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12th Annual Rural and Remote Medicine Conference

Quebec City

April 15 to 17, 2004

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Size matters!

John Wootton, MD  
Shawville Que.  
Scientific editor, CJRM

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Unspoken within this oft-repeated witticism is the assumption: "the bigger the better!" Unfortunately in health care this conclusion, although just as hidden, is also present and pervasive. By size is also meant volume, and that elusive quantity "critical mass."

Size of course does matter, if only in the sense of there being a right size and a wrong size, or, like two shoes picked at random out of a shoe closet, mismatched sizes.

For example, McGill has been in mega hospital dreamin' mode for some years now, and it is at least debatable whether the benefits of amalgamating all its multiple clinical units will outweigh the disadvantages of loss of flexibility and intimacy of separate individual institutes and services.

Can anyone agree on the right size? In shoes we can tell that if the shoe pinches or is too sloppy, we won't get very far. In health care institutions it is not so obvious. It probably makes sense to have centralized spinal units, one per province or even region, but it is not reasonable to deprive rural women of basic surgical services. Yet I still hear provincial surgical associations muse about the number of cesareans required to keep their member surgeons skilled (assuming they were trained in the first place — but that is another story), and that threshold hovers dangerously close to the number that describes rural surgical practice.

At a recent job fair I had the opportunity to wander among the competition, sampling their wares and savouring their spin, looking for inspiration. One place comes close to providing it. Les îles de la Madeleine lie approximately 120 nautical miles from Gaspé and 80 nautical miles off the northern tip of PEI, and to a Martian could just as logically be a part of Newfoundland as of Quebec. The

numbers tell a story. 13 000 inhabitants, 23 GPs, all of whom participate in ED call, hospitalizations and primary care, 2 internists, 2 surgeons, 2 psychiatrists, 1 ob/gyn, 1 radiologist, and 1 anesthetist (the one admitted weakness). With an extra anesthetist, and with stability ensured by the unassailable logic imposed by the surrounding Atlantic, they might be described as the model of rural self-sufficiency.

This is not just my analysis. In the brutally fair-minded way Quebec draws up its regulations, and in spite of their remoteness, the islands' relatively flush staffing prevents them from offering the same incentives to locum GPs as other more desperate corners of Quebec. This is as it should be and is bureaucratic validation that something close to the "right" size exists there.

Can it sustain itself? In the mid '90s there was a lemming-like crash when 7 to 8 physicians all left within a short space of time, and clearly their anesthesia shortage puts many of their services at considerable risk, but for the most part they have been successful at replacing those who left with a similar product. Their example is worth noting, and every critical element worth underlining: sufficient numbers to share the load, sufficiently differentiated GPs to cover multiple bases, sufficient back-up to support confidence, and sufficient money (and time off) to support stability. And it doesn't hurt that it's also a cool place to live...

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La taille a de l'importance!

John Wootton, MD  
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Rédacteur scientifique, JCRM

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Ce mot d'esprit souvent répété sous-entend que «plus c'est gros, mieux c'est!» En matière de soins de santé, même si elle est également sous-entendue, cette conclusion est malheureusement aussi omniprésente. Par taille, on entend aussi volume, et cette quantité insaisissable qu'est la «masse critique».

La taille importe, bien entendu, ne serait-ce que pour signifier qu'il y a une bonne taille et une mauvaise taille ou, comme deux chaussures choisies au hasard dans une armoire, des tailles mal appariées.

McGill, par exemple, rêve d'un mégahôpital depuis des années déjà. On peut au moins se demander si les avantages de fusionner toutes ses multiples entités cliniques l'emporteront sur les inconvénients résultant de la perte de flexibilité et d'intimité dans chaque institut et service.

Peut-on jamais s'entendre sur la bonne taille? Dans le cas des chaussures, nous pouvons dire que si le soulier est trop serré ou trop grand, nous n'irons pas très loin. Ce n'est pas aussi évident dans le cas des établissements de santé. Il est probablement logique de centraliser les services de soins de la moelle épinière à raison d'un par province, voire par région, mais il n'est pas raisonnable de priver les femmes des régions rurales de services de chirurgie de base. Or, j'entends encore des associations provinciales de chirurgiens parler du nombre de césariennes nécessaires pour maintenir les qualifications de leurs membres (en supposant qu'ils aient reçu une formation au départ — mais c'est là une autre question) et ce seuil ressemble dangereusement à celui qui décrit la pratique de la chirurgie en milieu rural.

Au cours d'un récent salon de l'emploi, j'ai pu rendre visite à la concurrence, regarder ce qu'elle offre, écouter ses arguments de vente, à la recherche

d'inspiration. Un endroit y parvient presque. Les îles de la Madeleine sont situées à environ 120 milles nautiques de Gaspé et à 80 milles nautiques au large de la pointe nord de l'Île-du-Prince-Édouard. Pour un Martien, il serait tout aussi logique qu'elles fassent partie de Terre-Neuve que du Québec. Les chiffres sont révélateurs : 13 000 habitants, 23 omnipraticiens, qui participent tous aux horaires de garde à l'urgence, aux hospitalisations et aux soins primaires, deux spécialistes en médecine interne, deux chirurgiens, deux psychiatres, un obstétricien-gynécologue, un radiologiste et un anesthésiste (la seule faiblesse avouée). Avec un anesthésiste de plus et la stabilité garantie par la logique inébranlable imposée par l'Atlantique qui entoure les îles, on pourrait les décrire comme le modèle de l'autosuffisance rurale.

Cette analyse n'est pas seulement la mienne. Vu la façon brutalement équitable dont le Québec s'y prend pour rédiger ses règlements, il se trouve qu'en dépit de l'éloignement des îles, leurs effectifs médicaux relativement abondants les empêchent d'offrir les mêmes incitations aux omnipraticiens remplaçants que d'autres régions éloignées et plus désespérées du Québec. C'est ainsi qu'il devrait en être et cette validation administrative montre qu'il existe la quelque chose qui se rapproche de la «bonne» taille.

L'autosuffisance est-elle possible en l'occurrence? Au milieu des années 1990, il y a eu un exode général lorsque sept ou huit médecins sont partis en peu de temps et il est clair que la pénurie d'anesthésistes représente un risque considérable pour beaucoup des services des îles, mais dans la plupart des cas, les insulaires ont réussi à remplacer ceux qui sont partis par un produit semblable. Il vaut la peine de signaler cet exemple et de souligner chaque élément critique : des effectifs suffisamment nombreux pour partager la charge de travail, des omnipraticiens suffisamment polyvalents pour traiter de multiples problèmes, des services auxiliaires suffisants pour étayer la confiance et suffisamment d'argent (et de congés) pour appuyer la stabilité. C'est aussi un endroit intéressant où vivre, ce qui ne nuit pas...

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President's message: Change is afoot!

Jill Konkin, MD  
Thunder Bay, Ont.

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There are changes afoot in the SRPC. As I write this message, your executive is finalizing the hiring of an Executive Director. There were many highly qualified applicants for this job. This new position will add to the infrastructure of the Society and will allow us to increase the projects, policy development, CME and lobbying we carry out on behalf of rural physicians throughout Canada.

There are a number of interesting developments in the area of rural medical education, which I will highlight.

Congratulations to Dr. Jim Rourke of Goderich, Ont.! Jim has been named the Dean of Medicine at Memorial University of Newfoundland. Well done, Jim!

This past year Jim chaired a committee charged with producing a policy paper with recommendations regarding strategies that medical school admissions committees could use to increase the number of medical students who are from rural and remote communities. There are data to indicate that students from rural and remote communities are significantly under-represented in Canadian medical schools. This policy paper will be presented at the April meeting of admissions deans from medical schools across the country.

The measures the SRPC will be recommending will be one piece of a larger puzzle. The literature confirms that students from rural and remote communities in this country are much less likely to attend university than their urban and suburban counterparts and that the numbers attending are inversely proportional to the distance from an urban centre. There are many issues at the local level that our communities and their municipal/provincial/federal governments will need to tackle to increase the numbers of rural and remote origin students who choose to attend university.

Congratulations to Dale Dewar (Saskatchewan), and Karl Stobbe and Len Kelly (Ontario) for their successful project, Care to Care. They spent 3 weeks in Kurdistan, Iraq, providing CME to local rural physicians. See their article on [page 11](#).

A big thank you to members who organized and delivered regional CME programs in New Brunswick, Quebec, Ontario and BC. If members in other regions are interested in planning something for their region, please let your executive know. Peter Hutten-Czapski is now busy organizing the Caribbean Rural Critical Care Course in February 2004. If it's not too late, check the Web site if you're interested.

Still on the education front, there are two other important initiatives ongoing at the moment. Karl Stobbe is spearheading this work as Chair of the Education Committee. The SRPC Education Committee is working on a template for a rural medical education unit as well as developing a list of essential skills that all residents completing their family medicine training must have. There was a very successful workshop at the Family Medicine Forum of the CPFC in Calgary in October. These initiatives will be revisited on Society Day at the SRPC Annual Rural and Remote Conference in Quebec City in April 2004. For those of you interested in rural medical education, consider attending the meeting in Quebec City.

All the best to all of you and your families for a happy and healthy 2004!

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Message de la présidente : Des changements s'annoncent!

Jill Konkin, MD  
Thunder Bay (Ont.)

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Des changements s'annoncent à la SMRC au début de la nouvelle année. Au moment où je rédige ce message, l'Exécutif termine l'embauche d'un directeur général. Les candidats très qualifiés ont été nombreux. Ce nouveau poste s'ajoutera à l'infrastructure de la Société et nous permettra d'augmenter le nombre des projets et des activités d'élaboration de politiques, d'ÉMC et de lobbying que nous réalisons pour le compte des médecins ruraux du Canada.

Il y a de nombreux événements intéressants que je décrirai dans le domaine de l'éducation en médecine rurale.

Félicitations au Dr Jim Rourke, de Goderich (Ontario), qui vient d'être nommé doyen de médecine à l'Université Memorial de Terre-Neuve. Bravo, Jim!

Au cours de l'année écoulée, Jim a présidé un comité chargé de produire un document de politique et des recommandations sur des stratégies que les comités d'admission des facultés de médecine pourraient appliquer pour augmenter le nombre d'étudiants en médecine originaires de communautés rurales et éloignées. Les données indiquent que les étudiants de communautés rurales et éloignées sont très sous-représentés dans les facultés de médecine du Canada. Ce document stratégique sera présenté au cours de la réunion des doyens des admissions des facultés de médecine du Canada, en avril.

Les mesures recommandées par la SMRC constitueront l'un des éléments d'un plus grand ensemble. Les écrits confirment que les étudiants des communautés rurales et éloignées du Canada sont beaucoup moins susceptibles de fréquenter l'université que ceux des milieux urbains et suburbains, et que le nombre de ceux qui fréquentent l'université est inversement proportionnel à leur éloignement d'un centre urbain. Il y a de nombreux problèmes locaux auxquels nos communautés, les administrations municipales et les gouvernements provinciaux et fédéral devront

s'attaquer pour augmenter le nombre d'étudiants des régions rurales et éloignées dans les universités.

Il faut féliciter aussi Dale Dewar (Saskatchewan), Karl Stobbe (Ontario) et Len Kelly (Ontario) pour leur projet couronné de succès, Care to Care. Ils ont passé trois semaines au Kurdistan (Irak) à dispenser de la formation médicale à des médecins ruraux locaux. Vous lirez leur article à la page 11.

Un gros merci aux membres qui ont organisé et présenté des programmes régionaux d'ÉMC au Nouveau-Brunswick, au Québec, en Ontario et en Colombie-Britannique. Les membres qui souhaiteraient planifier quelque chose pour leur région sont priés de communiquer avec l'Exécutif. Peter Hutten-Czapski est maintenant occupé à organiser le cours sur les soins d'urgence en milieu rural dans les Antilles, en février 2004. S'il n'est pas trop tard, vérifiez le site web si cela vous intéresse.

Toujours sur la scène de l'éducation, deux autres initiatives importantes sont en cours, sous la direction de Karl Stobbe, président du Comité de l'éducation de la SMRC. Le Comité prépare un gabarit pour un module d'éducation en médecine rurale, ainsi qu'une liste de compétences spécialisées que doivent posséder tous les résidents qui terminent leur formation en médecine familiale. Au cours du Forum sur la médecine familiale que le CMFC a tenu à Calgary en octobre, on a présenté un atelier qui a connu un franc succès. On reprendra ces initiatives au cours de la Journée de la Société au Congrès annuel sur la médecine en milieu rural et éloigné que la SMRC tiendra à Québec en avril 2004. Ceux et celles d'entre vous qui s'intéressent à l'éducation en médecine rurale devraient envisager d'assister à la réunion à Québec.

Tous mes vœux de bonheur et de santé pour vous et les vôtres en 2004!

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## Rural CME in Iraq: SRPC Care to Care Project — 2003

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On November 2nd, 2003, the authors, members of the Educational Committee and Rural Critical Care Course of the Society of Rural Physicians of Canada (SRPC), and one spouse left for northern Iraq (Iraqi Kurdistan) to assess the feasibility of delivering continuing medical education (CME) to rural physicians in a beleaguered and underserved area of the world. Four months of negotiation and networking with a multitude of non-government organizations made it clear that rural continuing medical education was a novel approach to capacity-building in health care for many of these agencies. Eventually our team networked with the organization Helping Hands through an SRPC RuralMed contact, Dr. Lance DeFoa, a physician in northern Ontario. Helping Hands provides transportation and medical and political contacts within northern Iraq.

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While Iraq hostilities remained prominent in the news, hostilities had largely settled in the Northern region by the time we arrived. From the gassing of the Kurds in 1988 through the embargoes of the '90s, this area has remained under-resourced and irregularly serviced.

### Setting goals

Before arriving in Iraq we listed the following goals:

1. to safely assess the feasibility of delivering CME and faculty development to rural Kurdish physicians;
2. to understand their educational, and personal needs and experiences;
3. to understand the medical system and politics, and the role of primary and rural health care;
4. to explore the development of long-term projects in view of the above; and
5. to listen to where people are at in the peace/conflict/ healing process.

## Iraqi medical administration

It was important for the team to recognize several political and administrative realities. Kurdistan's eastern province of Sulaimanya was inhabited by the Talibani tribe, whose political affiliation was with the Patriotic Union of Kurdistan while the western province of Irbil was largely of Barzani heritage and politically aligned with the Kurdistan Democratic Party. The program therefore included meetings with the Minister of Health of each province and their respective deans of medicine.

