysis is very large, such as country, province or "rural," while people are less likely to journey beyond borders, the measures of physician distribution tend to hide intraregional differences.<sup>8,47</sup> Because of this analytical dilemma,

Connor and colleagues,<sup>48</sup> in their overview of the literature in this area, have differentiated 2 types of analysis. One type is called the "contained-area model"; this is based on the traditional concept of a self-contained local service area with well-defined boundaries, within which a local practitioner or a group of practitioners provides most of the care for local residents. The other is the "full-travel model"; it measures the effects of travel on physician access as a continuous function of distance or time. It allows each of several practitioners to have a portion of the market for a given population.

A number of analytical approaches have been suggested, with a view to overcoming the difficulties posed by geographic unit of analysis and/or travel by patients and physicians. For example, the Quebec Ministry of Health and Social Services<sup>49</sup> has proposed a physician resources distribution plan that estimates physician availability based on full-time equivalents (FTEs). The objective of the plan is to measure regional disparities in terms of availability and access to medical care. Data can be examined in several ways.

**Number of FTE physicians established in a region:** This refers to the actual production of services by physicians within a region, regardless of the origin of the patients receiving these services or the region in which they are provided.

**Number of FTE physicians available in a region:** This refers not to the region where the physicians are established but to the region in which services are provided.

**Consumption in FTE physicians by the population of a region:** This allows the examination of the volume of medical services consumed by the population of a region, translated into FTE physicians, regardless of the regions in which the services are consumed or the origins of the physicians providing them.

The difference between the number of FTEs established and the number of FTEs available provides an indication of the extent of itinerancy. On the other hand, the difference between the number of FTEs established or available in a region and the population's consumption, in terms of FTEs, provides an indication of the region's self-sufficiency in the provision of medical care.

Wing and Reynolds<sup>44</sup> have suggested another approach, which does not rely on non-overlapping geopolitical units. They have developed implicit physician service areas that are probabilistic and interpenetrating in order to yield estimates of the supply of physician services in small geographic areas. This is accomplished by allocating a portion of the services of each physician to his or her home area and to other areas in proportion to both the availability of potential patients and the propensity of patients to travel for medical care. The final estimate of the availability of physician services in each small area is the sum of the service proportions of every physician in all of the small areas. The total supply of physician services is the same as the original total, but the distribution is adjusted to reflect the time that patients are willing to spend in travel time to obtain medical care.

## 2. Electronic "travelling"

The problem of geographic mobility is going to become even more difficult to handle as telehealth becomes more pervasive and plays an increasingly important role in rural health care. Broadly defined, telehealth is the use of telecommunications and information technologies to overcome geographic distances between health care practitioners and service users for the purposes of diagnosis, treatment, consultation, education and health information transfer. To date, physician and patient mobility means, with few exceptions, travel from one location to another. In the not-too-distant future, mobility will mean both travelling by car, plane and train and "travel" on the electronic highway.

As telehealth technology becomes more powerful and affordable, interactions over long distances between physicians and patients, as well as between physicians and their colleagues, for medical purposes will become commonplace. Increasingly, face- to-face interactions will be replaced by "virtual" contacts. In a way, telehealth can be seen as a form of mobility, involving long-distance "travelling" by patients to see their physicians or vice versa by means of telecommunications.<sup>50</sup> As a result, the shape of rural medical service delivery could be altered substantially.

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### Other methods used

#### 1. Distance between physicians and population

Earlier we mentioned 2 major problems associated with using the population-to-physician ratio: the need to adopt an often artificially defined geographic unit of analysis and the assumption that there is no mobility across regional boundaries on the part of service providers and service users. These problems have presented many conceptual and analytical difficulties. For these and other reasons, some researchers interested in the geographic distribution of physicians, as well as other types of health services, have adopted a different approach by using distance between physicians and patients or potential patients as the analytical focus.

When access to medical care is the main concern, a more direct measure, and probably a measure that is more meaningful to most people, is the distance between service consumer and service provider or the amount of time needed to travel in order to access service. The issue is no longer the number of physicians in an area or the number of communities without a physician, but how far an individual has to travel or how much time he or she has to spend on travelling in order to access medical care. Thus, the level of analysis has shifted from the geographic area to the individual.<sup>18,51,52</sup> Nonetheless, as explained by Joseph and Bantock,<sup>53</sup> these 2 types of measure — population-to-physician ratios and distances between population and physicians —

are complementary. Whereas the former are indicators of broad supply and demand relationships across large regional units, the latter can be used to gauge the variability in potential access within a region.

The how-many-miles-to-the-doctor approach is not entirely new. Using data from the 1971 census, Angus<sup>54</sup> and Angus and Brothers<sup>55</sup> examined the geographic distribution of physicians in Alberta by using the "proximity of population to physicians" method, which was an attempt to establish a correlation, in terms of distance, between people and the physician closest to them, irrespective of the boundaries of regions or counties within the province. The researchers examined the average distance that populations, using the enumeration area (EA) as a base, would have to travel in order to obtain medical care. The distance was calculated between the centre of the EA and the centre of the municipality in which the physician was located.

Williams and coworkers<sup>52</sup> analyzed the distances that rural residents in 16 US states had to travel to receive medical care from various types of specialists and documented changes in physician availability in the 1970s. To estimate the distance to the doctor, they calculated the distance (as the crow flies) between a point corresponding to the centre of each 33-square-mile grid and a point corresponding to the latitude and longitude of the nearest physician of a designated specialty.

Joseph and Bantock<sup>53</sup> used a distance indicator to study changes in potential accessibility to GPs/FPs in Bruce and Grey Counties in Ontario from 1901 to 1981. In their study of accessibility of medical services in the Abitibi–Temiscaming region of Quebec, Thouez and colleagues<sup>56</sup> also used a measure of geographic access that incorporated the notion of distance between physician and population.

An attempt was made by Ng and colleagues<sup>57</sup> to examine the proximity of population to physicians in Canada based on the aerial distance to the nearest physician from a representative point within each of Canada's 45 995 EAs.

In our more recent work<sup>2</sup> we re-computed the distances between population and physicians for 1996, using the methodology described by Ng and colleagues.<sup>57</sup> In addition, distances between population and physicians were computed, using equivalent data for 1986 and 1991. We observed that the mean and median distances to the nearest physician decreased from 1986 to 1991 and again from 1991 to 1996. These distance trends reflect the increasing numbers of Canadians and the increasing numbers of physicians living in relatively large urban areas. The corollary to this observation is the fact that the distances to physicians for rural residents are increasing. We also observed that a GP/FP working alone in a community (i.e., very rural!) was generally located more than twice the distance from his or her nearest specialist colleague than counterparts who worked in communities with 2 or more GPs/FPs.

The population-to-physician distance methodology, employed by Ng and colleagues<sup>57</sup> and us,

suffers from the impact of artificially designated geographical units. Both populations and physicians are given locations by assigning postal codes to the centres of EAs. Distance computations are then made between EA centres. When a distance is computed as zero, this distance measurement is set to 0.5 km to acknowledge the fact that the population is not "living in the physician's office." For urban areas, this default minimum distance is likely to have little impact on the real median or mean distance between population and physicians. However, in rural areas where the EAs are very large, this approach probably underestimates the actual distances. True distances can be determined when and if we are able to obtain the precise locations of every physician and every person in the Canadian population!

## 2. Using "distance measures" in health service planning

The proximity-of-population-to-physician approach can be and has been used in health service planning. In the US, the Graduate Medical Education National Advisory Committee has recommended that 5 basic types of health services should be available within some minimum time standards: 30 minutes of travel for emergency medical care, 30 minutes for adult medical care, 30 minutes for child medical care, 45 minutes for obstetrical care and 90 minutes for surgical care. The 30-minute travel time for non-emergency medical care has become the standard in health service planning in the US.<sup>18</sup> In Canada, the Advisory Panel on the Provision of Medical Services in Underserviced Regions<sup>30</sup> has suggested that primary care should be available within 30 minutes, secondary care within 2 hours and tertiary care within 5 hours.

A physician resource planning approach has been developed in Saskatchewan, which assumes that residents will receive a particular service in the closest community where such service is available.<sup>58</sup> This approach is referred to as the "closest-to" population analysis. For any particular "closest-to" population analysis, it is necessary to first identify the communities that will provide the service. The next step is to assign the population closest to the provider community in terms of travel time, resulting in the calculation of a "closest-to" catchment area population for each provider community. The specialist supply is then distributed to each provider community in proportion to that community's catchment area population. If only 3 centres (Saskatoon, Regina and Prince Albert) are designated to provide specialist services, 28.7% of the population in 30 districts would have to travel 90 minutes to the closest one of these 3 centres, and 19.7% would have to travel more than 2 hours to the nearest centre. If the number of provider communities is increased to 6 (Saskatoon, Regina, Prince Albert, North Battleford, Yorkton and Moose Jaw), 16.3% of the population would have to travel more than 90 minutes to the closest of these centres. Only 7.5% would have to travel more than 2 hours to the nearest centre.<sup>58</sup>

[Table 2](#) summarizes the various geographic concepts or measures and their advantages and disadvantages.

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## Conclusions

The physician manpower pendulum appears to be swinging from a perceived surplus to a perceived deficit. Uneven geographic distribution is likely to be aggravated if there are insufficient physicians to go around. Smaller and more remote communities tend to be the first to feel the effects of an impending physician shortage. Thus, there will be more demands to find out where physicians are located, and our ability to accurately describe the geographic distribution of physicians, as well as to explain it, will be put to test.

We have highlighted in this article the problems facing researchers and how some of these problems have been dealt with. The need to use often artificially defined areal units in analyses is one of the most perplexing problems. This problem exists, to a greater or lesser extent, regardless of which methodology is used. Clearly, there is not a single approach that will serve all research or planning purposes.

We believe that the traditional population-to-physician ratio is a valid general planning tool. However, we also believe that these ratios are too often computed (because it is relatively easy to do so!) with little critical evaluation of what they actually mean in terms of geography. Without this critical evaluation, health care plans and policies designed to deal with rural health care delivery problems may be poorly conceived. Since many programs and policies designed to improve the availability of physicians in rural areas are made on the basis of population-to-physician ratios, it is advisable that researchers who use such ratios in their studies explain what the ratios mean and identify their limitations, with a view to making sure that policy-makers and health services planners are cognizant of the pitfalls of various methodologies and the intricacies in interpreting physician distribution data.

The issue of mobility looms large in how we describe physician distribution. Improvements in transportation have made it more convenient for people to travel to seek or deliver medical care, rendering the notion of static physician distribution unrealistic. As we have pointed out earlier, the widespread use of telehealth is going to be an even greater confounding factor. If travelling on the highway, railway, skyway and waterway has made the task of describing physician distribution more difficult, "travelling" on the electronic freeway will make the situation even more complex. The need to come up with new approaches to conceptualize and measure physician distribution has never been greater.