Through our first series of meetings, we further learned that the Regional Ministries of Health were responsible for the rural hospitals, and the university was responsible for the 3 Northern medical colleges and their urban teaching hospitals. The ministries of health were keen to see our team teach in the rural districts, and the deans encouraged our presence in the medical schools and urban centres. Some time was therefore spent in each setting, but most teaching focussed on rural areas. The idea of teaching in the rural hospitals was completely foreign to the medical deans, so our team felt this was an excellent opportunity to model rural CME. It became apparent that CME was unusual in the urban teaching centres as well, and appeared to generate a great deal of interest. Consequently, several 2-hour lectures were given in the city centres to groups of 80-100 participants, before moving out to the countryside.

The Iraqi medical system includes mandated rural service. After completing 6 years of medical college following high school, all candidates do a 1- or 2-year rotating internship with 1 month of rural placement. Following that, they are considered general practitioners, and are assigned to a rural centre for 2 years. Since this is mandated, many physicians are in a holding pattern to return to the city centres and specialty training for another 2 to 4 years. The universities do not yet recognize general or family practice as a self-standing discipline, but admit this is an area for future development.

In Kurdistan, there are 3 medical colleges within 2 provinces with a combined virtual name of Salladin University. In fact, the province of Irbil has medical schools in the cities of Irbil and Duhok, and the province of Sulaimanya has a medical school in its regional city of the same name. Each medical school has 600-700 medical students spread out over their 6 years of training.

## Upon arrival

After flights through Germany and Turkey, we took a taxi across eastern Turkey and the complex Turkey-Iraq border. Shared fears of safety fortunately settled after a successful crossing, and the meeting of members of our hosting agency on Iraqi

soil.

Our team met with the Irbil regional Minister of Health, an oncologist, who placed a high value on CME and noted that the timing was ripe because the medical supply and electrical situation had recently stabilized following the chaos in the aftermath of the overthrow of the central government. He paved the way with the regional health director and the hospital director in Soran, located 2 hours away through the mountains. Soran was our first planned rural teaching community with 10 000 people and a catchment area of 60 000.

## Soran

The Soran medical staff included 12 specialists and 25 GPs. Sessions were held in this Islamic area during Ramadan, when most of the medical staff was fasting from sun-up to sunset. Consequently, concurrent 1-hour sessions were run at 11:30, with longer 2-hour sessions at 18:30 following the evening meal.



Teaching team, in Soran.

L to R: Karl Stobbe, Dale Dewar, teaching a small group session in Soran.  
Dewar, Len Kelly. (Photo by: Len Kelly)



The 3 educators brought prepared topics gleaned from the SRPC Rural Critical Care Course, Problem Based Small Group Learning, Scientific Assembly presentations, and resident and student training workshops.

The topics presented were:

- Canada: "Our home and native land"
- C-spine management and x-ray interpretation
- Upper limb orthopedics
- Hand and tendon injuries
- EKG interpretation
- Asthma management
- Joint injections
- Hypertension management

- Emergency cases management
- Fertility/infertility and contraception
- Dysfunctional uterine bleeding
- Knee exam
- CVA management
- Burn management
- Post-partum haemorrhage

Over 4 days of the first week, the 14 hours of CME were each attended by 20 to 30 physicians, who completed evaluations designed specifically for this setting. Evaluations focused typically on content and teaching but also included feedback on pace of lecture, use of language, timing and suggested improvements and topics. After each session the evaluations (totalling 165 at this site) were read, and hallway discussions led to a constantly changing curriculum. Teaching modules were customized to meet the needs of the participants on a daily basis, and new modules created. The Kurdish physicians were a keen and bright group who enjoyed lively exchanges in English, the medical language of Iraq.

We slept in vacant patient rooms in this rural hospital and ate and socialized each day with the physicians. This led to the development of a close teacher/learner/colleague rapport. Interestingly, this presented an educational challenge, as the feedback was immediate and called for modifying teaching styles (small groups, hands-on workshops, case-based learning, learner participation in x-ray interpretation and didactic sessions). In addition to teaching there were visits to satellite clinics, work in the emergency department and operating rooms, and attendance at hospital rounds.



Emergency department, in Soran



Local shepherd in Mosul. (Photo by: Len Kelly)

## Halabja

The second week, our team moved to the second northern province, Sulaimanya and its capital city of the same name. Following lectures in the city itself, we travelled a bumpy 2 hours toward the mountains and the Iranian border community of Halabja.



The muddy drive to Halabja. (Photo by: Len Kelly)



Halabja is infamous for being the location of a chemical weapons attack by the Iraqi central government in 1988. For a 3-day period beginning March 16th 1988, the community was exposed to 45 aerial bombardments, including multiple unknown nerve gases; 5000 of the 25 000 local inhabitants died immediately and the rest fled to other regions of Iraq and through the mountains into Iran. Some 15 years later, the ground water and soil have yet to be tested for residual safety. The medical staff reported high prevalence of respiratory, neurologic, oncologic and fertility sequellae in patients. The extent of weapons of mass destruction deployment in Kurdistan is only now being uncovered, with the likelihood that over 250 rural Kurdish villages were targeted in the late '80s.

The local hospital director of Halabja and his medical staff of 12, most of whom were general practitioners, met with us for a series of interactive workshops over another 4 days. Being close to the Iranian border, the community was not felt to be safe enough for westerners, so at the Ministry of Health's suggestion we spent 4 hours a day travelling by road to and from a more secure area.

An afternoon was spent at the Halabja museum, which documented the atrocities of the nerve gas attack. The SRPC members met with some of the nerve gas survivors, and were invited to return in the future. Unfortunately, in such a remote site in an underdeveloped medical system, little more than supportive care could be rendered for the still unknown effects of chemical weapons exposure. Since the April 2003 overthrow of the central Iraqi government, this community felt they were finally free of the daily threat of renewed aerial attacks.



Child and grandmother in Halabja. (Photo by: Len Kelly)

Throughout the visit to Kurdistan, our team met dozens of rural physicians and learned of the lack of resources they encounter. (For example, surgeries had been cancelled recently for lack of gauze.) We met with 2 regional ministers of health and 2 medical school deans. Lectures occurred in several large urban settings, however most of the time was spent in small workshop settings in 2 rural areas. In total, 34 hours of CME were delivered. The 3 educators spent an additional 30 hours developing new education modules and re-tooling prepared ones for delivery in response to local requests and feedback received. All lectures and workshops were evaluated with a written evaluation form (395 in total), designed specifically for the setting. The evaluations were strongly supportive: that CME was highly valued, particularly in remote regions, which are left out of the existing medical education network. At the final session in each rural community, a CD-ROM containing photos from the area, lecture slides of the presentations and requested patient handout information were left with the hospital administrator and his staff. We were welcomed and cheerfully engaged by everyone with whom we were in contact.

We felt we were able to address most of our goals. Not only did we get a sense of the CME needs, we were able to deliver a multitude of educational sessions. We saw that faculty development remained a future challenge to address as the culture of CME becomes increasingly established. We met many colleagues and developed friendships beyond our expectations.

One team member stated that it "far surpassed expectations with respect to welcome, teaching opportunities, safety and travel opportunities." Another noted: "[I] developed a respect for the skill and knowledge of Kurdish physicians" and found the people "fiercely proud, warm and welcoming ... we will never fully understand the decades of suffering and loss they have endured."

#### Future direction

Before leaving Iraq, we had several discussions with several non-governmental organizations and discussed melding our involvement with a developing medical education program from the University of East Tennessee, which has a successful model of rural training and recruitment and an intention for some curriculum development with the Kurdistan medical colleges. We discussed our experience with these and related issues (e.g., telehealth initiatives in Canada).

Expectations at the onset were that a needs assessment would be done and that some teaching would occur. The experiences of our team led them to reaffirm that rural CME, as we have discovered in Canada, has a valuable role in supporting rural colleagues and the communities they serve. We encountered a warm reception and met many physicians who were very interested in learning about up-to-date management of common primary and secondary medical care topics. The travel,



cultural experiences, language difficulties and bouts of various travel ailments affirmed that cross-cultural medical education presents rewarding challenges.

As a team, we hope that sufficient local and governmental contacts have been established to engender a longer-term project and we hope to invite colleagues in the SRPC to help continue this educational initiative in the future.

Interested parties may contact Dr. Dale Dewar, Program Coordinator and Associate Professor, Rural Division, Department of Family Medicine, College of Medicine, Saskatchewan, Box 549, Wynyard SK S0A 4T0; [rmed@sasktel.net](mailto:rmed@sasktel.net)

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Competing interests: None declared.

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Health impact on caregivers of providing informal care to a cognitively impaired older adult: rural versus urban settings

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[\[résumé\]](#)

**Introduction:** Rural caregivers, compared to urban caregivers, may experience a heavier burden, which could result in poorer health status for these caregivers. Furthermore, caregiving demands may prevent rural caregivers from engaging in healthy behaviours. We investigated potential differences between rural and urban caregivers in the health impact on these caregivers of caring for cognitively impaired individuals.

**Methods:** Two convenience samples of caregivers of older adults with cognitive impairment were obtained from Northern Ontario. The rural sample ( $n = 20$ ) was taken from a community of  $< 15\,000$  inhabitants, the urban sample ( $n = 17$ ) from a community of  $125\,000$ . We obtained demographical information for caregivers and care recipients, and information regarding the level of independence in activities of daily living and frequency of behaviour problems of care recipients, the type and quantity of supports available and used by caregivers, global health indices and a measure of healthy behaviours from caregivers.

**Results:** A greater proportion of rural caregivers was non-spousal and employed. Care recipients' characteristics from the 2 groups were similar, except for higher frequencies of behaviour problems among the rural sample. Rural caregivers had access to fewer formal supports but did not report greater burden, poorer health status, or fewer healthy behaviours than urban caregivers. However, for rural caregivers, higher reports of burden were associated with fewer healthy behaviours ( $r = 0.79$ ,  $p = 0.001$ ); we found no such association for urban caregivers ( $r = 0.04$ ,  $p = 0.861$ ).

**Conclusion:** Rural caregivers may have special needs regarding the management of behaviour problems in care recipients and in the promotion of healthy behaviours for themselves. Primary health care providers have an important role in ensuring

that these needs are met.

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**Introduction :** Les soignants en milieu rural ont peut-être une charge de travail plus lourde que les soignants en milieu urbain, ce qui pourrait nuire à leur état de santé. De plus, les exigences de leur travail pourraient les empêcher d'avoir des comportements sains. Nous avons cherché à déterminer les différences pouvant exister entre les soignants en milieu rural et ceux en milieu urbain sur le plan des répercussions que peuvent avoir sur leur santé les soins qu'ils dispensent à des personnes atteintes d'un déficit cognitif.

**Méthodes :** Deux échantillons de commodité de personnes soignant des adultes âgés présentant une déficience cognitive ont été constitués dans le nord de l'Ontario. L'échantillon rural ( $n = 20$ ) provenait d'une communauté de moins de 15 000 habitants; l'échantillon urbain ( $n = 17$ ), d'une communauté de 125 000 habitants. Nous avons obtenu l'information suivante : renseignements démographiques sur les soignants et les patients; degré d'indépendance des patients dans leurs activités quotidiennes; fréquence de problèmes de comportement chez ceux-ci; type et quantité d'aide à la disposition des soignants et utilisée par eux; indices de santé globale et évaluation des comportements santé des soignants.

**Résultats :** La plupart des soignants en milieu rural n'étaient pas les conjoints des patients, mais plutôt des enfants. Les caractéristiques des patients des deux groupes étaient similaires, à l'exception de la fréquence plus élevée de problèmes de comportement dans l'échantillon rural. Les soignants en milieu rural avaient accès à moins d'aide structurée, mais n'ont pas signalé que leur charge de travail était plus lourde, leur état de santé moins bon, ou leurs habitudes de vie moins bonnes que ceux des soignants en milieu urbain. Cependant, chez les soignants en milieu rural qui signalaient une charge de travail plus lourde, celle-ci était associée à de moins bonnes habitudes de vie ( $r = 0,79$ ;  $p = 0,001$ ). Nous n'avons observé aucune association du genre chez les soignants en milieu urbain ( $r = 0,04$ ;  $p = 0,861$ ).

**Conclusion :** Les soignants en milieu rural pourraient avoir des besoins spéciaux relativement à la prise en charge des problèmes de comportement chez les patients et à l'adoption d'habitudes de vie saine pour eux-mêmes. Les prestataires de soins primaires ont un rôle important à jouer pour faire en sorte que ces besoins soient satisfaits.

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Researchers have suggested that caregivers of cognitively impaired individuals are at greater risk of psychiatric and physical morbidity compared to population norms and control groups.<sup>1,2</sup> Caregivers providing support for activities of daily living (ADL), dealing with high levels of behaviour problems and experiencing burden often report more physical symptoms and poorer health<sup>3-5</sup> and may have higher

mortality risk.<sup>6</sup> Elevated hormonal levels as evidence of a distress process have been reported in caregivers.<sup>7</sup> Furthermore, the immune capacity of caregivers may be lower than that of controls.<sup>8-11</sup> Not surprisingly, caregivers use more prescription medications and health care services than non-caregivers.<sup>12,13</sup>

These data suggest that caregivers are at increased risk of morbidity and that physiological processes may mediate this situation. However, one alternative/additional explanation is a change in lifestyle, such as poorer diets or lack of sleep and exercise. In one study, caregivers of adults with Alzheimer's disease experienced a reduction in their physical activity and quantity of sleep with the initiation of caregiving duties.<sup>14</sup> In a different study, healthy behaviours were adversely affected in a group of spouses caring for frail elderly with compromised independence in ADL with or without cognitive impairment.<sup>15</sup> However, it is unclear how well these data generalize to other caregivers of those suffering from dementia.