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Table 1. Selected methodologies used to define “rural” in Canada*			
Organization (source)	Population characteristics	Distance characteristics	Other/comments
Statistics Canada <sup>31</sup>	<1000 population <400 persons/sq km	Adjacency to census metropolitan areas (CMAs) and census agglomerations (CAs) used to provide subcategories	Each enumeration area of Canada classified into: <ul style="list-style-type: none"> <li>• urban core</li> <li>• urban fringe</li> <li>• rural fringe</li> <li>• urban outside CMA/CA</li> <li>• rural outside CMA/CA</li> </ul>
Canadian Medical Association and Canada Post <sup>33-35</sup>			Second character (first number) in postal code is a “0” (zero) <sup>33</sup>
Research Sub-Committee of the Interdepartmental Committee on Rural and Remote Canada <sup>36</sup> using the criteria of the Organization for Economic Co-operation and Development <sup>37</sup>	<150 persons/sq km	Adjacency to metropolitan areas. Northern hinterlands used to provide subcategories	Each census consolidated subdivision (CCS) classified into: <ul style="list-style-type: none"> <li>• agglomerated</li> <li>• intermediate</li> <li>• rural, metro adjacent</li> <li>• rural, non-metro adjacent</li> <li>• rural north</li> </ul>
Ontario Medical Association <sup>24</sup> www.oma.org	<10 000 population	Distances to a community of 50 000+ used to provide subcategories	Used to define groups of physicians re CME subsidies: Group 1, >80 km Group 2, 50–80 km
Canadian Association of Emergency Physicians <sup>38</sup>	<10 000 population	Distances from a major regional hospital used to provide subcategories: <80 km or 60 min 80–400 km or 1–4 h >400 km or >4 h	Rural close Rural remote Rural isolated
Society of Rural Physicians of Canada <sup>39</sup>	Drawing population (i.e., total number of people) of communities	<ul style="list-style-type: none"> <li>• distance from closest advanced referral centre</li> <li>• distance from closest basic referral centre</li> <li>• number of GPs within 25 km of community</li> <li>• number of specialists within 25 km of community</li> <li>• presence of an acute care hospital within 25 km of community</li> </ul>	The population and distance criteria are weighted to generate a score that is labelled as the General Practice Rurality Index.
Rural and Small Town Programme, Mount Allison University; prepared for the Canada Mortgage and Housing Corporation <sup>40</sup>	<ul style="list-style-type: none"> <li>• omitting CMA/CA communities as defined by Statistics Canada, divide census subdivisions into incorporated and unincorporated categories</li> <li>• compute means and standard deviations (SDs) of 3 variables: total population, population density, % workforce in primary industry</li> </ul>	Adjacency to CMA/CA used to provide subcategories of unincorporated communities	The number of SDs away from the mean of the 3 population criteria and the adjacency index added together to produce a score for each non-CMA/CA community to generate an 8-fold classification: Rural (4 categories) Small Town (4 categories)
*The methods included here are not wholly designed for use in defining “rural” for the purposes of health research or policy formulation.			

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Table 2. Selected features of geographical component of population-to-physician ratio computations		
Measure/Concept	Advantages	Disadvantages
Area: Administrative (e.g., province/territory, census division, public health unit, district health council and regional health authority)	<ul style="list-style-type: none"> <li>• “given”</li> <li>• excellent for quick overviews</li> <li>• few or small temporal changes in boundaries as areal units increase in size; therefore good for temporal analyses</li> <li>• data often keyed to or collected for these specific areas</li> </ul>	<ul style="list-style-type: none"> <li>• aggregated data provided most frequently (especially for larger areal units), therefore masking sub-regional variations</li> <li>• boundaries change more frequently for smaller units making time series analyses difficult</li> <li>• difficult to assess cross-border movements</li> <li>• may not reflect natural patterns of health care delivery or consumption</li> </ul>
Area: Service, market or trade areas	<ul style="list-style-type: none"> <li>• better reflects natural patterns of health care delivery and/or consumption</li> <li>• mobility patterns of health care providers and consumers better expressed</li> </ul>	<ul style="list-style-type: none"> <li>• not “given”</li> <li>• must be computed or derived; and often derived in order to capture the dynamic nature of service area boundaries</li> <li>• data rarely collected for such units on a regular basis</li> </ul>
Area: Forward sortation area (FSA) (i.e., areas with postal codes having “0” [zero] as the second character [first number])	<ul style="list-style-type: none"> <li>• “given”</li> </ul>	<ul style="list-style-type: none"> <li>• subject to frequent boundary changes that are not necessarily announced to researchers and health care planners</li> <li>• meant for postal delivery, NOT health workforce planning</li> <li>• depending on one’s definition of “rural,” boundaries may overlap rural and non-rural areas</li> </ul>
Area: Rural/remote	<ul style="list-style-type: none"> <li>• useful for rural health research, planning purposes</li> <li>• highlights gross disparities between rural and non-rural areas</li> </ul>	<ul style="list-style-type: none"> <li>• no agreement on definitions of “rural” or “remote”</li> <li>• “rural” accounts for about 90% of the Canadian land mass, too big for meaningful analysis</li> <li>• assumes a homogeneity (in terms of demographics, economics, etc.) across Canada that does not exist</li> </ul>
Distance: Straight-line measure	<ul style="list-style-type: none"> <li>• relatively easy to measure</li> <li>• able to be adjusted to serve future “distance” concepts that will emerge as a result of technological developments such as telemedicine</li> </ul>	<ul style="list-style-type: none"> <li>• fails to recognize real physical barriers like mountain ranges or lakes</li> <li>• fails to recognize actual travel routes</li> <li>• may not reflect travel times or similar measures of accessibility</li> </ul>
Distance: Road	<ul style="list-style-type: none"> <li>• better able to reflect travel times or similar measures of accessibility</li> <li>• becoming easier to measure with advances in GIS technology</li> <li>• other factors such as seasonal road conditions can be built in</li> </ul>	<ul style="list-style-type: none"> <li>• no standard, national road network yet for GIS analyses (although some provincial or sub-provincial datasets are very good)</li> <li>• other travel modes not recognized</li> </ul>

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General practitioner-to-population ratios and long-term family physician retention in British Columbia's health regions

Harvey V. Thommasen, MSc, MD, CCFP  
Amy T. Thommasen

CJRM 2001;6(2):115-22.

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**Objective:** To determine if there is a relationship between long-term retention of general practitioners (GPs) and low GP-to-population ratios, low specialist-to-GP ratios, and poor regional health indicators.

**Study population:** Rural British Columbia health regions located outside the lower mainland and outside southern Vancouver Island.

**Main outcome measures:** Health region GP-to-population ratios, health region specialist-to-GP ratios and 3 health indices were plotted against long-term GP retention rates. The long-term GP retention rate (i.e., percentage of physicians listed for 10 or more consecutive years in a health region community) was determined from physician directories published each year by the College of Physicians and Surgeons of British Columbia (1979–1980 to 1998–1999). Regional health indices used were: 1) age standardized mortality rates, 2) teen pregnancy rates, and 3) smoking rates. These indices were obtained from recent reports published by British Columbia's Provincial Health Officer.

**Results:** Health regions with the lowest long-term GP retention rates tended to be the more northerly ones. Health regions with low GP-to-population ratios and low specialist-to-GP ratios tended to have the lowest long-term GP retention rates. Health indices data reveal that health regions with high standardized mortality rates, high regional smoking rates and high teen pregnancy rates had the lowest long-term GP retention rates.

Conclusions: Provincial physician directory information can be used to investigate relationships between long-term GP retention rates and GP-to-population ratios, specialist-to-GP ratios and regional health indicators.

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Objectif : Déterminer s'il y a un lien entre le maintien à long terme des effectifs d'omnipraticiens (OP) et la faiblesse des ratios OP:habitants, le faible ratio spécialistes:OP et les indicateurs régionaux médiocres de la santé.

Population de l'étude : Les régions de santé rurales de la Colombie-Britannique situées à l'extérieur des basses-terres continentales et à l'extérieur du sud de l'île Vancouver.

Principales mesures de résultats : On a tracé la courbe des ratios OP:habitants et des ratios spécialistes:OP des régions de santé, ainsi que de trois indices de santé en fonction des taux de maintien à long terme des effectifs d'OP. On a calculé le taux de maintien à long terme des effectifs d'OP (c.-à-d. le pourcentage des médecins inscrits pendant dix années consécutives ou plus dans une communauté d'une région de santé) à partir des répertoires des médecins publiés chaque année par le Collège des médecins et chirurgiens de la Colombie-Britannique (1979–1980 à 1998–1999). Les indices régionaux utilisés ont été les suivants : 1) taux de mortalité normalisé selon l'âge, 2) taux de grossesses chez les adolescentes et 3) taux de tabagisme. On a tiré ces indices de rapports publiés récemment par le directeur médical de la Colombie-Britannique.

Résultats : Les régions de santé qui présentaient les taux les plus faibles de maintien à long terme des effectifs d'OP avaient tendance à être situées le plus au Nord. Les régions de santé où les ratios OP:habitants et spécialistes:OP étaient faibles avaient tendance à présenter les taux les plus faibles de maintien à long terme des effectifs d'OP. Les données sur les indices de santé révèlent que les régions de santé où les taux de mortalité normalisés, les taux de tabagisme et les taux de grossesses chez les adolescentes sont élevés présentaient les taux les plus faibles de maintien à long terme des effectifs d'OP.

Conclusions : On a utilisé les renseignements tirés de répertoires de médecins de la province pour étudier les liens entre les taux de maintien à long terme des effectifs OP et les ratios OP:habitants, les ratios spécialistes:OP et les indicateurs régionaux de la santé.

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#### Introduction

General practitioner (GP)-to-population ratios in all northern health regions and in many other

rural communities throughout British Columbia are below the provincial average.<sup>1</sup> A low GP-to-population ratio in a rural community implies a heavy workload for physicians, with long hours in clinic, onerous "on-call" obligations, professional isolation, relatively little uninterrupted free time for self and family, and difficulty securing time for vacation and continuing medical education (CME). A recent British Columbia Medical Association (BCMA) survey confirmed that rural BC physicians are concerned about all of these issues.<sup>2</sup>

The specialist-to-GP ratio is also below the provincial average in all northern health regions and in many rural communities.<sup>1</sup> One would predict that rural family physicians (FPs) who work in such communities manage more complicated patients with fewer laboratory and diagnostic services than their urban colleagues. The BCMA survey did find that rural FPs report significantly lower satisfaction scores with respect to issues such as access to lab and diagnostic services, appropriate procedural skills training, and access to specialists than urban physicians do.<sup>2</sup>

Other studies have also identified relatively long work hours, lack of time for self, family and CME, availability of procedural skills training, professional isolation, and income as important issues for North American rural physicians.<sup>3–10</sup> Low job satisfaction has, in turn, been associated with depression, burnout and the intention to move.<sup>6,11–17</sup>

BC's Health Officer recently released 2 reports summarizing regional health indicators (e.g., age-standardized mortality rates, teen pregnancy rates and smoking rates) for all health regions in BC.<sup>18,19</sup> One would predict that fewer FPs stay in health regions where the health status of residents is rated as poor because the work is harder in these regions.

We could find no published data that quantified a relationship between a suspected retention inhibitor and actual FP retention in a community or regional health area. Almost all of the information on physician retention comes from cross-sectional surveys on what physicians think and what they plan to do. The objective of this study was to determine if long-term retention of GPs, as measured by physician directory listings, can be used to demonstrate a relationship between GP retention and low regional GP-to-population ratio, low regional specialist-to-GP ratio, and poor regional health indicators.

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## Methods

The study population comprised the following 12 BC health regions located outside the densely populated lower mainland and southern Vancouver Island: East Kootenay (EK), West Kootenay–

Boundary (WK), North Okanagan (NO), South Okanagan/Similkameen (SO), Thompson (TH), Coast Garibaldi (CG), Central Vancouver Island (CVI), Upper Island/Central Coast (UI), Cariboo (CA), Northwest (NW), Peace Liard (PL) and Northern Interior (NI) (see [Fig. 1](#)).

Population estimates for communities were obtained from [1996 BC census data](#).

GP-to-population ratios and specialist-to-GP ratios for health regions in BC were calculated from BC Medical Services Plan regional health data.<sup>1,20,21</sup> Because some FPs work part-time, full-time equivalent data were used in this calculation, rather than the number of FPs working in a health region.<sup>1</sup>

Health status indicator data for age-standardized mortality rate,<sup>18</sup> teen pregnancy rate (15–17 years of age),<sup>18</sup> and smoking rate (over 12 years of age)<sup>19</sup> for each of the BC regions were obtained from the 1997 and 1998 Provincial Health Officer's annual reports.

Long-term GP retention rates for each health region were obtained from BC medical directories (1979–1980 to 1998–1999). All physicians listed in each directory for each community were tabulated on a spreadsheet. Only GPs/FPs were included in the study; specialists were excluded. Communities were organized into health regions, and the total number of FPs who stayed in each health region for more than 9 years was calculated.

The relationships between GP-to-population ratios and long-term GP retention rates; specialist-to-GP ratios and long-term GP retention rates; and long-term GP retention and the 3 regional health indicators were plotted, and trend lines were generated using a statistical program embedded in Microsoft Excel.

We attempted to validate medical directory information 3 ways.

- We asked the BC Medical Services Plan (MSP) office in Victoria for any physician count numbers. They had the 1997–1998 data for 57 Northern and Isolated Allowance (NIA) communities, data that were based on physician billings per community.
- We phoned clinics in each of these 57 NIA communities and asked the person who answered the phone (usually the receptionist, office manager or physician) how many physicians were living in that community and working full- or part-time.
- We conducted a randomized survey of rural physicians living and working in the NIA communities,<sup>11</sup> and used the results as a validation tool.

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## Results

Long-term GP retention for each of the health regions, calculated as the percentage of FPs listed in medical directories in each community for more than 9 years, is shown in [Fig. 2](#). Health regions with the lowest long-term GP retention rates tended to be the more northerly ones; those with the highest long-term GP retention rates tended to be the more southerly ones (see Fig. 1).

GP-to-population ratios versus long-term GP retention rates for each health region are shown in [Fig. 3](#). Health regions with the lowest GP-to-population ratios (expressed as FP full-time equivalents per 1000 population) tended to have the lowest long-term GP retention rates.

Specialist-to-GP ratios versus long-term GP retention rates for each health region are shown in [Fig. 4](#). Health regions with the lowest specialist-to-GP ratios tended to have the lowest long-term GP retention rates.

The relationships between long-term GP retention and the 3 regional health indicators are shown in [Figs. 5, 6](#) and [7](#). Health regions with the lowest age-standardized mortality rates (rate per 10 000 pop.) (Fig. 5), smoking rates (Fig. 6) and teen pregnancy rates (Fig. 7) tended to have the highest long-term GP retention rates.

The outcome of our attempts to validate medical directory information was encouraging. According to the BC Medical Services Plan billing data, there were 333 physicians working in the 57 NIA communities in 1997–1998. According to the 1997–1998 Physician Directory, the estimated total number of physicians in these 57 communities was 348 — a difference of only 15.

It was clear from our telephone interviews that people were less sure of the number of family physicians in the larger communities (especially those over 20 000). Responses to our phone survey indicated there were 302 physicians living and working in these communities — about 87% of the 348 estimate using the directories, and a number consistent with previously calculated year-to-year physician recruitment rates in rural BC.<sup>22</sup>

In a recent study of NIA communities, 198 surveys were mailed; 131 (66%) of them were returned.<sup>11</sup> A follow-up telephone survey of nonresponders revealed that 1 nonresponder was an unlisted foreign-trained specialist, 7 were on leave-of-absence, 8 had retired or were semi-retired, 2 were duplicate mailings (i.e., a physician working and listed at 2 different community sites), and 12 had moved. These physicians make up 15% of the survey population, which, again, is consistent with previously calculated year-to-year physician recruitment rates.<sup>22,23</sup>

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## Discussion

This study suggests that low long-term GP retention is related to variables that are associated with increased workload: namely, low GP-to-population ratios, low specialist-to-GP ratios and poor community health status. The findings also support cross-sectional survey data that indicate low physician-to-population ratios are associated with relatively heavy workloads, low job satisfaction, physician burnout and the decision to relocate away from rural communities.<sup>3–17</sup>

We argue that the association between poor community health status (i.e., high mortality rates, teen pregnancy rates and smoking rates) and low long-term GP retention rates reflects the heavier workload associated with poor community health. We could also argue that poor community health is negatively affected by physicians who do not stay in a community long enough to establish good working relationships with their communities. Unfortunately, cause-and-effect relationships cannot be established with this data.

Future research to investigate these relationships might include studying health indices in communities that are comparable in all respects, except that one has low GP turnover and the other has high turnover. Alternatively, one could monitor, prospectively, any changes in health indices when several "long-term" physicians leave a community at once.

Some of the limitations to our study include the observation that physician retention is a complicated issue involving more than just physician:population ratios, associated workload and on-call load. Turnover rates for physicians in a particular health region can reflect differences in the level of use of temporary physicians from overseas and from metropolitan areas — these physicians stay their mandatory time and then leave. Physician retention is also related to personal demographics (e.g., rural background or not), family status (e.g., raising a family or not), medical school training (e.g., exposure to rural medicine during training or not), professional concerns (e.g., medical confidence), practice characteristics (e.g., solo v. group), satisfaction with compensation (e.g., financial, professional, personal) and lifestyle preferences. Individual community characteristics, such as the size of the community, cultural opportunities available, percent of the population aged 0–5 years and over 65, and the presence or absence of a hospital, also affect physician location.<sup>24–28</sup>

Another limitation is that not all health regions in our study fit the expected pattern. For example, Coast Garibaldi health region stands out in Fig. 4 for having a high long-term GP retention ratio but a relatively low specialist-to-GP ratio. In fact, Coast Garibaldi health region is unique among the provincial health regions in that it is located relatively close to the North Shore and Vancouver health regions — regions with the greatest number of specialists in the province. In reality, the Coast Garibaldi health region has very good specialist coverage compared with other more northern or isolated health regions because specialists from the lower mainland areas make

frequent visits to Coast Garibaldi community clinics. The same may be true of other health regions, although not to the same extent. The fact that physicians and patients travel to other locations to deliver or receive medical care means one cannot always equate regional physician counts and regional population with service availability.

The final limitation of this study concerns the use of directory information.

- Not all FPs listed actually provide patient care; a few may have been semi-retired or retired physicians.
- A small number of physicians functioning as specialists in areas such as obstetrics, general surgery and urology, but not recognized officially by the College of Physicians and Surgeons of Canada, may have been counted as GPs/FPs.
- Directories do not list all FPs who work in a community; physicians functioning as temporary locums would not, as a rule, be listed.

In conclusion, provincial physician directory information can be used to generate qualitative relationships between physician retention and variables believed to affect retention — at least at the health region level. In future studies, we plan to examine the relationships between physician retention rates and factors that we suspect may affect physician retention at the community level. It will be interesting to see if relationships observed in this study are still apparent at the community level.

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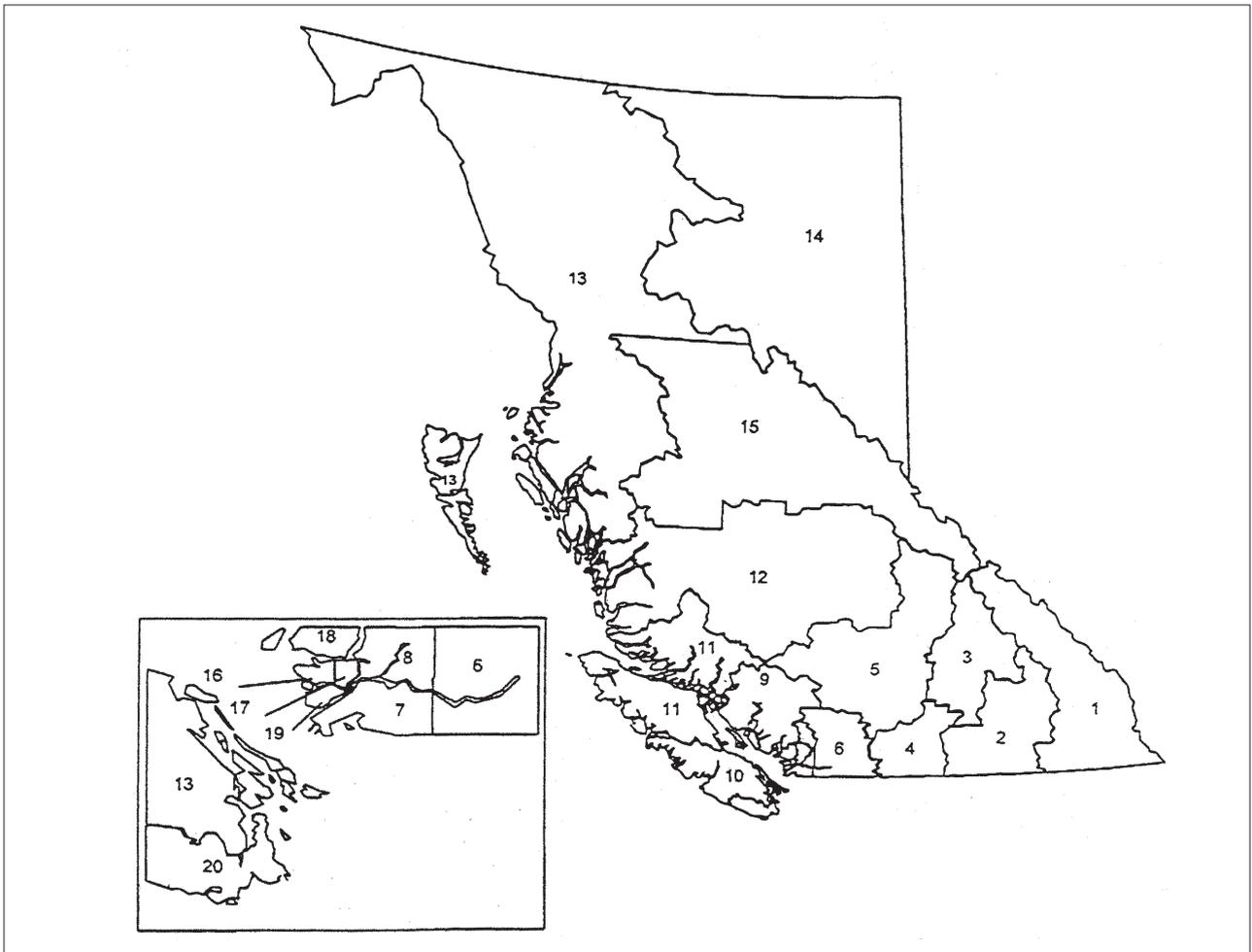


Fig. 1. Health regions in British Columbia. 1 = East Kootenay, 2 = West Kootenay, 3 = North Okanagan, 4 = South Okanagan/Similkameen, 5 = Thompson, 6 = Fraser Valley, 7 = South Fraser Valley, 8 = Simon Fraser, 9 = Coast Garibaldi, 10 = Central Vancouver Island, 11 = Upper Island/Central Coast, 12 = Cariboo, 13 = Northwest, 14 = Peace Liard, 15 = Northern Interior, 16 = Vancouver, 17 = Burnaby, 18 = North Shore, 19 = Richmond, 20 = Capital.