To minimize the negative impact of caregiving we need to understand its determinants. These determinants are broadly characterized into 1 of 3 categories: 1) care-recipient characteristics (e.g., frequency and/or severity of behaviour problems), 2) caregiver characteristics (e.g., resilience) and 3) external variables (e.g., social supports). Possibly the most important determinant of caregiver burden, among the care-recipient characteristics, is the presence of behaviour problems in the care recipient.<sup>16</sup> These behaviour problems can range from being repetitive to being physically aggressive. Behaviour problems alone often explain 50% of the variability in caregiver burden. Problem behaviours are also associated with poorer caregiver general health status, but the magnitude of this association is unclear.<sup>17</sup> Dependence in ADL is also associated with higher caregiver burden<sup>16</sup> but its relationship with caregiver health status is unclear. Cognitive impairment by itself is not associated with caregiver burden<sup>16</sup> or health status.<sup>17</sup>

The contribution of caregiver and external variables (such as health care availability or community supports, over which the caregiver has no control) has also been documented, but their role appears less substantial than that of care-recipient characteristics. It is possible that these caregiver and external variables act as moderators. This would be consistent with the "wear and tear" hypothesis. The "wear and tear" hypothesis is based on the premise that role demands accumulate, ultimately reaching a level at which caregivers cannot cope and are forced to institutionalize the care recipients. Burton and colleagues<sup>15</sup> reported that caregivers with a higher sense of control had more healthy behaviours than caregivers with a lower sense of control. Others reported an association between poorer health and dissatisfaction with social supports.<sup>17</sup> The specific role of these care-recipient, caregiver and external variables remains to be established.

Geographic setting

One external variable that may affect the caregiving experience is geographic setting. Unfortunately, few data are available to document differences between caregivers living in rural and urban settings. Some data suggest that urban dwellers may be referred to specialized clinics earlier than rural dwellers<sup>18</sup> and that patterns of home care received by urban residents are typical of long-term care support whereas these patterns are more consistent with post-acute care for rural residents.<sup>19</sup> Others have reported that older adults from rural regions may be institutionalized prematurely in comparison to their urban counterparts;<sup>20</sup> however, this issue is still being debated.<sup>21,22</sup>

At present it remains difficult to evaluate if these potential differences are rooted in the difficulties experienced by rural and urban caregivers and/or the availability of supports. Caregivers in rural and urban settings may deal with different situations and may have different needs. For example, burden may be higher for caregivers living away from other relatives, friends or neighbours. Services that are available in heavily populated urban communities (e.g., respite care, home health care, rehabilitation, transportation services) may not be available in remote and rural environments. Bruce and Paterson described barriers to community support faced by urban caregivers of cognitively-impaired older adults.<sup>23</sup> These included late referral to community agencies by general practitioners and lack of information about the diagnosis and dementia in general, about how to deal with behaviour problems and about how to access services. More need for information and support from family practitioners was also mentioned in another sample.<sup>24</sup> Using a combination of rural and urban caregivers, Bowd and Loos<sup>25</sup> identified, in decreasing order of importance, needs regarding information about the care-recipient condition (> 90%), regarding informal support (> 60%) and formal support (> 30%). There is reason to believe that some of these specific needs (e.g., supports, transportation) would be more prevalent and difficult to surmount in rural settings.

Differences between rural and urban settings may have implications for the health of caregivers and the planning of service provision. We set up this preliminary study to investigate 3 issues: 1) differences in health status between rural and urban caregivers, 2) differences in support availability across settings and 3) the relationship between healthy behaviours and the burden experienced by caregivers.

## Methods

### Participants

The participants were caregivers of individuals with possible or probable Alzheimer's or other forms of dementia. They were identified through local agencies, advertising and networking; names were released to the investigators if

the caregivers agreed to be contacted. Informed consent was obtained prior to completion of the questionnaires. Caregivers and care recipients lived in Northern Ontario, Canada. The rural setting was a town of less than 15 000 residents. The urban setting was a city of approximately 125 000 residents. The urban setting had the typical amenities of larger centres, including an acute hospital, a rehabilitation/chronic care hospital, a psychiatric hospital and several services for older adults and their caregivers. The rural setting was approximately a 1.5-hour drive from such services. It had a 57-bed hospital with 24/7 emergency coverage, but most specialist services were provided by out-of-town physicians.

## Measures

All data were obtained from caregivers. We gathered demographic information about caregivers and care recipients and about available supports. We used standardized instruments to determine care recipients' independence in ADL and frequency of behaviour problems. The ADL scale used in this study was developed by Lawton and Brody<sup>26</sup> and is divided into basic ADL (BADL) and instrumental ADL (IADL). The minimum and maximum scores are respectively 6 and 29 for BADL and 8 and 26 for IADL; higher scores indicate greater independence. The frequency of behaviour problems was recorded with the Dysfunctional Behaviour Rating Instrument (DBRI).<sup>27,28</sup> The DBRI is composed of 4 domains: 1) difficult behaviours, 2) emotional behaviours, 3) psychotic behaviours and 4) repetitive behaviours. For each of the 25 behaviours listed the caregivers were asked to rate the frequency of these behaviours from "never" (0) to "more than five times daily" (5), for a minimum possible score of 0 and a maximum of 125. Caregiver burden was measured with the 12-item short version of the Zarit Burden Interview (S-ZBI).<sup>29</sup> The S-ZBI has excellent internal consistency ( $\alpha = 0.77$  to  $0.89$ ) and is composed of 2 domains: 1) role burden and 2) personal burden.<sup>29</sup> Role burden is related to the demands of the caregiving role, whereas personal burden pertains to caregivers' sense of adequacy in their role. Items are scored from 0 (never) to 4 (daily); higher scores indicate more burden. Nine items assess role burden (possible total score varies from 0 to 36) and 3 assess personal burden (possible total score varies from 0 to 12). To measure current health status and quality of sleep we used 5-point Likert items (1 = very good; 5 = very poor). To measure change in the past year we also used 5-point Likert items (1 = much better; 5 = much worse). To measure healthy behaviours we used 27 questions related to specific healthy behaviours from the "Health-Promoting Lifestyle Profile."<sup>30</sup> Questions are scored on a scale of 1 (never) to 4 (routinely); minimum score was 27, the maximum was 108.

## Results

Our sample was composed of 20 rural caregivers and 17 urban caregivers. The majority of caregivers were daughters. However, we had a larger proportion of

spousal caregivers in the urban sample ( $p = 0.037$ ). The majority of caregivers were not gainfully employed but more were employed in the rural sample ( $p = 0.032$ ). The typical caregivers had been assuming this role for more than 3 years at the time of the study (see [Table 1](#) for caregiver characteristics).

The typical care recipient approached 80 years of age; roughly more than half were women (20/37). More than half of the care recipients had another serious medical condition. The care recipients from both settings were similar regarding independence in ADL, however, rural caregivers reported a higher frequency of repetitive ( $p = 0.031$ ) and difficult ( $p = 0.034$ ) behaviours compared to urban caregivers ([Table 2](#)).

We examined the availability of formal and informal supports ([Table 3](#)). Among our urban sample, 15 caregivers (88%) reported that formal supports were available. This number was only 7 (35%) in the rural sample ( $p = 0.001$ ). However, few caregivers used these formal supports often. The paucity of formal support in the rural environment was also in evidence when caregivers were asked to describe if the predominant type of help they received was formal or informal. Most rural caregivers (85%) received help predominantly from informal sources, compared to only one-third for urban caregivers ( $p = 0.002$ ). Consistently, rural care recipients were more often involved in out-of-home activities than their urban counterparts ( $p = 0.002$ ) and rural caregivers received more overall hours of weekly support than urban caregivers ( $p = 0.030$ ).

Data on the health and psychological impact of caregiving are presented in [Table 4](#). In general, most caregivers reported good health (overall mean = 2.08; 2 = fairly good; 3 = not good) but somewhat more difficulty sleeping (overall mean = 2.54; 2 = fairly good; 3 = not well). For both health and sleep, most caregivers reported their status was about the same or worse compared to one year ago (respective overall means = 3.24 and 3.32; 3 = about the same; 4 = worse). On the healthy behaviours' scale the average caregiver scored about mid-way. Personal burden, which is based on 3 items, was high comparatively to role burden (9 items). We found no differences across settings on these variables.

Because differences in specific healthy behaviours may be present in the absence of an overall difference we examined the 27 behaviours ([Table 5](#)) in further detail. Given the number of comparisons and the increased risk of a Type I error (rejecting the null hypothesis when it should be retained) we focussed only on differences with a probability value of less than 0.01. We found 2 differences that exceeded this threshold. In the first instance, rural caregivers reported that, when in doubt, they sought a second opinion less often than did the urban caregivers ( $p = 0.001$ ). In the second instance, rural caregivers reported that they engaged in leisure/physical activities more often than their urban counterparts ( $p = 0.004$ ).

Finally, because we were interested in the impact of caregiver burden on healthy behaviours we correlated role and personal burden with healthy behaviours separately for rural and urban samples. For the rural sample, we found a strong negative association between role burden and healthy behaviours ([Fig. 1](#), right panel). For each increase of one unit on the role-burden scale, we found a decrease of 1.15 units on the health behaviour scale ( $r = 0.79$ ,  $p = 0.001$ ). We did not find an association between personal burden and healthy behaviours ( $r = 0.08$ ,  $p = 0.748$ ). For the urban sample, we found neither an association with role burden ( $r = 0.04$ ,  $p = 0.861$ ; [Fig. 1](#), bottom panel) nor personal burden ( $r = 0.00$ ,  $p = 0.984$ ).

## Discussion

The results of this study indicate that the situation of caregivers living in rural regions may vary from that of caregivers living in urban regions. We had a greater proportion of employed, non-spousal caregivers in the rural sample. Rural caregivers reported a greater frequency of care-recipient behaviour problems, fewer formal supports compared to urban caregivers and, consistently, a greater reliance on informal supports, a situation also reported in a large sample of caregivers.<sup>31</sup> Our findings must be considered in light of issues of accessibility to services and our use of convenience sampling and small sample sizes. However, they point to interesting issues.

Although the exact reason for the higher frequency of repetitive and difficult behaviours reported by rural caregivers is unclear, it is an important finding. Behaviour problems cause considerable difficulties for caregivers;<sup>16,32-38</sup> often explaining 50% or more of the variability in burden, a considerable proportion given the multi-factorial nature of burden.<sup>39</sup> These behaviour problems may partly explain why caregivers of cognitively impaired older adults experience more burden than caregivers of cognitively intact older adults.<sup>40</sup> Not surprisingly, behaviour problems<sup>41-44</sup> and burden<sup>32,45,46</sup> are associated with the decision to institutionalize care recipients. However, this option may not always be available to rural caregivers.

The reported health status and change over the past year was equivalent for both samples. Although this result is encouraging for rural residents, we are reminded that this study used a cross-sectional design and, as such, may not accurately capture change over time. A prospective study to follow-up on caregivers over time would provide better answers regarding the long-term health impact of caregiving.

Overall we found that caregivers in both settings engage in healthy behaviours with similar frequency. However, rural caregivers rarely sought a second opinion. Although this difference may be related to accessibility issues, it is possible that rural caregivers have more confidence in their physicians, whom they may know better professionally and socially. On the other hand, rural caregivers engaged in



more leisure/physical activities than urban caregivers. The reasons underlying this difference will require further investigation.

The overall average score on the healthy behaviour scale was 67, effectively representing 49% of the possible range. Although it would be desirable to determine how this score compares with non-caregivers, there is, nonetheless, considerable room to improve on healthy behaviours. Others' data suggest that health care provider support may influence rural older women's healthy behaviours<sup>47</sup> and the use of preventive (e.g., immunization) services.<sup>48</sup> Yet, one problem inherent to rural communities, in addition to fewer supports for caregivers, is the limited availability of health care services.<sup>49</sup> Hence, limited health care support in rural environments may deny caregivers an important source of support.

We were able to explain 62% of the variance in healthy behaviours for the rural participants by role burden alone. On the other hand, we found no such relationship for the urban sample. This attests to the potential difference in the determinants of healthy behaviours across settings. Similarly, the determinants of burden are not homogeneous across settings, and interventions may need to be tailored to environments.<sup>50</sup> The relationship between role burden and healthy behaviours in the rural sample could be explained by the paucity of formal supports, even though rural caregivers received more overall hours of support than urban caregivers. Furthermore, a greater proportion of rural caregivers were non-spousal (typically daughters) and employed. Hence, multiple demands associated with caring for an aging parent, children, and being employed full-time may explain this finding.

To better support caregivers of rural regions we need to consider interventions tailored to their specific needs.<sup>51-53</sup> Primary care physicians may play an important role in ensuring that care recipients' behaviour problems are managed as well as possible, by optimally supporting caregivers and by ensuring timely referrals to support systems. Current management guidelines for adults with Alzheimer's disease suggest that behaviour problems should be assessed, monitored and managed, and caregivers supported.<sup>54</sup> Unfortunately, these recommendations are not always followed,<sup>55</sup> and this situation may be exacerbated by distance issues in rural and remote communities. Data from the US suggest that individuals with memory and ADL problems living in rural regions may access primary care physicians less often than urban dwellers.<sup>56</sup> Others have also reported that caregivers who live farther away from friends, and who do not have a car, receive less informal support.<sup>31</sup> For many older adults transportation can be a serious source of strain.<sup>57</sup>

To surmount the barriers preventing rural caregivers' access to all services we may need to use new technologies. For example, telephone conference calls were used with caregivers of individuals with traumatic brain injuries and the outcomes were compared with traditional "in-person" meetings.<sup>58</sup> The results showed equal

improvement in caregivers' outcomes, including burden. Tele-psychiatry has been successful with nursing homes in dealing with residents' issues<sup>59</sup> and, along with video-conferencing and other forms of telephone technologies, may provide additional approaches to increasing support to rural caregivers, both by informing them about caregiver-relevant aspects and supporting the maintenance of healthy behaviours.<sup>60</sup>

Future research, using better sampling methodology, is required to further identify the needs of rural caregivers and especially those of female caregivers. Women represent 70% of all caregivers<sup>61</sup> and may not benefit as much as men from current interventions.<sup>62</sup> This work would be an important step toward the development of new and effective models of service delivery for rural caregivers.