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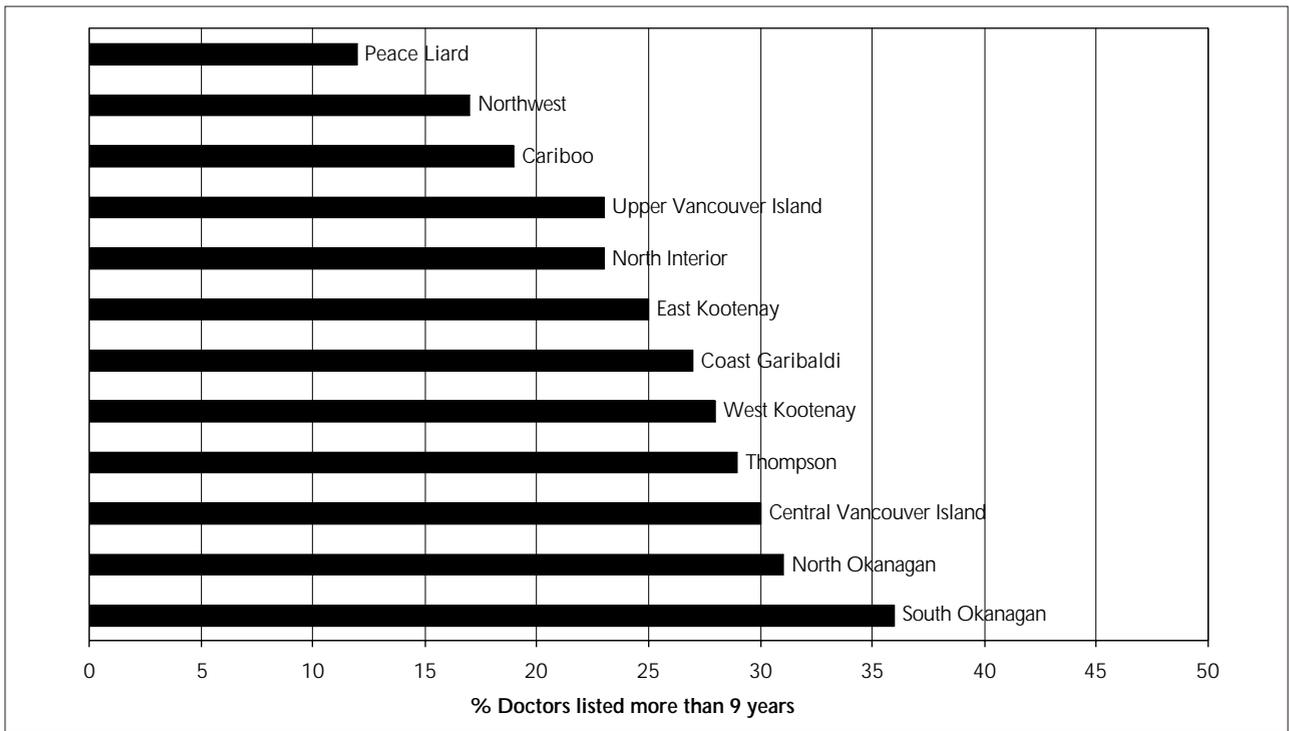


Fig. 2. Physician retention by health region.

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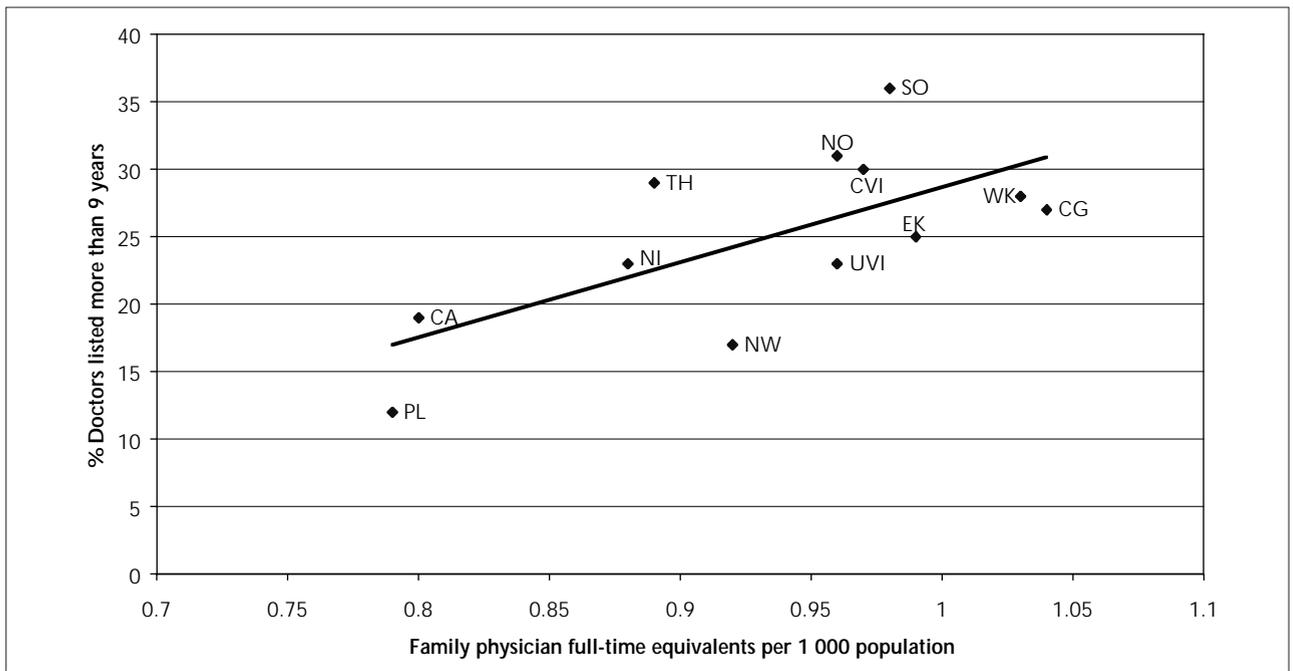


Fig. 3. GP full-time equivalent to population ratio versus physician retention. PL = Peace Liard, CA = Cariboo, NI = North Interior, TH = Thompson, NW = Northwest, NO = North Okanagan, UVI = Upper Island/Central Coast, CVI = Central Vancouver Island, SO = South Okanagan Similkameen, EK = East Kootenay, WK = West Kootenay-Boundary, CG = Coast Garibaldi.

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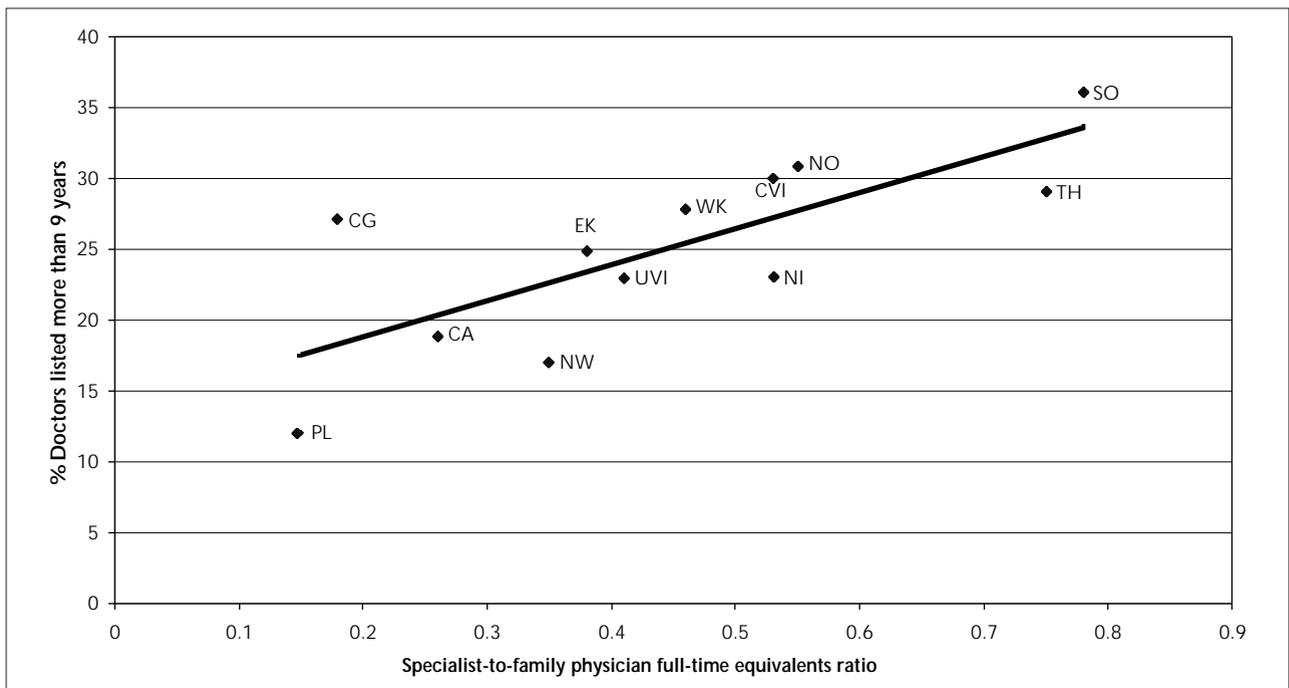


Fig. 4. Specialist-to-GP ratios versus long-term GP retention rates for each health region.

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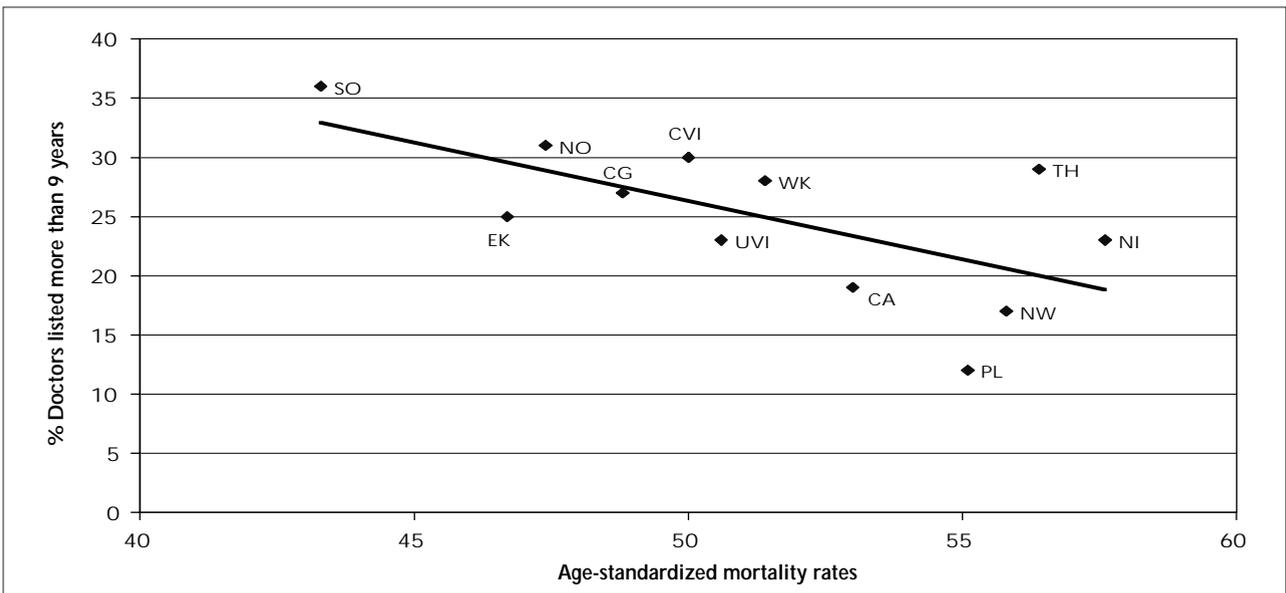


Fig. 5. Age-standardized mortality rate versus physician retention rates.