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**Table 1. Characteristics of rural (*n* = 20) and urban (*n* = 17) caregivers providing informal care to a cognitively impaired older adult**

| Variable   | Rural caregivers;<br>no.*† | Urban caregivers;<br>no.*† | <i>t</i> value/- <sup>2</sup> ‡ | <i>p</i> value§ |
|--|----------------------------|----------------------------|---------------------------------|-----------------|
| Age, yr  | 54.65 (16.64)              | 59.59 (16.30)              | −0.91                           | 0.370           |
| Gender female  | 15 (75%)                   | 14 (82%)                   | 0.29                            | 0.588           |
| Spouse of care recipient   | 5 (25%)                    | 7 (41%)                    | 4.36                            | 0.037           |
| Employed (full-time)   | 7 (35%)                    | 1 (6%)                     | 4.60                            | 0.032           |
| Years caring   | 3.2 (2.5)                  | 5.5 (5.0)                  | −1.69                           | 0.104           |
| <p>Note: For this study, rural sample taken from a community of &lt;15 000; urban sample taken from a community of 125 000.</p> <p>*Unless otherwise specified.</p> <p>†Values are means (standard deviation) for continuous variables or frequency (%) for categorical variables.</p> <p>‡Values are <i>t</i> values (independent samples) for continuous variables or chi-square for categorical variables.</p> <p>§Probability values (two-tailed) associated with the tests.</p> |                            |                            |                                 |                 |

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| Variable  | Care recipients residing in a rural area; no.*† | Care recipients residing in an urban area; no.*† | <i>t</i> value / $\chi^2$ ‡ | <i>p</i> value§ |
|---|---|--|-----------------------------|-----------------|
| Age, yr   | 78.45 (7.56)                                    | 78.24 (10.19)                                    | 0.07                        | 0.942           |
| Gender female   | 12 (60%)  | 8 (47%)  | 0.62                        | 0.431           |
| No. of care recipients with concurrent, serious medical condition   | 8 (42%)   | 12 (71%)   | 2.95                        | 0.086           |
| Activities of daily living (ADL) scale score¶   |   |  |                             |                 |
| Basic (BADL)  | 16.15 (5.76)                                    | 19.47 (4.68)                                     | 1.90                        | 0.065           |
| Instrumental (IADL)   | 12.18 (3.26)                                    | 14.59 (5.41)                                     | 1.60                        | 0.121           |
| Frequency of behaviour problems; score for each of 4 domains**  |   |  |                             |                 |
| Difficult   | 11.00 (7.74)                                    | 5.94 (5.90)                                      | 2.20                        | 0.034           |
| Emotional   | 10.65 (4.84)                                    | 8.53 (5.56)                                      | 1.24                        | 0.223           |
| Psychotic   | 5.05 (5.17)                                     | 6.82 (7.82)                                      | 0.83                        | 0.415           |
| Repetitive  | 8.40 (1.43)                                     | 6.53 (3.06)                                      | 2.31                        | 0.031           |
| Note: For this study, rural sample taken from a community of <15 000; urban sample taken from a community of 125 000.<br>*Unless otherwise specified.<br>†Values are means (standard deviation) for continuous variables or frequency (%) for categorical variables.<br>‡Values are <i>t</i> values (independent samples) for continuous variables or chi-square for categorical variables.<br>§Probability values (two-tailed) associated with the tests.<br>¶The ADL scale used in this study was developed by Lawton and Brody<26> and is divided into BADL and IADL.<br>**Recorded with the Dysfunctional Behaviour Rating Instrument.<27,28> |   |  |                             |                 |

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| Variable  | Rural caregivers; no.*† | Urban caregivers; no.*† | <i>t</i> value / $\chi^2$ ‡ | <i>p</i> value§ |
|---|-------------------------|-------------------------|-----------------------------|-----------------|
| Any formal supports   | 7 (35%)                 | 15 (88%)                | 10.80                       | 0.001           |
| Used often  | 2 (29%)                 | 3 (20%)                 | 0.57                        | 0.451           |
| Informal help predominant   | 17 (85%)                | 5 (29%)                 | 9.80                        | 0.002           |
| Care recipient involved in out-of-home activities > 1/week  | 16 (80%)                | 5 (29%)                 | 9.58                        | 0.002           |
| Caregiver involved in these out-of-home activities most of the time   | 12 (60%)                | 6 (35%)                 | 1.80                        | 0.180           |
| Hours of help/week  | 10.95 (13.26)           | 3.59 (3.39)             | 2.34                        | 0.030           |
| Note: For this study, rural sample taken from a community of <15 000; urban sample taken from a community of 125 000.<br>*Unless otherwise specified.<br>†Values are means (standard deviation) for continuous variables or frequency (%) for categorical variables.<br>‡Values are <i>t</i> values (independent samples) for continuous variables or chi-squared for categorical variables.<br>§Probability values (two-tailed) associated with the tests. |                         |                         |                             |                 |



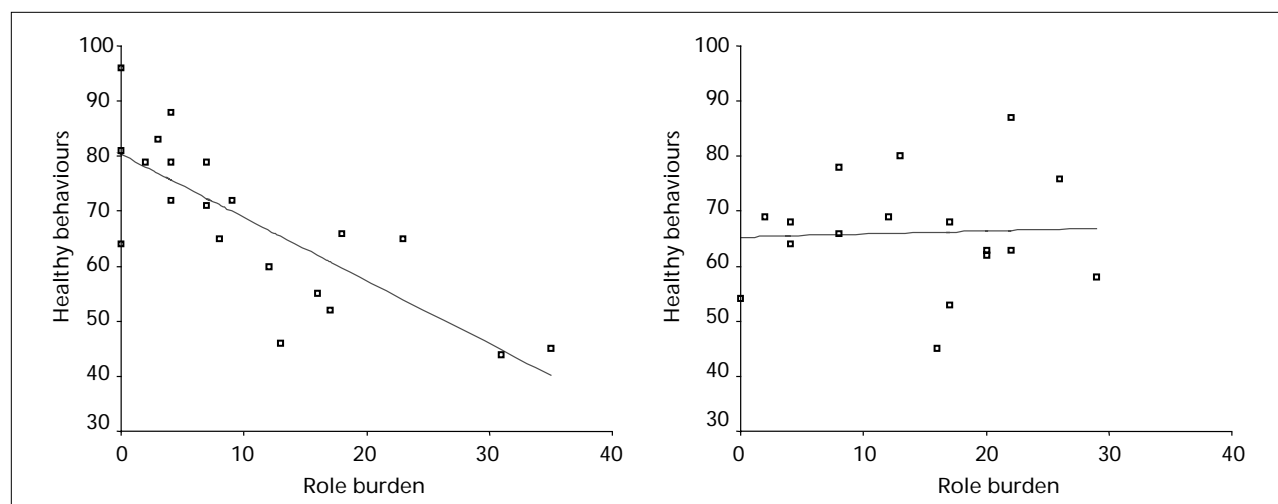
**Table 4. Impact of caregiving on rural (*n* = 20) and urban (*n* = 17) caregivers providing informal care to a cognitively impaired older adult**

| Variable   | Rural caregivers;<br>no.* | Urban caregivers;<br>no.* | <i>t</i> value† | <i>p</i> value‡ |
|--|---------------------------|---------------------------|-----------------|-----------------|
| Health§  |                           |                           |                 |                 |
| General health   | 2.10 (0.85)               | 2.06 (0.97)               | 0.14            | 0.891           |
| Change in health   | 3.20 (0.77)               | 3.29 (0.77)               | −0.37           | 0.713           |
| General sleep  | 2.65 (0.88)               | 2.41 (0.94)               | 0.80            | 0.430           |
| Change in sleep  | 3.35 (0.75)               | 3.29 (0.92)               | 0.20            | 0.839           |
| Health behaviours  | 68.10 (14.68)             | 66.06 (10.50)             | 0.48            | 0.635           |
| Burden, score for each of 2 domains¶   |                           |                           |                 |                 |
| Role strain  | 10.65 (10.09)             | 14.12 (8.69)              | −1.11           | 0.275           |
| Personal strain  | 5.30 (2.89)               | 4.53 (4.02)               | 0.68            | 0.503           |
| <p>Note: For this study, rural sample taken from a community of &lt;15 000; urban sample taken from a community of 125 000.</p> <p>*Values are means (standard deviation)</p> <p>†Values are <i>t</i> values (independent samples)</p> <p>‡Probability values (two-tailed) associated with the tests.</p> <p>§Healthy behaviours measured with the Health-Promoting Lifestyle Profile.&lt;30&gt;</p> <p>¶Caregiver burden measured with short version of Zarit Burden Interview.&lt;29&gt;</p> |                           |                           |                 |                 |

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| Behaviour*                                   | Rural caregivers;<br>score (and SD) | Urban caregivers;<br>score (and SD) | <i>t</i> value† | <i>p</i> value‡ |
|--|-------------------------------------|-------------------------------------|-----------------|-----------------|
| Low-fat / low-cholesterol diet               | 2.80 (1.11)                         | 2.59 (1.23)                         | 0.55            | 0.584           |
| Report physical signs / symptoms             | 3.05 (0.76)                         | 2.41 (1.06)                         | 2.12            | 0.041           |
| Follow an exercise program                   | 2.60 (1.23)                         | 1.76 (0.90)                         | 2.37            | 0.023           |
| Get enough sleep                             | 2.45 (0.76)                         | 2.41 (1.06)                         | 0.13            | 0.900           |
| Low sugar / sweets diet                      | 2.90 (1.07)                         | 2.88 (1.11)                         | 0.05            | 0.961           |
| Vigorous exercise · 3 times/week             | 1.75 (0.97)                         | 1.65 (1.00)                         | 0.32            | 0.752           |
| Relax each day                               | 2.25 (0.72)                         | 2.59 (0.87)                         | -1.30           | 0.203           |
| Moderate exercise · 5 times/week             | 2.75 (1.07)                         | 2.06 (0.97)                         | 2.05            | 0.048           |
| Accept things one can't change               | 2.45 (0.69)                         | 2.94 (0.90)                         | -1.88           | 0.068           |
| Look forward to the future                   | 2.30 (0.73)                         | 3.06 (0.97)                         | -2.71           | 0.010           |
| Seek second opinion when in doubt            | 1.30 (0.57)                         | 2.06 (0.90)                         | -3.11           | 0.004           |
| Participate in leisure / physical activities | 3.10 (0.64)                         | 1.82 (0.88)                         | 5.09            | 0.001           |
| Feel content and at peace                    | 2.45 (0.69)                         | 2.53 (0.80)                         | -0.33           | 0.747           |
| Discuss health concerns                      | 2.80 (0.69)                         | 2.76 (0.83)                         | 0.15            | 0.883           |
| Control stress                               | 1.85 (0.75)                         | 2.18 (0.81)                         | -1.27           | 0.213           |
| Light exercise daily                         | 3.00 (0.56)                         | 2.76 (0.97)                         | 0.88            | 0.386           |
| Balance work and play                        | 2.25 (0.79)                         | 2.35 (0.79)                         | -0.40           | 0.694           |
| Find each day interesting / challenging      | 2.30 (0.47)                         | 2.76 (0.75)                         | -2.21           | 0.036           |
| Seek information to stay healthy             | 2.65 (0.81)                         | 2.18 (0.95)                         | 1.63            | 0.111           |
| Aware of what is important in life           | 3.05 (0.60)                         | 3.06 (0.83)                         | -0.04           | 0.970           |
| Read labels of packaged foods                | 2.85 (1.04)                         | 3.00 (0.94)                         | -0.46           | 0.650           |
| Attend health education programs             | 1.70 (0.73)                         | 1.41 (0.87)                         | 1.09            | 0.281           |
| Pace oneself                                 | 2.40 (0.68)                         | 2.47 (0.87)                         | -0.28           | 0.784           |
| Feel connected with greater force            | 2.85 (1.09)                         | 2.47 (1.12)                         | 1.04            | 0.305           |
| Eat breakfast                                | 3.05 (0.83)                         | 3.53 (0.94)                         | -1.65           | 0.108           |
| Seek guidance / counselling                  | 2.80 (0.89)                         | 2.12 (0.93)                         | 2.27            | 0.029           |
| Expose oneself to new experiences            | 2.40 (0.75)                         | 2.24 (0.90)                         | 0.61            | 0.549           |

Note: For this study, rural sample taken from a community of <15 000; urban sample taken from a community of 125 000.  
 \*Each behaviour was scored from 1 (never) to 4 (routinely); values are means (standard deviation [SD]). Healthy behaviours measured with the Health-Promoting Lifestyle Profile.<30>  
 †Values are *t* values (independent samples).  
 ‡Probability values (two-tailed) associated with the tests.



**Fig. 1. Relationship between role burden and healthy behaviours for the rural sample (left panel) and urban sample (right panel). Each square represent pairs of data for each participant, the straight line represents the best-fit line (least-squares method).**

| Table 2. Characteristics of rural ( <i>n</i> = 20) and urban ( <i>n</i> = 17) care recipients in study of caregivers providing informal care to a cognitively impaired older adult  |   |  |                                  |                 |
|---|---|--|----------------------------------|-----------------|
| Variable  | Care recipients residing in a rural area; no.*† | Care recipients residing in an urban area; no.*† | <i>t</i> value /- <sup>2</sup> ‡ | <i>p</i> value§ |
| Age, yr   | 78.45 (7.56)                                    | 78.24 (10.19)                                    | 0.07                             | 0.942           |
| Gender female   | 12 (60%)  | 8 (47%)  | 0.62                             | 0.431           |
| No. of care recipients with concurrent, serious medical condition   | 8 (42%)   | 12 (71%)   | 2.95                             | 0.086           |
| Activities of daily living (ADL) scale score¶   |   |  |                                  |                 |
| Basic (BADL)  | 16.15 (5.76)                                    | 19.47 (4.68)                                     | 1.90                             | 0.065           |
| Instrumental (IADL)   | 12.18 (3.26)                                    | 14.59 (5.41)                                     | 1.60                             | 0.121           |
| Frequency of behaviour problems; score for each of 4 domains**  |   |  |                                  |                 |
| Difficult   | 11.00 (7.74)                                    | 5.94 (5.90)                                      | 2.20                             | 0.034           |
| Emotional   | 10.65 (4.84)                                    | 8.53 (5.56)                                      | 1.24                             | 0.223           |
| Psychotic   | 5.05 (5.17)                                     | 6.82 (7.82)                                      | 0.83                             | 0.415           |
| Repetitive  | 8.40 (1.43)                                     | 6.53 (3.06)                                      | 2.31                             | 0.031           |
| <p>Note: For this study, rural sample taken from a community of &lt;15 000; urban sample taken from a community of 125 000.</p> <p>*Unless otherwise specified.</p> <p>†Values are means (standard deviation) for continuous variables or frequency (%) for categorical variables.</p> <p>‡Values are <i>t</i> values (independent samples) for continuous variables or chi-square for categorical variables.</p> <p>§Probability values (two-tailed) associated with the tests.</p> <p>¶The ADL scale used in this study was developed by Lawton and Brody&lt;26&gt; and is divided into BADL and IADL.</p> <p>**Recorded with the Dysfunctional Behaviour Rating Instrument.&lt;27,28&gt;</p> |   |  |                                  |                 |