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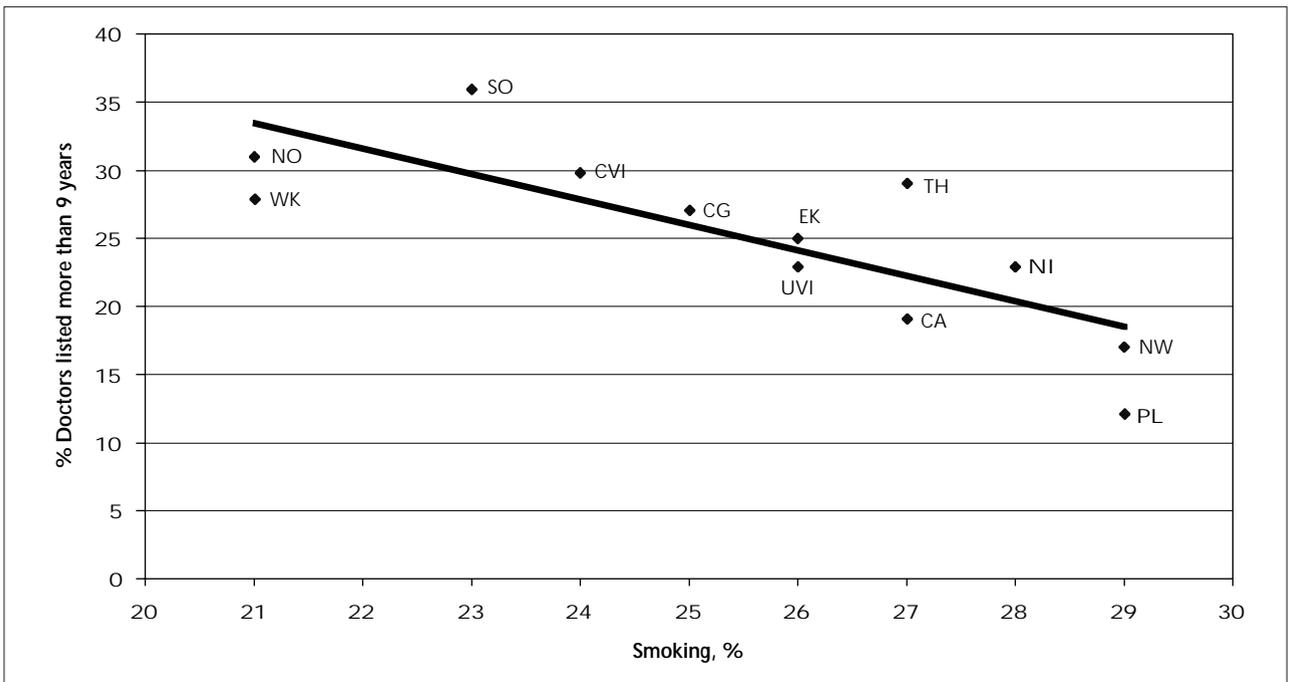


Fig. 6. Percentage of population who smoke versus physician retention rates.

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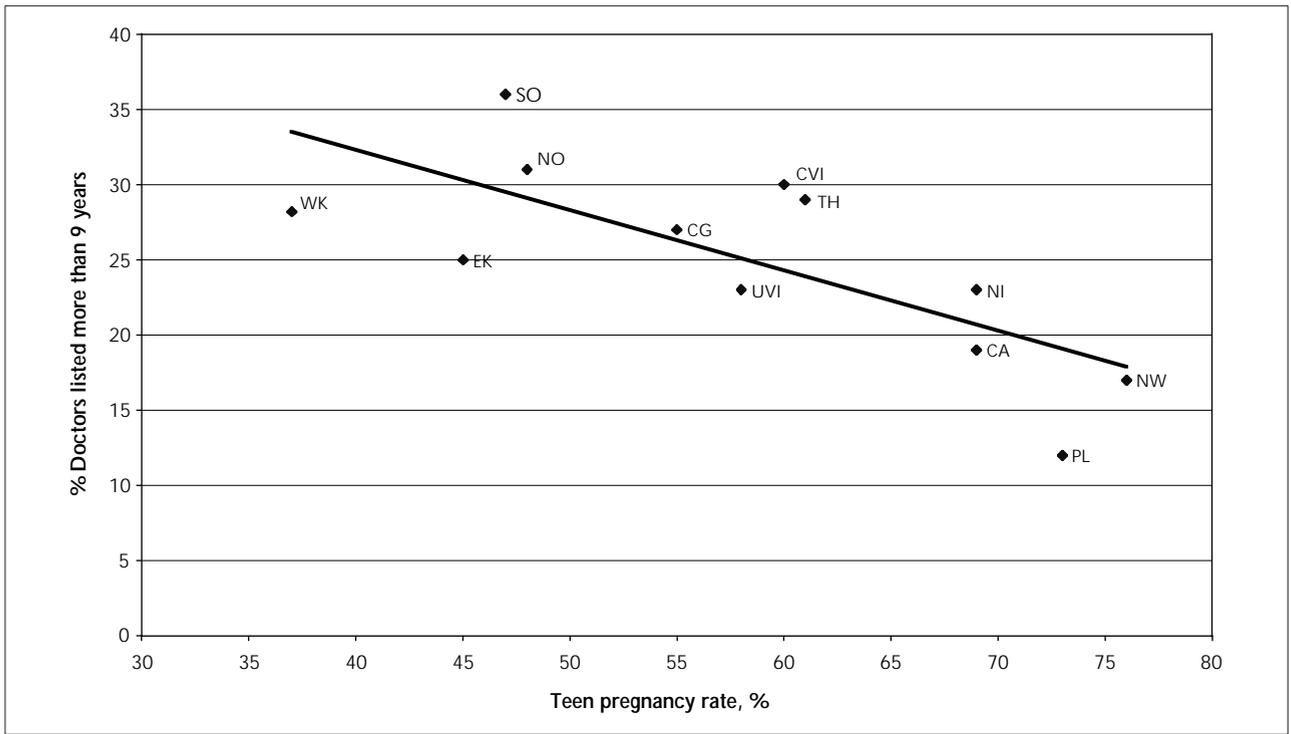


Fig. 7. Teen pregnancy rate (per 1000 females) versus physician retention rates.

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Administering chemotherapy in a rural setting: description of a successful program

Dave McLinden, BAartsSc, MD, CCFP

CJRM 2001;6(2):123-6.

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Delivering chemotherapy in a patient's home community, as part of a cancer care program, is described for the town of Sioux Lookout, Ont., 1 of 14 communities in the newly developed Northwestern Ontario Community Cancer Care Program. Elements are outlined that were found to be important for administering chemotherapy in a rural setting, including local requirements, systemic requirements and a well-defined philosophy or mode of operation. Patients benefit from a local cancer care program and so do family physicians, who gain an additional skill set.

On décrit la prestation de services de chimiothérapie dans la communauté d'un patient, dans le cadre d'un programme de traitement du cancer, à Sioux Lookout (Ontario), une des 14 localités participant au nouveau programme de traitement du cancer dans le nord-ouest de l'Ontario. On décrit les éléments jugés importants pour l'administration de traitements de chimiothérapie en contexte rural, y compris les besoins locaux, ceux du système et une philosophie ou un mode de fonctionnement bien définis. Un programme local de traitement du cancer est avantageux pour les patients tout autant que pour les médecins de famille, qui acquièrent des compétences spécialisées supplémentaires.

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The year was 1992. Mrs. H, 58, had recently been diagnosed with stage IIIA breast cancer. Her

mastectomy and staging had been done in her home community of Sioux Lookout, Ont., and everything had run smoothly until it was time for her adjuvant chemotherapy. She had to travel by car every 4 weeks to receive chemotherapy in Thunder Bay, Ont. (a 4-hour drive in good weather). The first cycle was not bad. She had a little nausea, but was able to get home comfortably.

The second cycle was a different story. Despite being given sufficient anti-nauseant after the chemotherapy, Mrs. H had to stop 3 times at the side of the road to vomit. In addition, the roads were icy; it took her 6 hours to get home. On her next visit to her family physician, she complained, "Why can't this be done here?"

The concept of delivering chemotherapy in a patient's home community as part of a cancer care program is far from new. Comprehensive cancer care has been available in rural areas in many northern US states for years.<sup>1</sup> There are rural communities throughout Canada where chemotherapy is delivered, but the literature describes few established chemotherapy programs. Trained family physicians have been administering chemotherapy in rural communities since 1985 within the Manitoba Outreach Program.<sup>2</sup> As well, outreach cancer care is administered in rural areas of northeastern Ontario through the Northeastern Ontario Regional Cancer Centre, located in Sudbury.<sup>3</sup>

This article outlines the elements that have been found to be important for administering chemotherapy in a rural setting. The experience in Sioux Lookout, 1 of the 14 communities in the newly developed Northwestern Ontario Community Cancer Care Program, is described.

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## The Northwestern Ontario Community Cancer Care Program

The hub of the Northwestern Ontario Community Cancer Care Program (NWOCCCP) is the Northwestern Ontario Regional Cancer Centre, located in Thunder Bay (herein referred to as the "regional cancer centre"). This regional cancer centre provides cancer care to a geographically massive area (one-third of the landmass of the province of Ontario, stretching from the north shore of Lake Superior, to Manitoba and Hudson's Bay). The region has a population of approximately 250 000. Decentralization of some of the duties of the regional cancer centre to the local communities is an obvious step, given these vast distances.

The NWOCCCP operates as a partnership with the regional cancer centre and the local community hospital. The patient is initially referred to the regional cancer centre, where the

diagnosis is made or confirmed and staging is undertaken if it has not already been done in the local community. A treatment plan is developed by the oncologist in the regional cancer centre and communicated to the local chemotherapy unit and the "designated family physician" in the community. The designated family physician is 1 of 2 family physicians from each community. These physicians have received extra training through the regional cancer centre and are involved in ongoing cancer care education (see "Systemic requirements"). The first cycle of chemotherapy is often administered at the regional cancer centre. Subsequent cycles are then administered in the patient's own community, with communication by fax, email or phone before and after each cycle. Radiotherapy, alone or in conjunction with chemotherapy, is administered at the regional cancer centre. Complications, side effects and blood work are monitored locally, in conjunction with the responsible oncologist from the regional cancer centre.

### The philosophy

In order to bring together all the professionals (oncologists, family physicians, nurses, pharmacists) necessary to administer chemotherapy in a rural community, it is important to have a generally understood philosophy. This philosophy, or mode of operation, may be summarized as follows.

- The standard of care must be the same whether chemotherapy is administered in the rural community or at the regional cancer centre.
- Communication on a routine and emergent basis between the community physician and the oncologist at the regional cancer centre must be maintained at all times.
- Education of the community health care workers (designated family physicians, nurses, pharmacists) must remain an ongoing priority.
- Impact on the local hospital services (especially financial impact) should be minimized.

### Local requirements

At the community level, the requirements necessary to administer chemotherapy may be divided into two areas: physical requirements and personnel requirements.

#### Physical

- A clean, comfortable, private area where the patient may receive the chemotherapy
- A type IIb biological fume hood for mixing of the chemotherapy agents (This is often a health and safety issue for the hospital. Generally, manufacturers' recommendations are that chemotherapy agents need to be mixed only in a still-air environment. The mixing instructions for each agent should be checked.)
- Intravenous (IV ) pumps
- Access to fax/phone/computer.

#### Personnel

- Two trained, "designated" family physicians
- Nursing staff trained in chemotherapy (In my community, we have 5 trained nurses, but this number can vary, depending on chemotherapy volume and other duties of the nurses.)
- Pharmacy services for mixing medications and for monitoring. (If a pharmacist is not available, pharmacy technicians can be trained or the physician, in some cases, may mix the agents.)
- Supportive care services (e.g., nutritionist, social work, pastoral care) are helpful.

### Systemic requirements

**Education:** The NWOCCCP, as a system, has done much to fulfill the requirements necessary to administer chemotherapy in the rural setting. The first and possibly most important systemic requirement is education of personnel from the rural communities who will be involved in administering the chemotherapy. Within the NWOCCCP, all nurses who will be administering chemotherapy must take a chemotherapy course. This can be accomplished through distance education. In addition, they must be involved in a practicum with an experienced cancer care nurse at the regional cancer centre. Designated family physicians are invited to educational weekends hosted by faculty from the regional cancer centre and the communities. These funded weekends are held twice a year. There are also monthly teleconferences among all the communities and the oncologists from the regional cancer centre; patients are discussed and educational sessions are presented. Local pharmacists are offered practicums at the regional cancer centre.

In terms of the education of the designated family physicians, it should be noted that great emphasis is placed on how to deal with the complications of chemotherapy, as well as the many issues surrounding its administration. Teaching modules concerning oncologic emergencies have been developed over the past several years through the regional cancer centre. All designated physicians have been exposed to these modules, and each community has copies of them. Designated physicians may use them to teach colleagues, nurses and pharmacists, among others.

**Financial:** There are few rural hospitals that can afford the chemotherapy agents or the small improvements necessary to run a local chemotherapy program. The NWOCCCP was fortunate to receive initial funding from the Ministry of Health and then the Northern Heritage Fund Corporation. This allowed the program to purchase fume hoods, IV pumps, chemo-chairs and computers for the local hospitals. As well, these monies have been used to purchase the chemotherapy agents that are sent to the local hospital from the regional cancer centre on a patient-to-patient basis.

**Communication:** There must be well-established 2-way routine communication between the regional cancer centre and the local hospital, so that each facility is aware of what is happening to their shared patient. In the NWOCCCP, the fax has been the mainstay of this routine communication, but email is becoming a more popular form of communication. In addition to routine communication, there must be barrier-free communication between the regional cancer

centre and the local personnel, on an urgent or emergent basis. Physicians or nurses who encounter a problem or have a question while administering chemotherapy must be able to communicate with their more experienced counterpart in the regional cancer centre in a timely manner.

With this seamless communication, evaluation of the NWOCCCP becomes a much easier undertaking. In this program each patient is generally seen by an oncologist before and after his or her entire course of chemotherapy. Also, each chemotherapy treatment is documented and reviewed by an oncologist and a nurse at the regional cancer centre. Feedback is given to the designated physician and the local chemotherapy unit on a regular and as-needed basis. A patient satisfaction survey is in the planning stages for the entire program.

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#### Conclusions

It is hoped that this article has revealed some of the possibilities for administering chemotherapy in a rural area. The benefits to our patients are obvious. The rural physician accrues an additional skill set while learning more about cancer care that can only assist her or his cancer patients who are not receiving chemotherapy.

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Competing interests: None declared.

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This article has been peer reviewed.

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Rural patient stories / physician management narratives. 4. Long-term pediatric genetic disease

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CJRM 2000;6(2):123-6.

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In developing the "Postgraduate Education for Rural Family Practice. Vision and Recommendations for the New Millennium" report,<sup>1,2</sup> the Working Group felt it was important to illustrate rural family practice with a series of rural patient stories / physician management narratives.<sup>1-6</sup> These case studies demonstrate the broad range of knowledge, skills and attitudes used by rural family physicians in responding to the needs of their patients. They provide examples of rural maternity care,<sup>4</sup> mental health care,<sup>5</sup> trauma care<sup>6</sup> and long-term pediatric genetic disease care. They are based on real-life dramas from diverse rural locations across the country. Certain details of these patient stories / physician management narratives have been altered or based on composite examples to protect the identity of the individuals involved. The fourth in the series, a case study on long-term pediatric genetic disease, appears here.

### Patient's history

A young woman, pregnant with her third child, presents in labour. She progresses to an uncomplicated delivery. Soon afterward, the neonate is noted by the delivering physician to be "grunty," and a meconium ileus is also diagnosed. The baby is resuscitated with intravenous lines, ventilatory support and antibiotics. Following stabilization the infant is air medevaced to a tertiary care pediatric centre. The rural physician explains the possible diagnoses to the parents, who cannot travel for 24 hours.

### Knowledge of

1. Normal low risk obstetrics
2. Signs of respiratory distress in the newborn

3. Causes of early onset respiratory distress
4. Local resources for support of a sick neonate versus those of the tertiary centre
5. Issues involved in transfer

## Skills

1. Ability to perform a normal delivery in the absence of surgical support
2. Ability to obtain neonatal venous access, including umbilical lines
3. Ability to use the neonatal incubator for transport
4. Ability to communicate well with the tertiary team, local staff who need to provide interim support to the neonate, and with parents

## Attitude

1. Vigilance for the unexpected
2. Willingness to recognize that the parents are patients too, and in need of support
3. Clinical courage to deal with a difficult and unexpected situation

In the ensuing year the infant's medical progress is a stormy one, with long periods of mechanical ventilation and episodes of severe extremis while in the pediatric facility. The rural physician becomes the channel for information for the parents, who cannot be with the child for long periods of time. Eventually the infant is discharged home to her rural community, with a confirmed diagnosis of cystic fibrosis (CF). To maximize the family's time together, the plan is for her care to be managed by the local rural family physicians and, periodically, by the tertiary centre pediatricians.

In the following years, the child suffers delays in growth and development, nutritional problems, repeated hospital admissions, many long courses of IV antibiotics, and physiotherapy. The rural family physician spends much time with the parents, reassuring them and keeping them abreast of any new developments in the management of this illness. The child experiences numerous acute exacerbations of her condition, pneumonia and septicemia. She frequently needs IV treatment requiring central lines, cut-downs and jugular access. Repeatedly, decisions have to be made as to when she needs intervention and whether the interventions could be delivered locally or require tertiary support. The rural physician remains in close, frequent contact with the appropriate specialists, who also know this patient well.

## Knowledge of

1. Cystic fibrosis and complications — developed as part of the MDs commitment to lifelong learning
2. Normal and abnormal growth and development
3. Medical emergencies such as sepsis

#### 4. Local centre and local capabilities versus those of the tertiary centre

### Skills

1. Communication
2. Venous access in a child
3. Physical assessment to diagnose illness
4. Team coordinator: organizing and coordinating the team, from home care workers to physiotherapists to the tertiary specialists, to ensure optimal delivery of care

### Attitude

1. Commitment to lifelong learning
2. Commitment to continuity of care

Despite genetic counselling that resulted in the parents' decision for the mother to undergo tubal ligation, she becomes pregnant 7 years later — the result of a failed tubal ligation. Antenatal diagnosis is offered but because of religious convictions, is declined. Fortunately, the child is born safely, in the tertiary care centre in anticipation of the possibility of CF. However, the infant has no neonatal respiratory problems and it is later concluded that the infant does not have CF. The family, which has limited financial resources, continues to live in their rural setting, struggling to deliver care to their 7-year-old child with CF and to respond to the needs of their other children.

Because it is too difficult and too costly to see the specialists at the tertiary centre frequently, the care and supervision of care is taken on by the rural physicians and the small rural hospital and staff. There are multiple, long, in-hospital stays for the daughter with CF, frequent physiotherapy, inhalation therapy, and IV therapy delivered via scalp IVs, saphenous IVs and central lines. She experiences recurrent infections, slow malnourishment, constipation and rectal prolapse, all of which are dealt with locally.

A decision is made to insert a permanent indwelling line. While in the tertiary care pediatric intensive care unit (ICU) however, the child becomes septic, has a respiratory arrest and is resuscitated; there is a prolonged stay in the ICU on the ventilator. The line is found to be colonized and is withdrawn. A decision is made to not reinsert it. While the mother has been in the tertiary centre for the duration of the child's stay, the father has stayed at home with the other children, and it has fallen to the rural family physician to interpret and relay information provided by ICU staff to the rest of the family.

### Knowledge of

1. Management of complications of CF

2. Interventions that can minimize need for repeated IV access (i.e., indwelling lines) and the complications of these
3. Local resources one could involve to support the family (e.g., social worker, clergy)

## Skills

1. Communicating bad news
2. Communication with tertiary centre specialists

## Attitude

1. Commitment to continuity of care for the family

Over the next year, the child's condition deteriorates. She requires home oxygen, nasogastric feeding and treatment for repeated pseudomonal infections. She subsequently develops rapidly progressing pulmonary hypertension and cor pulmonale. Despite intensive treatments and long counselling sessions she deteriorates physically, and slowly gives up. She eventually is admitted in extremis; hope and all will to live have long since faded. Both parents are totally drained by the previous years of care. Given the clinical state of the child, a decision is made not to transfer her out. Shortly after her admission, she is assessed as cyanosed, limp, and is noted to be tachypnoeic. There has been no improvement despite aggressive treatments. The rural physician discusses issues of palliative care with the parents and family, and a decision is made to keep the child comfortable and minimize aggressive measures. When it is apparent that she is about to die, the rural physician disconnects all lines and lifts the frail child into her father's arms. He rocks her, hugging her tightly, and, in time, she slips away. . . . The sadness is all consuming . . . the hospital now a morgue . . . all that could be done was done. Although a player in this tragedy, the rural physician now again becomes the continuing care giver: a lifetime of counselling for the parents and the remaining siblings. The rural physician knows how this will continue to affect the family and the rest of their small community. The family physician seeks support from other sources once again, for the family, the hospital staff who have grown to be very involved in the life of the little girl, and for himself.

## Knowledge of

1. Palliative care and end of life issues
2. Natural history of CF
3. The effects of the death of a child on the health care team
4. The grief process for parents and siblings

## Skills

1. Communicating bad news
2. Grief counselling
3. Ability to support the health care team as the team leader

## Attitude

1. Ongoing commitment to care for the family
2. Willingness to recognize the toll that the death of such a patient can take on one's own psyche, and the willingness to seek measures to prevent burnout.

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The Working Group was a diverse group, comprising members of the College of Family Physicians of Canada (CFPC), the Society of Rural Physicians of Canada (SRPC) and a representative from the Royal College of Physicians and Surgeons of Canada. The group included practising physicians from rural and remote communities across Canada whose practice profiles included special skills and interests in such areas as anesthesia, obstetrics and emergency work. It included physicians involved in teaching both students and residents for rural practice, family medicine residents, rural program coordinators, a postgraduate family medicine program director, and an associate dean of postgraduate medical education. The group was directed "to review the current state of postgraduate education for rural practice in Canada and to outline an appropriate curriculum to prepare new family physicians for the challenges of rural practice."<sup>1-3</sup> The report was endorsed by the SRPC in April 1999 and approved by the CFPC Board in May 1999.