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**Table 3. External supports for rural (*n* = 20) and urban (*n* = 17) caregivers providing informal care to a cognitively impaired older adult**

| Variable  | Rural caregivers;<br>no.*† | Urban caregivers;<br>no.*† | <i>t</i> value /- <sup>2</sup> ‡ | <i>p</i> values§ |
|---|----------------------------|----------------------------|----------------------------------|------------------|
| Any formal supports   | 7 (35%)                    | 15 (88%)                   | 10.80                            | 0.001            |
| Used often  | 2 (29%)                    | 3 (20%)                    | 0.57                             | 0.451            |
| Informal help predominant   | 17 (85%)                   | 5 (29%)                    | 9.80                             | 0.002            |
| Care recipient involved in out-of-home activities > 1/week  | 16 (80%)                   | 5 (29%)                    | 9.58                             | 0.002            |
| Caregiver involved in these out-of-home activities most of the time   | 12 (60%)                   | 6 (35%)                    | 1.80                             | 0.180            |
| Hours of help/week  | 10.95 (13.26)              | 3.59 (3.39)                | 2.34                             | 0.030            |
| <p>Note: For this study, rural sample taken from a community of &lt;15 000; urban sample taken from a community of 125 000.</p> <p>*Unless otherwise specified.</p> <p>†Values are means (standard deviation) for continuous variables or frequency (%) for categorical variables.</p> <p>‡Values are <i>t</i> values (independent samples) for continuous variables or chi-squared for categorical variables.</p> <p>§Probability values (two-tailed) associated with the tests.</p> |                            |                            |                                  |                  |

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**Table 4. Impact of caregiving on rural ( $n = 20$ ) and urban ( $n = 17$ ) caregivers providing informal care to a cognitively impaired older adult**

| Variable   | Rural caregivers;<br>no.* | Urban caregivers;<br>no.* | $t$ value† | $p$ value‡ |
|--|---------------------------|---------------------------|------------|------------|
| Health§  |                           |                           |            |            |
| General health   | 2.10 (0.85)               | 2.06 (0.97)               | 0.14       | 0.891      |
| Change in health   | 3.20 (0.77)               | 3.29 (0.77)               | -0.37      | 0.713      |
| General sleep  | 2.65 (0.88)               | 2.41 (0.94)               | 0.80       | 0.430      |
| Change in sleep  | 3.35 (0.75)               | 3.29 (0.92)               | 0.20       | 0.839      |
| Health behaviours  | 68.10 (14.68)             | 66.06 (10.50)             | 0.48       | 0.635      |
| Burden, score for each of 2 domains¶   |                           |                           |            |            |
| Role strain  | 10.65 (10.09)             | 14.12 (8.69)              | -1.11      | 0.275      |
| Personal strain  | 5.30 (2.89)               | 4.53 (4.02)               | 0.68       | 0.503      |
| <p>Note: For this study, rural sample taken from a community of &lt;15 000; urban sample taken from a community of 125 000.</p> <p>*Values are means (standard deviation)</p> <p>†Values are <math>t</math> values (independent samples)</p> <p>‡Probability values (two-tailed) associated with the tests.</p> <p>§Healthy behaviours measured with the Health-Promoting Lifestyle Profile.&lt;30&gt;</p> <p>¶Caregiver burden measured with short version of Zarit Burden Interview.&lt;29&gt;</p> |                           |                           |            |            |

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**Table 5. Individual behaviours of rural (n = 20) and urban (n = 17) caregivers providing informal care to a cognitively impaired older adult, by setting**

| Behaviour*   | Rural caregivers;<br>score (and SD) | Urban caregivers;<br>score (and SD) | t value† | p value‡ |
|--|-------------------------------------|-------------------------------------|----------|----------|
| Low-fat / low-cholesterol diet   | 2.80 (1.11)                         | 2.59 (1.23)                         | 0.55     | 0.584    |
| Report physical signs / symptoms   | 3.05 (0.76)                         | 2.41 (1.06)                         | 2.12     | 0.041    |
| Follow an exercise program   | 2.60 (1.23)                         | 1.76 (0.90)                         | 2.37     | 0.023    |
| Get enough sleep   | 2.45 (0.76)                         | 2.41 (1.06)                         | 0.13     | 0.900    |
| Low sugar / sweets diet  | 2.90 (1.07)                         | 2.88 (1.11)                         | 0.05     | 0.961    |
| Vigorous exercise · 3 times/week   | 1.75 (0.97)                         | 1.65 (1.00)                         | 0.32     | 0.752    |
| Relax each day   | 2.25 (0.72)                         | 2.59 (0.87)                         | -1.30    | 0.203    |
| Moderate exercise · 5 times/week   | 2.75 (1.07)                         | 2.06 (0.97)                         | 2.05     | 0.048    |
| Accept things one can't change   | 2.45 (0.69)                         | 2.94 (0.90)                         | -1.88    | 0.068    |
| Look forward to the future   | 2.30 (0.73)                         | 3.06 (0.97)                         | -2.71    | 0.010    |
| Seek second opinion when in doubt  | 1.30 (0.57)                         | 2.06 (0.90)                         | -3.11    | 0.004    |
| Participate in leisure / physical activities   | 3.10 (0.64)                         | 1.82 (0.88)                         | 5.09     | 0.001    |
| Feel content and at peace  | 2.45 (0.69)                         | 2.53 (0.80)                         | -0.33    | 0.747    |
| Discuss health concerns  | 2.80 (0.69)                         | 2.76 (0.83)                         | 0.15     | 0.883    |
| Control stress   | 1.85 (0.75)                         | 2.18 (0.81)                         | -1.27    | 0.213    |
| Light exercise daily   | 3.00 (0.56)                         | 2.76 (0.97)                         | 0.88     | 0.386    |
| Balance work and play  | 2.25 (0.79)                         | 2.35 (0.79)                         | -0.40    | 0.694    |
| Find each day interesting / challenging  | 2.30 (0.47)                         | 2.76 (0.75)                         | -2.21    | 0.036    |
| Seek information to stay healthy   | 2.65 (0.81)                         | 2.18 (0.95)                         | 1.63     | 0.111    |
| Aware of what is important in life   | 3.05 (0.60)                         | 3.06 (0.83)                         | -0.04    | 0.970    |
| Read labels of packaged foods  | 2.85 (1.04)                         | 3.00 (0.94)                         | -0.46    | 0.650    |
| Attend health education programs   | 1.70 (0.73)                         | 1.41 (0.87)                         | 1.09     | 0.281    |
| Pace oneself   | 2.40 (0.68)                         | 2.47 (0.87)                         | -0.28    | 0.784    |
| Feel connected with greater force  | 2.85 (1.09)                         | 2.47 (1.12)                         | 1.04     | 0.305    |
| Eat breakfast  | 3.05 (0.83)                         | 3.53 (0.94)                         | -1.65    | 0.108    |
| Seek guidance / counselling  | 2.80 (0.89)                         | 2.12 (0.93)                         | 2.27     | 0.029    |
| Expose oneself to new experiences  | 2.40 (0.75)                         | 2.24 (0.90)                         | 0.61     | 0.549    |
| Note: For this study, rural sample taken from a community of <15 000; urban sample taken from a community of 125 000.  |                                     |                                     |          |          |
| *Each behaviour was scored from 1 (never) to 4 (routinely); values are means (standard deviation [SD]). Healthy behaviours measured with the Health-Promoting Lifestyle Profile.<30> |                                     |                                     |          |          |
| †Values are t values (independent samples).  |                                     |                                     |          |          |
| ‡Probability values (two-tailed) associated with the tests.  |                                     |                                     |          |          |

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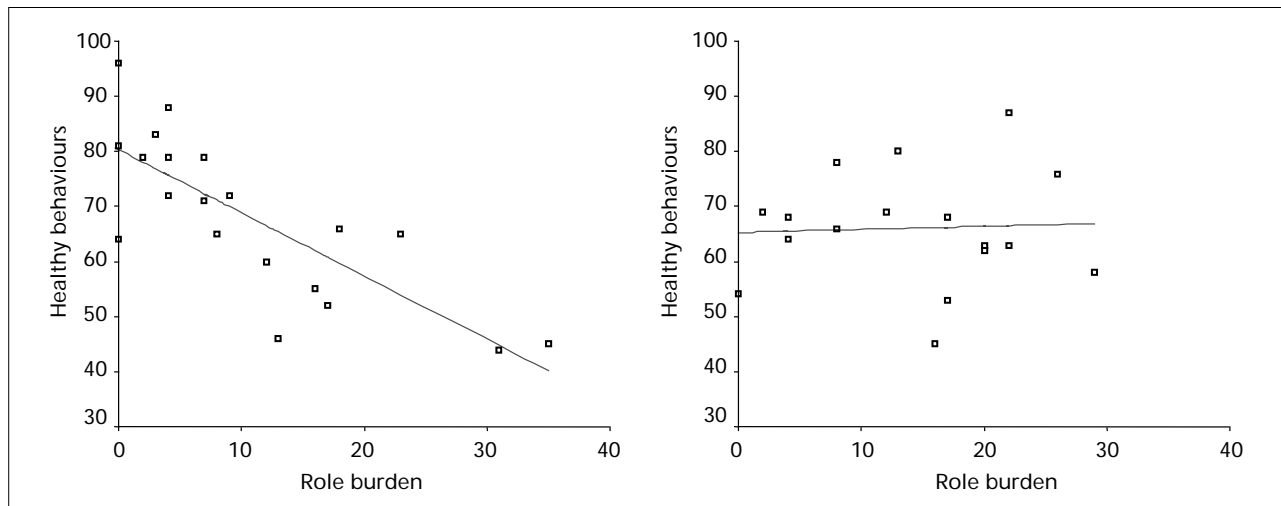


Fig. 1. Relationship between role burden and healthy behaviours for the rural sample (left panel) and urban sample (right panel). Each square represent pairs of data for each participant, the straight line represents the best-fit line (least-squares method).

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Country cardiograms case 24

Charles Helm, MD  
Tumbler Ridge, BC

CJRM 2004;9(1):37

A 51-year-old man presented to a rural British Columbia emergency department complaining of intermittent chest pain for the preceding day. An electrocardiogram (ECG) was taken (Fig. 1). There was no prior tracing available for comparison. What is your interpretation of this ECG?

A second ECG was recorded later (Fig. 2). What is your interpretation?

For the Interpretations and Discussion, see [page 48](#).

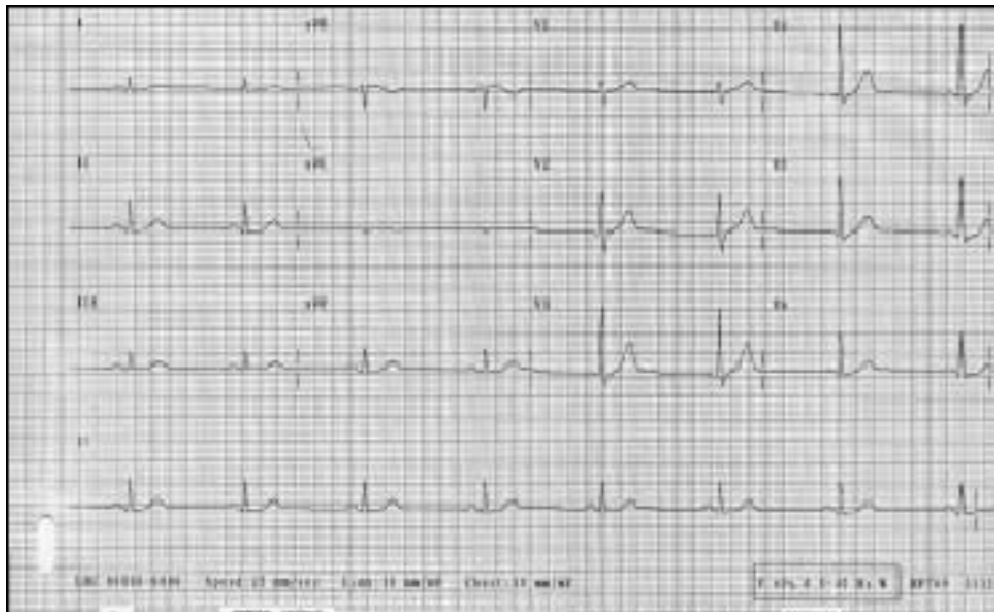


Fig. 1. First electrocardiogram of 51-year-old man with intermittent chest pain



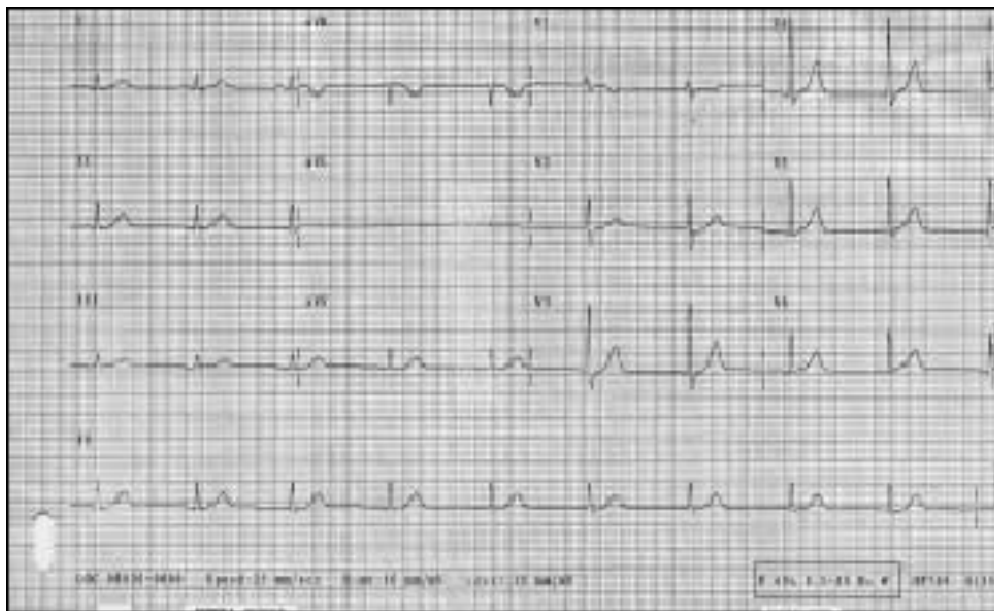


Fig. 2. Second electrocardiogram

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Competing interests: None declared.