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This article has been peer reviewed.

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Country cardiograms case 19: Five-in-one

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CJRM 2001;6(2):131

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This 83-year-old woman was a patient in our long term unit. She had a history of mild stable angina, but had had no obvious angina since suffering a stroke 5 months previously. [The cardiogram](#) was done during an episode of "vague chest pain."

What is your interpretation of the EKG? Hint: There are at least 5 things wrong.

Would you recommend this patient for a pacemaker?

For the Answer see [page 141](#).

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This article has been peer reviewed.

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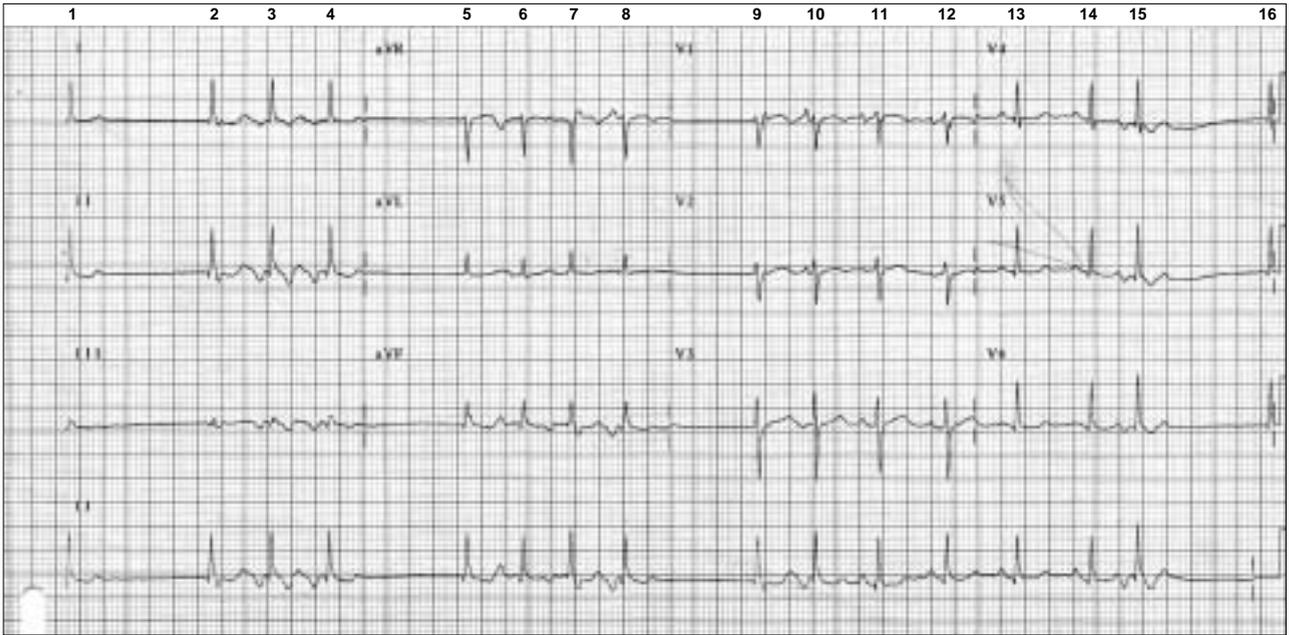


Fig. 1. Results of patient's electrocardiogram, done during an episode of "vague chest pain." / Résultats de l'électrocardiogramme d'une patiente, lors d'un épisode de «douleur diffuse à la poitrine».

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Country cardiograms case 19: answer

CJRM 2001;6(2):141

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This cardiogram is a bit difficult to interpret. Our cardiology consultant said it would be a good cardiogram to show candidates at the cardiology FRCP examination. There are 5 abnormalities:

1. sinus arrest
2. junctional escape rhythm
3. multifocal atrial tachycardia (MAT)
4. atrial flutter
5. low atrial or high junctional atrial premature contraction (APC)

What initially struck us was the presence of 4 pauses, each lasting about 1.3 seconds, and each followed by "grouped beats." Each pause is followed by a beat (2, 5, 9, 13, 16) that lacks a preceding P wave and thus appears to be a junctional escape beat following an apparent sinus arrest. The cardiac escape mechanism is doing its job in starting a rhythm after a sinus arrest. Furthermore, group 2–4 appears to be atrial flutter, group 5–8 appears to be MAT and group 9–15 appears to be sinus rhythm interrupted by a low atrial or high junctional APC (beat 15).

Because of the patient's age, the EKG suggests a "sick sinus syndrome." In the case of sinus abnormalities one must always think first of drug-related causes. This patient was on digoxin, but the blood level was subsequently found to be 1.2 nmol/L, which was probably too low to cause these EKG signs. In view of her age, ischemic heart disease would seem to be the likely cause.

Since there was no syncope and the pauses lasted less than 2–3 seconds, a cardiology consultant felt that a pacemaker was not indicated.

For the Question, see [page 131](#).

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Competing interests: None declared.

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Électrocardiogramme en région rurale, cas 19 : cinq en un

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CJRM 2001;6(2):131.

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Cette patiente de 83 ans était hospitalisée dans notre unité de soins de longue durée. Elle avait des antécédents d'angine stable, mais aucun symptôme d'angine depuis un accident cérébrovasculaire, survenu cinq mois auparavant. [L'électrocardiogramme](#) a été effectué au cours d'un épisode de «douleur diffuse à la poitrine».

Quelle est votre interprétation de cet électrocardiogramme? Indication : Il y a au moins cinq anomalies.

À votre avis, cette patiente devrait-elle recevoir un stimulateur cardiaque?

Voir la réponse en [page 141](#).

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Intérêts concurrents : aucun déclaré.

Cet article a fait l'objet d'un examen par les pairs.

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Électrocardiogramme en région rurale, cas 19 : réponse

CJRM 2001;6(2):141.

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Cet ECG est quelque peu difficile à interpréter. Notre cardiologue consultant nous dit qu'il constituerait un excellent choix pour l'examen du Collège royal en cardiologie. On constate cinq anomalies :

1. arrêt sinusal;
2. échappement jonctionnel;
3. tachycardie auriculaire multifocale;
4. flutter auriculaire;
5. contraction auriculaire prématurée ou jonctionnelle.

Nous avons d'abord remarqué la présence de quatre pauses, chacune d'une durée approximative de 1,3 seconde, chacune suivie d'un «groupe de battements». Chaque pause est ensuite suivie d'un battement (2, 5, 9, 13, 16) sans onde P précédente, ce qui semble indiquer un échappement jonctionnel suivi de ce qui semble être un arrêt sinusal. Le mécanisme d'échappement cardiaque fait son travail et reprend le rythme après l'arrêt sinusal. En outre, le groupe 2-4 représente probablement un flutter auriculaire et le groupe 5-8, une tachycardie auriculaire multifocale, tandis que le groupe 9-15 serait un rythme sinusal interrompu par une contraction auriculaire prématurée ou jonctionnelle (battement 15).

Étant donné l'âge de la patiente, l'ECG semble indiquer une «maladie du sinus». Dans le cas d'anomalies sinusales, il faut toujours penser d'abord à la possibilité d'un effet secondaire des médicaments. La patiente prenait de la digoxine, mais la digoxinémie était de 1,2 nmol/L, probablement trop faible pour causer des symptômes. Étant donné son âge, une cardiopathie ischémique semblerait être en cause.

Comme la patiente ne présentait pas de syncopes et que les pauses duraient moins de 2 à 3 secondes, un stimulateur cardiaque n'était pas indiqué.

Voir la question en [page 131](#).



The main man

John Wootton, MD

Scientific editor, CJRM Shawville, Que.

CJRM 2001;6(2):134.

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The news is grim. At least six men injured. Several burned, and several more crushed by falling timbers. Some assistance has been rendered at the scene, but there is too much chaos, too much smoke. The surgeon has been "on-call" without a day, an hour, off for the last month. He readies his workspace to receive the injured. There are few hands to help him, they are short staffed and have been for as long as he can remember. Nor can he expect help from distant colleagues — he is on his own, but has learned to live with it. What he is able to do for these injured men will be the work of his hands, the product of his training, the result of his preparations.

How has he prepared for this moment that he knew must come? At hand are his instruments: trephine, tourniquet, scalpels, clamps. Equally important and equally at hand, his laudanum, his purgatives...

Hold on there! Where are we? Perhaps you thought this rural general surgeon could be found in the logging country of British Columbia, or cut off in midwinter in the mining country of northeastern Ontario?



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Royaliste (right forefront) and fleet prepare to attack Fort York

No, this fellow toiled in the grandest rural landscape of them all, cut off from his colleagues by more formidable barriers than the rockies, the prairies, or even the vast northern tundra. His emergency room was in the middle of the Atlantic Ocean, aboard a British Royal Navy Frigate, two hundred years ago.

We have come in this publication, and elsewhere, to distill the definition of "rural" to its essences. One of these involves the relative isolation of the practice of rural medicine, the requirement for self reliance, the "making do" with what is at hand. The naval surgeon in the time of Nelson fit this description exactly. He was isolated for months at a time. His skills were almost inevitably needed, and if the ship engaged in significant action the "acuity" of the injuries he must treat would be of the highest order. Death was a common outcome, in some cases the best outcome. "Them that dies is the lucky ones!" was a slogan expressing a common sentiment.

But what chance did he have to make a difference, and what were his tools and his medicines? What would it have been like to have been a Dr. Maturin aboard an HMS Surprise? There are many fictional accounts of the Napoleonic wars at sea, including the incomparable series of 19 novels by the late Patrick O'Brian, and latter day history buffs have been known to spend their summers attempting to recreate some of that nineteenth century ambiance.

One such vessel is the 60-ft topsail ketch Royaliste, its unlikely home port the landlocked rural county of Pontiac in West Quebec, where her likable captain hauls her each winter to adorn the front yard of his farm, and provide endless hours of "winter work" in keeping this period wooden vessel in fighting trim.

I was privileged to step into that naval surgeon's role (and costume) as we led a flotilla of tall ships in a re-enactment of an attack on Fort York last summer as part of Toronto's Canada Day celebrations. The date was 1813, we were actually flying an American flag, and the British were our targets.

We were armed to the teeth, with mortars and cannon, boxes of black gunpowder (and earplugs), boarding pikes and a crew of bloodthirsty (well, thirsty anyway...) privateers. We acquitted ourselves admirably, sustaining no casualties (the butcher's bill was zero), lost no one overboard, and the surgeon was called upon only once... to remove a sliver.

In 1813 the surgeon would have had much more serious work to do. His role was to keep his head down, his scalpels sharp and his men alive. The imaginary cannon balls that followed on the heels of our absolutely non-imaginary explosions on deck would have sent guns spinning out of their blocks and into their gunners, would have split mast timbers and sent them crashing onto the heads of the sailors below, and would have sent splinters as sharp as bayonets into any unfortunates standing in their way. On deck the planks were painted ochre so that blood did not show and panic the crew, but below, for those who made it down there alive, the business of saving lives took over.

For many wounds the surgeon's main hope lay in amputation, if not immediately, then later after it was clear that infection had set in. By then, however, it might be too late and the brutal decision of immediate amputation was often a life-saving one.