This article has been peer reviewed.

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## The occasional C-spine x-ray

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Please turn to [page 42](#) for the C-spine X-ray Checklist.

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## Introduction

X-rays are used in conjunction with the clinical examination to "clear" the c-spine in patients who present with multiple trauma, head injuries with neck pain, and those who have altered levels of consciousness and unknown injuries. Recently, the "Canadian C-spine Rule" was published to help identify patients who may NOT require a c-spine x-ray.<sup>1</sup>

A lateral c-spine view can detect 60% to 80% of fractures.<sup>2</sup> Anterior-posterior (A-P) and open-mouth odontoid views improve the sensitivity to 80% to 95% or better.<sup>3,4</sup> For those of us who only occasionally interpret c-spine films, oblique views can make it much easier to detect certain injuries. Occasionally, fractures poorly seen on other views will be seen with flexion or extension. Adding a CT scan increases the sensitivity to 95% to 100%;<sup>2,3</sup> however, plain films are better than CT for detecting some injuries.<sup>5</sup>

Serious multiple injuries often require urgent treatment. Frequently, the c-spine is not cleared until after the patient is transferred to the referral centre.

## Classification of C-spine fractures

For those who infrequently read these x-rays, there are 2 types of fractures: easy to find and hard to find.

### 1. Easy to find:

- C3-C6 flexion/extension injuries.

## 2. Hard to find:

- rotatory subluxations
- upper c-spine fractures - C1 & C2
- fractures in non-visualized C6 or C7

Most of these injuries can be detected or suspected in a lateral c-spine film and confirmed on other views.

## Systematic interpretation

A systematic approach can help the physician to confidently determine whether a radiographic abnormality is visible.

### Step A

Start with lateral c-spine ([Fig. 1](#)). Leave the patient on the stretcher or backboard with the hard collar on while this x-ray is being taken.

#### A1

Check for adequacy of the film. All of C7, and the top of T1 should be visible. The lower levels need to be visualized before the patient can be discharged with a cleared c-spine.<sup>6</sup> On the other hand, if a fracture is visible on an "inadequate" film there is no need to risk further injury by moving the patient to get more views.

#### A2

Check the alignment. Follow the 4 lines indicated on the diagram. Line 1 is formed from the anterior aspect of the vertebral bodies and continues to the top of the odontoid process. The anterior arch of C1 lies anterior to this line. Osteophytes often create irregularities in this line. Line 2 follows the posterior aspect of the vertebral bodies and meets Line 1 at the top of the odontoid. This line is not usually affected by osteophytes. Line 3 connects the laminae, and also marks the posterior border of the spinal canal. Line 4 connects the tips of the spinous processes. Note that C1 does not touch this line.

#### A3

Look for soft tissue swelling ([Fig. 2](#)). In adults, the upper limit of normal is:

- 5 mm at C2
- 22 mm at C6

Next, check the space between the odontoid and C1 (atlas) anterior to it. This "atlanto-odontoid" space should be 3 mm or less.

#### A4

Look at the bones and disk-spaces. From C3-C7 each vertebral body should be about the same shape and size as its neighbour above and below. If the odontoid is intact on this film and the 4 lines demonstrate no abnormality, it is reasonable to proceed to more views. If normal but limited by not seeing C7, an attendant standing at the foot of the bed can pull on the patient's hands to bring the shoulders down.

If C7 cannot be seen despite arm traction, a swimmer's view will be required. To find C6 and C7 on this view, look for vertebrae articulating with ribs, indicating thoracic levels. C6 and C7 can be identified by counting up from T1.

#### Step B

If the lateral is normal; remove immobilization and proceed with more views.

A-P ([Fig. 3](#)):

- look for alignment of the spinous processes

Odontoid view ([Fig. 4](#)):

- Check alignment of the lateral masses
- Look for odontoid fracture

#### Step C

Obliques ([Fig. 5](#)) are not routinely done in all hospitals. These can be useful to show unilateral facet dislocations. Look for:

- Intact foraminae. Facet dislocations often obliterate one foramen on this view.
- The laminae should line up like "shingles on a roof." This alignment is disrupted in a facet dislocation.

Flexion and extension views occasionally show injuries not otherwise seen.<sup>7</sup>

Interpretation follows the same system as for the initial lateral c-spine view. These views can be falsely reassuring when the patient cannot adequately flex or extend the neck.<sup>8</sup>

Rural physicians are regularly faced with patients who have suffered trauma and have neck pain. Plain x-rays are usually the only diagnostic test available in the rural hospital. Plain films of the cervical spine have good sensitivity for fractures when compared with CT scanning. A systematic approach to interpretation can improve the confidence of rural physicians in interpreting these films. This systematic approach is summarized in [Figure 6](#), the Checklist on page 42.

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Competing interests: None declared.

This article has been peer reviewed.

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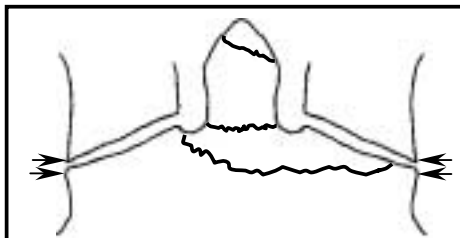
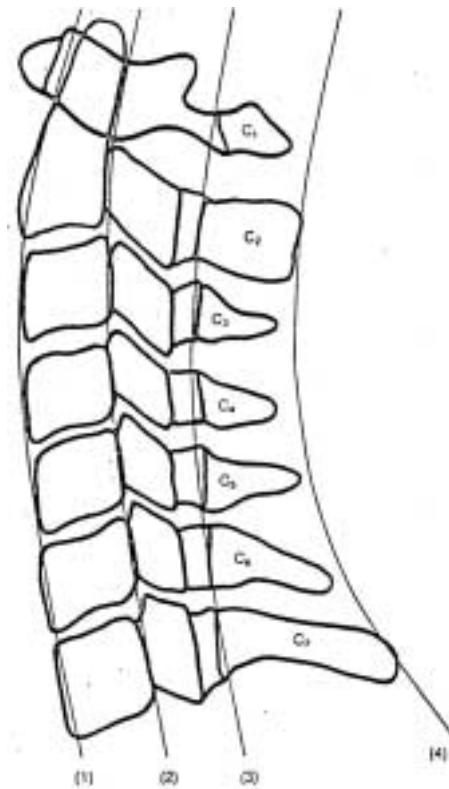
## C-spine x-ray checklist (adults)

### A. Lateral c-spine – keep hard collar on.

- ☐ adequacy of film – see all of C7, top of T1. If “No” – continue anyway. Repeat films if no fracture.
- ☐ Alignment – line 1 – continues along ant. odontoid
- ☐ Line 2 – continues along posterior odontoid
- ☐ Line 3
- ☐ Line 4 note C1 should *not* reach this line
- ☐ Soft tissue thickness < 5 mm at C2
- ☐ < 22 mm at C6
- ☐ atlanto–odontoid space: 3 mm or less
- ☐ Bones – check for fractures. Shape of C3–C7 vertebral body should be approx. the same as the one above and below.

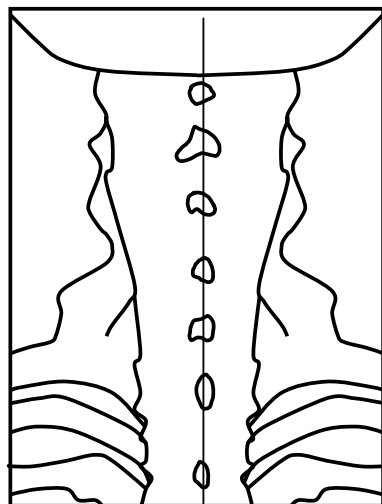
If a fracture is seen – do no further views – immobilize and transfer

### B. If lateral is normal, remove immobilization and proceed with more views



#### Odontoid view:

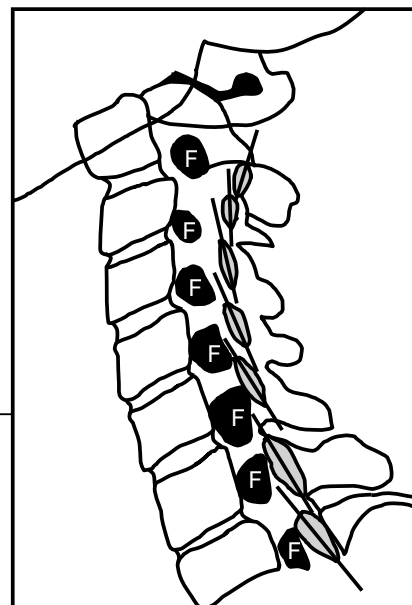
- ☐ Alignment of lateral masses (arrows)
- ☐ Odontoid fracture – 3 types shown



#### PA:

- ☐ Alignment of spinous processes only

- ### C. Obliques – Useful for unilateral facet dislocations
- ☐ Foraminae all intact (F)
  - ☐ Laminae line up like “shingles on a roof”



### D. Flexion–extension views – for further reassurance if other views normal. Use lat c-spine checklist. Some injuries not obvious on initial lateral will be visible on a lateral view.

Fig. 6. C-spine x-ray checklist (adults)

[\[Return to text\]](#)



Fig. 1. Lateral c-spine view

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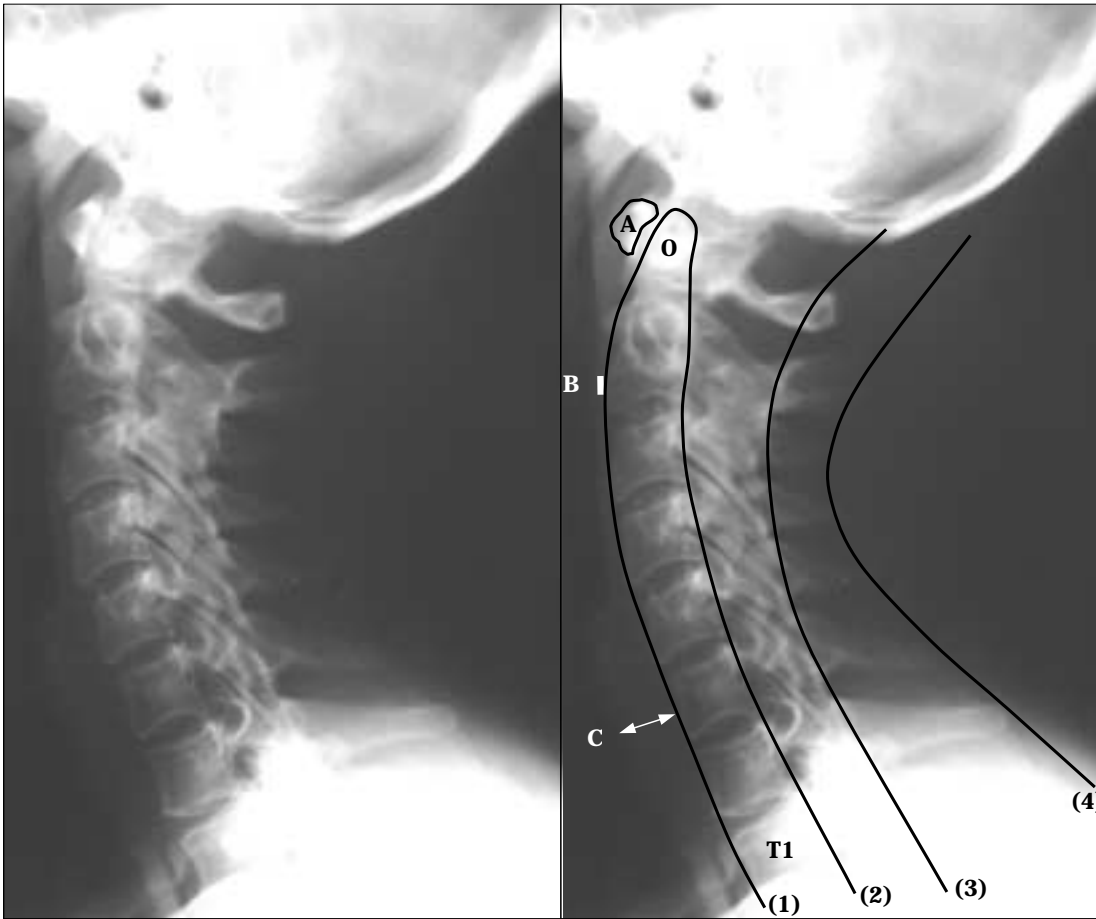


Fig. 2. Lateral c-spine:

- Adequate film: all of C7 is visible, as well as the top of T1
- All 4 lines form smooth arcs. Note that Lines 1 and 2 meet at the top of the odontoid (O). Note also that posteriorly C1 does not touch Line 4, and C1 (A) lies anterior to Line 1.
- Atlanto-odontoid space between C1 (A) and odontoid (O) is 3 mm or less.
- Soft tissue thickness anterior to C2 (B) is 5 mm or less.
- Soft tissue thickness anterior to C6 (C) is 22 mm or less.

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Fig. 3. A-P view: Note the alignment of spinous processes.

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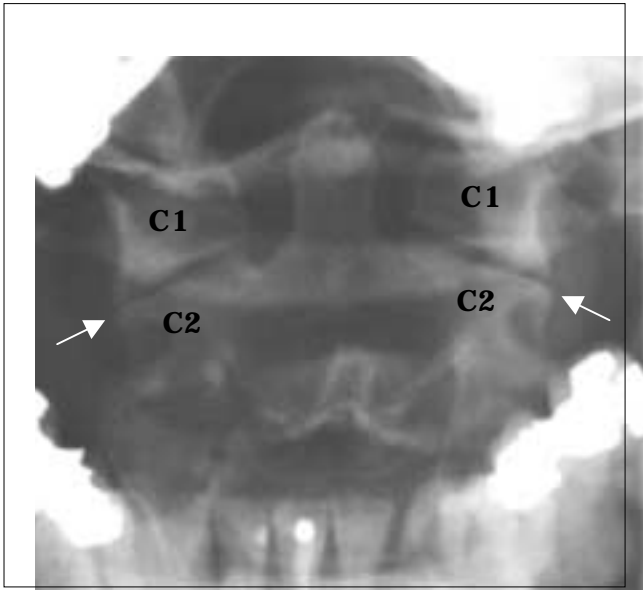


Fig. 4. Odontoid view: the lateral masses of C1 line up with the corresponding structure on C2 (indicated by arrows).

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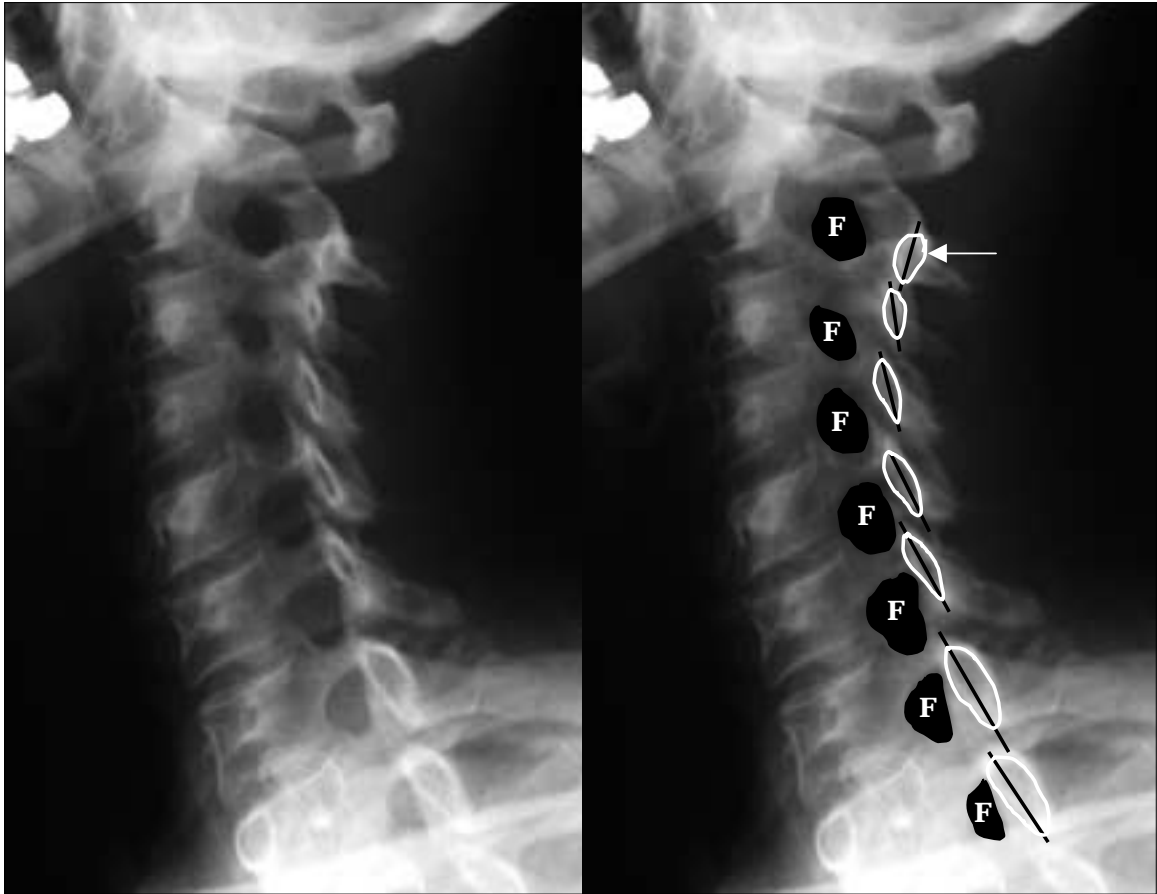


Fig. 5. Oblique view: Note the open neural foramina (F), and the laminae (arrow) lining up like “shingles on a roof.”

[\[Return to text\]](#)

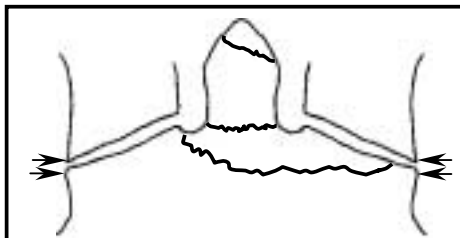
## C-spine x-ray checklist (adults)

### A. Lateral c-spine – keep hard collar on.

- ☐ adequacy of film – see all of C7, top of T1. If “No” – continue anyway. Repeat films if no fracture.
- ☐ Alignment – line 1 – continues along ant. odontoid
- ☐ Line 2 – continues along posterior odontoid
- ☐ Line 3
- ☐ Line 4 note C1 should *not* reach this line
- ☐ Soft tissue thickness < 5 mm at C2
- ☐ < 22 mm at C6
- ☐ atlanto–odontoid space: 3 mm or less
- ☐ Bones – check for fractures. Shape of C3–C7 vertebral body should be approx. the same as the one above and below.

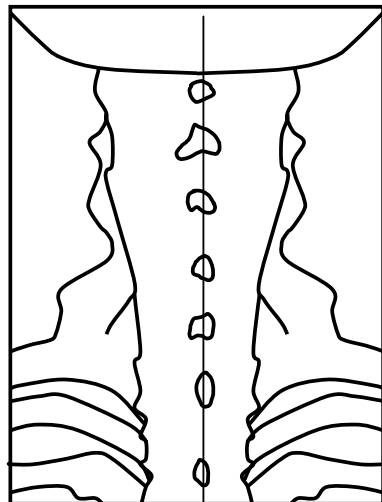
If a fracture is seen – do no further views – immobilize and transfer

### B. If lateral is normal, remove immobilization and proceed with more views



#### Odontoid view:

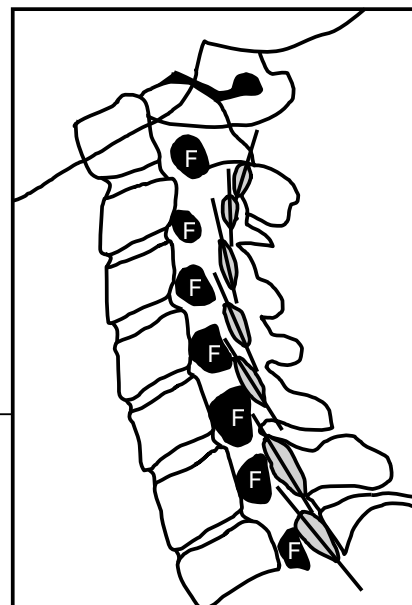
- ☐ Alignment of lateral masses (arrows)
- ☐ Odontoid fracture – 3 types shown



#### PA:

- ☐ Alignment of spinous processes only

- ### C. Obliques – Useful for unilateral facet dislocations
- ☐ Foraminae all intact (F)
  - ☐ Laminae line up like “shingles on a roof”



D. **Flexion–extension views** – for further reassurance if other views normal. Use lat c-spine checklist. Some injuries not obvious on initial lateral will be visible on a lateral view.

Fig. 6. C-spine x-ray checklist (adults)

[\[Return to text\]](#)

## Country cardiograms case 24: Interpretation and discussion

Charles Helm, MD  
Tumbler Ridge, BC

CJRM 2004;9(1):48-9

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The first ECG (Fig. 1) shows sinus bradycardia, rate 54 beats/min. All intervals are normal, as is the QRS axis. The only area of possible concern lies in leads VI and V2. In V1, the magnitude of the height of the R wave is approximately equal to that of the depth of the S wave, and in V2 a much taller R wave is present.

Three common possibilities should be considered when this type of phenomenon is encountered: right ventricular hypertrophy, posterior myocardial infarction or counter-clockwise rotation.

Right ventricular hypertrophy is excluded in this case by the absence of any other supporting ECG features.

In many cases it is not possible to distinguish between counterclockwise rotation and isolated old posterior myocardial infarction. In this case, in the absence of an old tracing for comparison, we cannot tell whether the prominent R waves are old or new. However, ST-T segment changes, if present, would point to an ischemic process. The ST segment in V1 in the first ECG (Fig. 1), shows possibly some slight ST depression and T-wave inversion. Yet T-wave inversion is normal in this lead, and the possible ST-segment depression is probably minor enough not to cause undue concern.

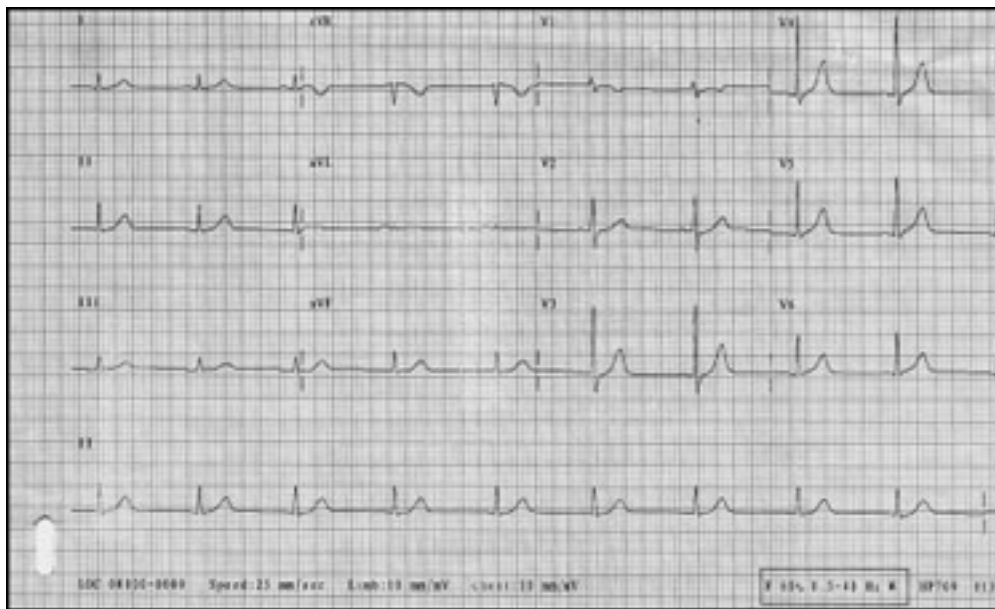


Fig. 1. First electrocardiogram of 51-year-old man with intermittent chest pain.

The first ECG could therefore be interpreted as: sinus bradycardia; early transition; unknown cause.

For this patient with chest pain, however, the need for follow-up tracings must have been clear. In isolation, the second ECG (Fig. 2) could likewise be interpreted as: sinus bradycardia, 46 beats/min; early transition; unknown cause.

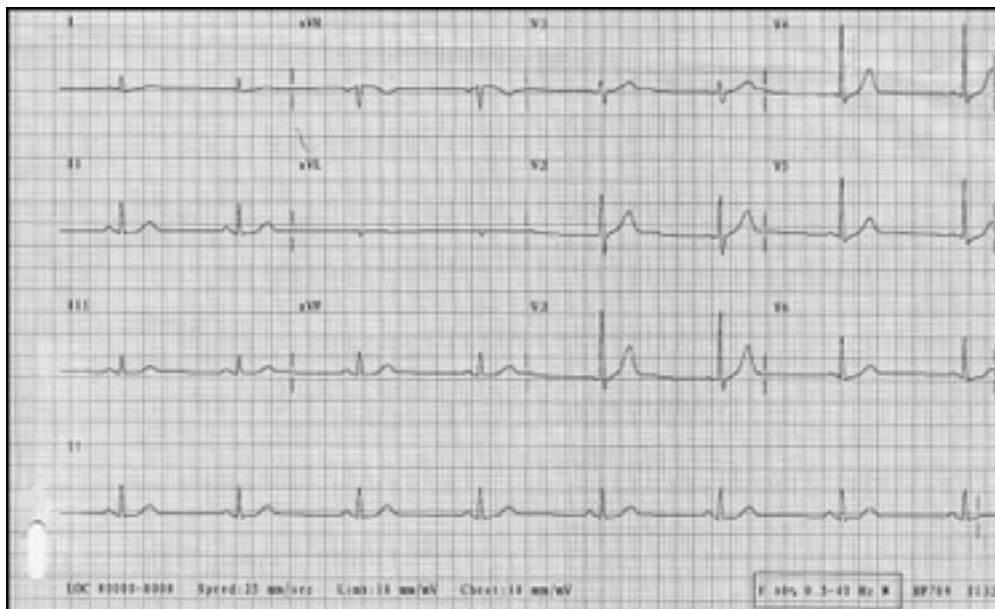


Fig. 2. Second electrocardiogram

However, these two ECGs dramatically show the value of serial tracings and meticulous comparison because there are indeed significant interval changes that allow a diagnosis of acute posterior myocardial infarction to be made with confidence.

Comparison of lead V1 in the two ECGs reveals that in the second ECG the R wave has possibly become a bit taller. There is no longer any ST depression, and the T waves have become markedly upright. Although T waves may normally be upright or inverted in V1, they should not change from the one to the other. This interval change alone is evidence of a posterior event. Remember that on the 12-lead ECG the posterior wall of the heart cannot be recorded directly. Instead we need to look for reciprocal changes, in which a tall R wave represents a deep Q wave, ST-segment depression represents ST elevation, and a T wave that changes from being inverted to being upright actually indicates developing T-wave inversion. For this reason many physicians prefer a 15-lead ECG in which lead V9 is placed posteriorly, and allows posterior changes to be seen in the usual fashion.

Comparison of these two tracings therefore demonstrates changes in Q-wave morphology, resolving ST-segment elevation, and developing T-wave inversion, even though in isolation each ECG could be interpreted as just showing early transition. It can be argued that the change in R-wave height in V1 could be due to a slightly different lead placement if the leads were not kept in place, and that the ST-segment changes are too subtle to be of definite significance. However, the interval T-wave changes are quite clearly pathologic. Acute posterior myocardial infarction can be diagnosed, and in this case was supported by the finding of a positive troponin T test.

For the Question, see [page 37](#).

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Destination: Line-ups and marathon highs

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Iqaluit, Nunavut

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It was Nov. 2, 2002, and I had finally arrived in New York City to run my first marathon, after months of gruelling training in Iqaluit, Nunavut, where I work as a family doctor. For 6 months I ran in sub-zero temperatures, on slippery gravel paths covered in ice and snow, often in 30 to 40 km/h winds. For 6 months, I juggled my call schedule to incorporate 4-hour-long runs, got up 3 hours before 8 am hospital rounds to run before work (and was sometimes late for rounds as a result!). For 6 months, I covered the same few kilometers (dusty in the summer, icy in the fall) of Iqaluit road over and over in order to accumulate the necessary mileage. Now I was finally in the Greatest City on the continent, to run with 32 000 others, many of whom had, like myself, been picked to run via lottery.