Having in many cases lost a good deal of blood, many injured seamen would have been semi-comatose while they were being attended to. I imagine that the urgency of the procedures required, particularly to stem the flow of blood, made considerations of pain relief impractical. If there was time and the press of other demands was not too great, laudanum could be administered to relieve pain, but this was employed most commonly in the postoperative period, to those who survived. That is, if any remained after a long voyage, and if the surgeon had not been feeding his own habit from the medicine chest.

The surgeons of the day were superb anatomists. Their skills were honed by dissection and experience, and their knowledge of pathology informed by specimens showing every tendon, muscle, nerve and vessel. Their knowledge of disease may have been imperfect, but their knowledge of injury must have been impressive. They were aware that the presence of foreign bodies was a death sentence and they took many risks to remove the wood and metal that sea battles deposited into the bodies of the crew. They knew about cautery and heated metal pokers to sear wound tracts to ward off infection. They held purgatives in the highest regard for a great many complaints and carried a large number of laxative and emetic substances including the sap of the ipecacuanha root (ipecac) and sulphur mixed with hog's lard as a purge.

As is now widely known, the British Navy was the first to formally introduce citrus fruits into the seaman's diet (hence the appellation "limey"), in spite of which it took another hundred years for the rest of the world's sailors to learn the benefits of this simple stratagem to ward off scurvy.

In the end however, nature often took its course. Many survived their injuries, but many more were buried at sea, enfolded in their hammocks, and sent on their way with a few words from the English Book of Common Prayer:

"..... we therefore commit his body to the deep, to be turned into corruption....".

So the next time some highway carnage rolls into your emergency room, look around at your space, praise your lucky stars for the work that the ambulance attendants have done on their way to you, for the capable help of the ED staff and technicians, for the help of your colleagues, who you know will get out of bed to help you if you really need them, and for your distant colleagues who are only a telephone call away. Note also that the floor of the crash room is not moving under your feet, and be thankful.

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## Handheld computers

Barrie McCombs, MD, CCFP, CCFP(EM)

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"I got my education, out behind the barn, I ain't a-fooling, no-o-o sir-ee-ee. Passed each examination, out behind the barn, but it almost made a wreck out of me" —  
Little Jimmy Dickens (c. 1950)

Handheld computers are practical tools that provide medical information right at the bedside or any other "point of need." The latest models have enough memory to store large amounts of information, such as drug databases, clinical practice guidelines and summarized versions of medical textbooks. Reviewed here are a few popular handheld computers, useful medical software programs and selected Web sites. Additional information on these handy devices is also provided.

## Purchase decision

Before purchase, think about how you plan to use the device and how much you wish to spend. The most popular size is the palmtop, which is small enough to fit in your pocket. Monochrome models cost from Can\$250 to \$500; colour models cost \$500 to \$800. The low-priced "entry-level" computers are only really useful for basic functions. They do not have enough memory to store many medical applications.

## Palm OS computers

In a recent report, computers using the Palm operating system (Palm OS) (Palm, Handspring Visor and TRG Pro) have a 90% market share. The operating system is simple and user-friendly because it concentrates on doing a limited number of tasks, and doing them well. Because of the popularity, there is much more software developed for these computers.

## Pocket Windows CE computers

Pocket Windows CE is related to the operating system used on PC-type desktop computers. It is more powerful than the Palm OS but requires more memory. Programs available include limited versions of Word (word processing) and Excel (spreadsheet). This may be attractive if you already use these programs on your desktop computer.

## Video display

Basic models have a monochrome (black and white) display that interprets colours as shades of grey. Colour displays vary in quality and price, so get a demonstration before you buy. The colour displays on the Handspring Visor and Compaq models are highly rated. The downside of colour models is that they require more power and have a shorter battery life.

## Keyboard

The video displays are touch-sensitive, so many functions are activated by touching an on-screen menu. You can also use a stylus (pointer) to "type" on a "virtual keyboard." Many models also provide handwriting recognition. A new accessory this year is a folding keyboard. When folded, it is as small as the computer. When unfolded, it provides a full-size keyboard and a cradle to hold the computer.

## Connecting to a PC

Most handhelds are sold with a docking cradle or cable that connects to a desktop computer. Software is installed on both computers, enabling them to exchange information when the handheld is placed in the cradle. Be sure that your desktop computer has the appropriate communication port (typically USB or serial) to match the handheld.

## Beam me up, Scotty!

Many handhelds have an infrared input/output so that information can be quickly exchanged (beamed) between handhelds, even those of a different brand. This port can also be used to send information to printers or personal computers.

## Voice recording

Windows CE computers provide a microphone for recording short voice messages. The Palms and Visors do not offer this feature. If you do a lot of dictation, consider the new handheld digital recording devices. Some of these include voice-recognition software to convert your recording to typewritten text. However, even with the latest software, you still have to proofread the results carefully.

## Memory expansion and accessories

Several brands provide expansion slots or other methods for connecting accessories, such as extra memory modules, cell phones, modems or wireless transmitters. The manufacturers of cell phones and pagers are competing by adding data processing and storage capability to their products.

## Basic software

The built-in calendar tracks important dates and appointments. You can use the alarm function to remind you of appointments a few minutes beforehand. The address book keeps track of important names, mailing addresses, phone numbers and email addresses. Instead of carrying business cards, it is now the "in thing" to beam your name and address to another handheld user, using the infrared port. The memo feature can store hundreds of pages of text information, including medical references. The calculator function is great for calculating pediatric drug doses. Thousands of other programs can be downloaded from the Internet, many of which are free.

## News channels and Web sites

News channels are a new service provided by AvantGo and other vendors. When your handheld is linked to a desktop computer, new information on selected channels is automatically downloaded so that you can read it at your leisure. The University of Calgary is developing customized news channels for its rural preceptors, and for other interested rural physicians. Many Web sites, including the [Canadian Medical Association Journal](#), now provide information that is formatted for downloading to a handheld computer.

## Pharmaceutical databases

Among the most frequently used medical applications are drug databases that are similar in function to the Canadian Compendium of Pharmaceuticals and Specialties (CPS). The most popular are the US ePocrates and LexiDrugs programs.

## Medical textbooks

Several textbooks are available in a condensed format for handhelds. These include the 5 Minute Clinical Consult (5MCC), Harrison's Principles of Internal Medicine, the Merck Manual, the Washington Manual, and Cline/Tintinalli's Emergency Medicine. These can be downloaded from the Internet (for a price). Some are available on memory modules for the Handspring Visor computers.

Web sites

Palm computers

[www.palm.com](http://www.palm.com)

The Palm brand was the first popular palmtop. The new M105 model replaces the popular IIIxe. Some users may prefer the smaller, but more expensive, 500 series. A colour screen is available on the IIIc and M505 models.

Handspring computers

[www.handspring.com](http://www.handspring.com)

The Handspring Visor computers provide an expansion slot for memory cards or other accessories. The Prism model offers a colour screen.

TRGpro

[www.trgpro.com](http://www.trgpro.com)

Physicians who wish to carry large quantities of information may prefer this lesser-known brand. It is only available in a monochrome-screen model. It has an expansion slot for high-capacity Compact Flash II memory cards. If you are an information junkie, IBM makes a 1.0-gigabyte Microdrive that fits into this slot.

Compaq iPAQ

[www6.compaq.ca](http://www6.compaq.ca)

The iPAQ uses the Pocket Windows CE operating system. Its expansion modules fit outside the computer. It is available with either a colour or monochrome display.

Medical Information Service

[www.ruralnet.ab.ca/medinfo/](http://www.ruralnet.ab.ca/medinfo/)

The "Handheld computers" link on this University of Calgary Web site provides links to all sites mentioned in this article. It contains additional information about other computers, accessories and software, including models released since this article went to print.

## PocketProf

[www.ruralnet.ab.ca/pocketprof/](http://www.ruralnet.ab.ca/pocketprof/)

This site provides information on the "PocketProf" project, which provides handheld computer information for rural preceptors at the University of Calgary. By the time you read this article, it should also have information of interest to all rural physicians.

## PDASStreet

[www.pdastreet.com](http://www.pdastreet.com)

PDASStreet is a good place to compare handhelds from different manufacturers. However, some details on its "Specifications" pages do not match the manufacturer's information.

## pdaMD

[www.pdamd.com](http://www.pdamd.com)

pdaMD is one of the best Web sites on the medical use of handhelds. Its unique features include discussion forums and tutorials.

## American Academy of Family Physicians

[www.aafp.org/fpnet/pda/](http://www.aafp.org/fpnet/pda/)

The AAFP Web site has several handheld-related articles and links. There is also an excellent online slide show, "The Palm Pilot in Medical Practice," which is worth viewing before you purchase your first handheld.

## Jim Thompson's Pilot Page

[www.jimthompson.net/palmpda/](http://www.jimthompson.net/palmpda/)

Dr. Thompson, a PEI emergency physician, manages a well organized Web site that deals with the medical use of the Palm and the TRG Pro computers.

## MedicalPocketPC

[www.medicalpocketpc.com](http://www.medicalpocketpc.com)

Here is a resource for medical users of Pocket PC computers. It contains articles, links, plus hardware and software reviews.

AvantGo

[www.avantgo.com](http://www.avantgo.com)

This Web site provides the free AvantGo newsreader software.

ePocrates

[www.epocrates.com](http://www.epocrates.com)

Go here to download the free ePocrates qRx 4.0 drug database and a free Infectious Disease database, but first read the user agreement carefully!

MedCalc

[www.calc.med.edu](http://www.calc.med.edu)

This excellent site provides online medical calculations, such as AA gradients, Body Mass Index and Number Needed to Treat. You can download a free version for Palm OS computers. It also has a database containing the diagnostic criteria for a number of clinical conditions.

Handheldmed

[www.handheldmed.com/](http://www.handheldmed.com/)

This vendor sells a wide range of medical software, including the 5MCC, Cline/Tintinalli's Emergency Medicine and Harrison's Principles of Internal Medicine. It also provides AvantGo channels containing abstracts from popular medical journals.

Skyscape

[www.skyscape.com](http://www.skyscape.com)

Skyscape's products include the popular LexiDrugs database, a drug interactions program, an infectious disease database, the 5MCC, and the new 5 Minute Emergency Medicine Consult

(5MEC).

Franklin

[www.franklin.com/medical/](http://www.franklin.com/medical/)

Franklin sells a variety of books, including medical textbooks that can be downloaded or purchased pre-loaded on memory expansion modules for the Handspring Visor.

Portable Emergency Physician Information Database (PEPID)

<http://63.89.206.228/>

This Web site provides a free demonstration version of a popular multi-purpose software package for emergency physicians.

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[www.ruralnet.ab.ca/medinfo/](http://www.ruralnet.ab.ca/medinfo/)

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## Instructions for Authors

The Canadian Journal of Rural Medicine (CJRM) is a quarterly peer-reviewed journal available in print form and on the Internet. CJRM seeks to promote research into rural health issues, promote the health of rural (including native) communities, support and inform rural practitioners, provide a forum for debate and discussion of rural medicine, provide practical clinical information to rural practitioners and influence rural health policy by publishing articles that inform decision-makers.

Material in the following areas will be considered for publication.

- Original articles: research studies, case reports and literature reviews of rural medicine
- Commentary: editorials, regional reviews and opinion pieces
- Clinical articles: practical articles relevant to rural practice. Illustrations and photos are encouraged
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- Cover: artwork with a rural theme

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