I arrived in NYC on the day prior to the race, after 5 hours of flying — thankfully no blizzard delays on the Iqaluit end! I had to hurry down to the Marathon Expo to pick up my registration package, number (for pinning to my shirt) and electronic chip (to record starting and finishing times). When I arrived at the Expo, my heart sank as I joined the longest line-up of my entire life — thousands of people were lined up, in a column that snaked down 11th Avenue and around the corner down 34th Street. But the line at least moved briskly, and thanks to the expert crowd management skills of the Manhattan volunteers, I was inside the building within the half hour.

Everywhere the marathon hype was mounting. Huge billboards outside sported slick Nike ads (NYC — land of the slick Nike advertisement) showing a sweaty marathoner's steely gaze and the caption "The lottery got me in, and guts will get me out." Inside, one could buy t-shirts with "26.2 miles" on the front, and "...and I still love New York" on the back; or signposts with "To Hell and Back — 26.2 miles ahead." Booths selling every possible runner's accessory abounded, and people from all over the world were there, either to run themselves, or to promote their own marathons, in locales as exotic as Bhutan, Negril, Jamaica and Norway.

Foreign languages could be heard at every turn — German, French, Italian. As our official marathon guide states, there were athletes from 96 different countries here (but only one family doc from the Arctic, I reckoned!)

The day of the marathon, I rose at the ungodly hour of 5 am to don my runners, with electronic chip attached. With tote bag in hand, I descended to the depths of the century-old subway system to catch a train to midtown Manhattan, to meet the official buses that would sweep me off to the starting line on Staten Island. I had just missed a train, and as I numbly waited for the next, more runners emerged, one by one, out of the chill pre-dawn, each with the running shoes sporting the telltale electronic chip. Still foggy with sleep, we solemnly nodded to each other, and resumed waiting for our downtown-bound train. When it finally arrived at our platform, we saw that it was already populated by other marathoners. At each stop, we took on more — runners of all different shapes, ages, gender and race.

At Times Square, we piled out in a sea of running tights, with toques and thin gloves donned against the chill November air. On the street outside, we coalesced into a pulsing artery of humanity, streaming toward the New York Public Library, where buses waited to transport us to the starting line. Thirty thousand people were corralled expertly by police and volunteers into a huge line, snaking back and forth along 42nd Street. My heart surged to see them all, and to hear the police and volunteers shout words of encouragement to us.

A half hour ride by bus saw us deposited at Fort Wadsworth, Staten Island, at the far side of the Verrazano-Narrows Bridge. It was 8:00 am, and we had 3 hours to kill before starting. There were volunteers handing out bagels, water, Gatorade, yogurt and coffee, and entertainers warming up the crowd. I had a quick breakfast, though declined to take part in the most patient line I'd ever seen — the thousands of people lined up solemnly for their morning coffee. Now that's an addiction! Instead, I curled up on the grass in a sunny spot to try to catch some ZZZs. A couple of hours later, I rose to stand in the slowest line of my life — 50 minutes to the front of the Porto-Potty line. Then suddenly, people were moving to their colour-coded corrals for the staggered start-off. I had been assigned to the second of 3 starts. After a beautiful rendition of the Star-Spangled Banner, the gun went off, and I watched the first 10 000 runners bound across the bridge to the strains of Frank Sinatra's "New York, New York," with the rest of us whooping and yelling encouragement. Here we all were, finally, after months of gruelling training. This was our long-awaited moment.

Of course, the elite runners started at the front of the pack, and quickly outstripped the rest of us average folk. The lead runner, a Kenyan named Rodgers Rop, would win the 26.2-mile race with the unbelievable time of 2 hours 8 minutes 7 seconds. The top woman, another Kenyan, won with a time of 2 hours 25 minutes 56 seconds. They were crossing the finish line just as many of us were hitting our

stride at mid-course.

We were ecstatic to be finally running. There were enthusiastic crowds lining the streets the whole way, and great volunteers who handed off water and Gatorade every mile or two. There was nothing to compare with the feeling of racing along in this sea of humanity, with these usually hardened New Yorkers (who typically do not give out encouragement for free) cheering us on with the greatest enthusiasm and fervour. The crowds oriented us to each borough along the way, shouting proudly "You're in Brooklyn," or "Welcome to the Bronx, people," as we passed from neighbourhood to neighbourhood. Live bands had set up along the course, and welcomed us with boisterous brass band tunes, or a chorus of bagpipes, or the harsh strains of a young punk band, or the rhythm of rap music, or an elementary school's orchestral efforts. Small kids held out their hands to "high five" the athletes. Spectators, young and old, picked out the names written on the t-shirts of individual racers to personalize their encouragement: "Way to go, Jason!," "looking good, Leslie," "keep going Jeff, you're almost there." I even got a "Way to go, Nunavut!" from one 12-year old boy who picked out the name on my shirt (maybe he thought it was my name). I was grinning like a fool the whole way and grinned even wider at that.

The race was moving at a good pace. At the half-marathon mark, I realized that I didn't really feel that tired. Training in the Arctic, I decided, must be like training at altitude — it had hardened me. After the challenge of snow, ice, sub-zero temperatures, 40-kilometre-per-hour winds, threats of polar bears, the uneven footing of the Arctic tundra, this run on paved roads at a balmy 8°C (no wind chill), blue skies and cheering crowds seemed like a dream.

I decided to speed up as I crossed the electronic mats at 10 k, half-marathon, and 20 miles, accelerating from an 11-minute mile to a 10-minute mile to a 9-minute mile. In the last 4 miles, I knew I was going to make it, and I started sprinting in an effort to shave a few more seconds off my time. With a whoop of triumph, I crossed the finish line with a net time of 4 hours 5 minutes 6 seconds. I ranked 12 647 out of 35 185 and 2476 out of 10 208 women — a respectable ranking, I thought, for a little family doc from the North!

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## Personal digital assistants

Barrie McCombs, MD, CCFP, CCFP(EM)

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Handheld computers (aka: personal digital assistants, or PDAs) are a practical tool for providing "point of care" medical information and recording patient information, in addition to their basic calendar, address book, and memopad functions. This article reviews some factors to consider before purchase.

### Usage

How will you use the PDA? If you just want a basic organizer, an entry level model may be adequate. If you want a medical reference tool, you need a large memory capacity. If you'll use it for data entry, compare models with handwriting recognition to those with a built-in keyboard.

### Transport

How will you carry it? In a pocket, on your belt, or in a purse or briefcase? This will help determine the most convenient size and shape of PDA.

### Palm OS models

The Palm Operating System (OS) is used on PDAs made by Palm and Sony. Palm brand models have a simple interface: all available programs are located in one main menu. Newer Sony models have a customized interface that takes advantage of their "jog dial" navigation feature, a wheel that allows one-handed scrolling. If you find this interface confusing, it's possible to reset it to match the "classic" Palm OS interface.

### Pocket PC models

Pocket PC (aka: Mobile Windows) models are made by Hewlett-Packard, Toshiba,

Dell, and Viewsonic. They're more powerful but it may take longer to learn to use all the available features. They're particularly useful if you want to exchange Microsoft Office files (Word, Excel, PowerPoint) between a desktop and handheld computer.

### Software availability

Most major medical software programs are available for both Palm OS and Pocket PC devices.

### Display

Most models have a colour display, which is bright and easy to read but uses more battery power than a monochrome display. Colour screens vary in quality, so get a side-by-side comparison if possible. Back-lit screens are easier to view indoors and "trans-reflective" screens are easier to view out-doors. Look for a display that has both.

### Processor

Processor speed ranges from 16-400 megahertz (mhz). Most suitable models are in the 100-300 mhz range. A novice may not need the faster processor used on high-end models.

### Random access memory

RAM is the main device memory, ranging from 8-64 megabytes (mb) on a Palm OS and 32-64 mb on a Pocket PC. Not all of this memory is available to the user; some is reserved for the OS.

### Expansion memory

If you wish to use a PDA as a medical reference tool, purchase one with a slot for a memory expansion card. These cards are sold separately and typically have a capacity of from 32-256 mb. Common formats include Secure Digital, Sony Memory Stick, and Compact Flash (older). Most medical programs can read their data files directly from the memory card, without first moving the file into RAM.

### Battery

Almost all PDAs have a rechargeable Lithium Ion or Lithium Polymer battery, which have important differences from the older nickel-cadmium (Ni-Cad) type. They should be recharged whenever possible. If they are fully discharged, it's

possible to damage the battery. A built-in battery is difficult or impossible to replace if it fails, so consider a model with a user-removable battery. You will then be able to switch to a second battery if you use your PDA for prolonged periods and can't recharge it.

## Data entry

Most models provide handwriting recognition, where the user draws "print" characters on the PDA display screen, using a stylus (pointer). A few models recognize script handwriting. All models offer a virtual keyboard, where you tap letters, numbers and symbols on an on-screen keyboard display.

## Built-in keyboards

A few models have a built-in keyboard. The keys may be small and awkward to use, so try different models. If you do a lot of data entry, consider buying a folding external keyboard. It's also possible to enter text on your desktop computer and then transfer it to the PDA.

## Synchronization

All PDAs come with either a cradle or cable for re-charging the battery and sharing data between the device and your desktop computer. A cradle is more convenient for connection to a desktop computer, but a cable is more compact for travel.

## Infra-red beaming

All PDAs have an infra-red (IR) port for "beaming" information to other devices. This allows you to share data files or "shareware" programs with other PDAs, IR-equipped printers or desktop computers. Most commercial medical software is copy-protected and cannot be transferred to another PDA.

## Bluetooth wireless

Some models offer "Bluetooth" wireless to communicate with other Bluetooth-capable devices. Bluetooth has a longer range than infra-red, but may require several set-up steps before communication is possible. I still find it quicker to use infra-red.

## Wi-Fi wireless

A few models offer longer-range "Wi-Fi" wireless communication, which allows the PDA to communicate with a wireless base station. This feature is most useful in

a "wireless office" or institutional setting.

## Cell phone wireless

Some PDAs can communicate with cell phone networks, allowing them to receive email or download information from the Internet. Combination PDA/cell phone devices are improving, but tend to be compromise devices without the full features of either a PDA or a cell phone.

## Voice recording

A few models allow you to record short voice messages, which may be more convenient than typing memos. The sound quality is not as good as dedicated digital recorders and is not suitable for prolonged dictation or transfer to speech recognition software.

## Cameras

Some models include a digital camera, but usually do not have a built-in flash. Some physicians may find this feature useful for medical purposes, such as following the progress of a rash or other skin condition.

## Music

Some models can store and play music files in the MP3 format. This may be useful, but can use precious memory capacity and battery power.

## Display protection

It's easy to scratch or damage a PDA's display. If the device doesn't come with a screen cover of some form, be sure to buy a protective case.

## Spare stylus

It is also easy to lose the stylus that fits into a special slot on your PDA. Consider buying spares. PDA models change rapidly and you may not be able to purchase the matching stylus if you lose it later.

University of Calgary  
Medical Information Service  
([www.ruralnet.ab.ca/medinfo/](http://www.ruralnet.ab.ca/medinfo/))

Our "Handheld Computers" page provides a wide range of up-to-date information

about handheld computers, including current models, features and prices, reviews of medical software, and links to other sources of PDA information.

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Competing interests: None declared.

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Childhood URTIs

CJRM 2004;9(1):47

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To the Editor:

In response to an article<sup>1</sup> on the treatment of childhood upper respiratory tract infections (URTIs), I have the following comments.

The definition of misuse of antibiotic seems to be based on epidemiological and microbiological data obtained from other studies more than on clinical backgrounds arising from the physical exam and investigations performed in the reported group of pediatric patients — I believe this is a major flaw of the paper.

I am perfectly convinced that some antibiotic prescriptions could have been avoided in consideration of the possible viral etiology of at the least some of the diagnosed acute otitis media (AOM) cases and based on the fact that AOM is not followed by complications and resolves spontaneously. However, I can imagine what made the family physicians more prone to suggest antibiotic treatment in that specific group of patients.

The first query is about the diagnosis. I do imagine that some of the children who were diagnosed with AOM may actually have had a difficult otoscopic exam. Examination with portable otoscope has strong limitations and may be difficult in children. Wax may have been present, and visualization of the inner ear could have been far from perfect. Etiological diagnosis by microbiology is virtually impossible in absence of perforated tympanic membrane (TM) (no distinction between AOM with intact or perforated TM was made in terms of antibiotic prescription pattern in this study), despite some swab being collected from the oro/rhinopharynx in an attempt to isolate the agent that may be eventually responsible for the infection or tympanocentesis and middle ear fluid culture performed.

A clinical/otologic score evaluating severity of TM findings (redness and bulging) and patient's fever, irritability and ear tugging, may be of some help, but it may also be misleading and, anyway, it would not add valuable information in discriminating among various bacterial etiologies of AOM (which equally accounts

for inappropriate antibiotics prescribing).

In a rural context it may be complex obtaining a second visit if things should not go as expected. And expectations of the parents are usually quite high. It would be rather interesting to see which percentage of pediatric patients with the diagnosis of AOM that were not prescribed antibiotics did actually receive antibiotic treatment on a second occasion and the rate of complications in this subpopulation. In this context it seems likely that the family doctors could have experienced few problems in supporting their therapeutic approach to the parents and that their prescription pattern did take into account the degree of urgency and magnitude of the problem as perceived by the parents. I believe that more accurate diagnostic tools and otoscopic skills would be extremely helpful in improving the prescribing pattern of family physicians in rural areas as well as urban ones.

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## Reference

1. Hamilton S, Graham D. [Rural emergency department antibiotic prescription patterns for the treatment of childhood upper respiratory tract infections.](#) Can J Rural Med 2003;8(3):185-9.

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[One author responds:]

The aim of this study was to present the experience of a single rural emergency department. The bulk of Dr. Cervoni's comments have stressed the importance of physical exam skills leading to diagnosis; however, we would emphasize the multiple studies that have demonstrated that it is virtually impossible to accurately differentiate bacterial and viral URTI etiology clinically. We therefore considered the more important question to be this: Once a diagnosis of a URTI is reached, how do the actual prescribing patterns of Canadian physicians compare to those proposed in current guidelines?

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