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The Occasional Ingrowing Toenail

Potential Gaps in Congestive Heart Failure Management

If All Ambulances Could Fly



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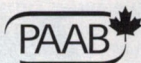
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This quilt was hand printed by members of the SRPC to raise money for Sabar Jasim to undergo surgery for her club foot. The fundraiser contributed to allowing Ms. Jasim, a young girl from Iraq, to travel to Montréal with her Aunt this Spring to undergo a successful operation. For more info on Sabar Jasim and the quilt, please see page 139.

Designed & sewn: Dr. Terry O'Driscoll

Photo: Dr. Len Kelly



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Beyond the slogan: It's all about sharing the load

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When it was founded the SRPC coined a slogan that read: "To make rural medicine something someone would want to do." The subtext was that rural medicine was too poorly taught, too poorly paid, and too tough all around to be attractive. This proposition supposed that if a shopping list of items were improved, physicians would follow.

Some of these goals have been achieved. Some rural practices have benefited from alternate payment plans, and in most places call is remunerated. Some teams are sufficiently large that on-call frequency is acceptable. The image of rural medicine has been burnished even if it is not yet shining brightly. There have been positive developments.

IF THEY CHOOSE NOT TO BE ACCOUNTABLE TO THE PUBLIC SYSTEM, ARE THEY NOT BACKING INTO ACCOUNTABILITY TO A PRIVATE ONE?

Has this brought about a sea change in the choices new graduates are making? Recent figures would suggest not. A review in *The Medical Post* is instructive. When discussing the benefits of a practice limited to the emergency department, one physician notes: "You are not tied down to a patient population; you don't wear a pager. You show up for your shift and then you sign over at the end of the shift, and you leave your work at the hospital, instead of taking it home with you."¹

This desire to achieve a better balance of personal and practice life (a result some say of the "humanization"

of the profession) is by no means to be condemned. On the contrary it has been embraced by those long into their practices who also want to "wake up and smell the roses."

Rural populations need care. Rural physicians need a life. Is it impossible to have it both ways? Individual avoidance of practice that is too intrusive of personal space is an illusory solution that is only socially viable if an equivalent number of practitioners make an opposite choice. Since health services are a government responsibility, are funded by government, and since citizens have equal rights wherever they live, the sum of such choices, if unbalanced, leads to inevitable tension and can provoke draconian responses. In Quebec we have lived through such an event.²

If physicians make decisions without regard to these realities they are in fact making a statement about accountability. If they choose not to be accountable to the public system, are they not backing into accountability to a private one? The laws of supply and demand are unencumbered by a social conscience, but create a far different system than the one we know today.

Perhaps it is time to look beyond the slogan. Rural medicine will never fully succeed in meeting the personal "want" test. (Who "wants" to be on-call?) It is, however, a collective responsibility, and by being shared can be both fulfilling and sustainable, and, in the end, truly Canadian.

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Au-delà du slogan : une question de partage

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Lorsqu'elle a été fondée, la SMRC s'est donné un slogan : «Transformer la médecine rurale en profession attrayante». On sous-entendait que la médecine rurale était trop mal enseignée, trop mal rémunérée et trop dure en général pour être attrayante. On supposait ainsi que si on en améliorait certains éléments, les médecins suivraient.

Certains de ces buts ont été atteints. Des pratiques rurales ont bénéficié de nouveaux modes de rémunération et à la plupart des endroits, les périodes de garde sont rémunérées. Certaines équipes sont suffisamment nombreuses pour que la fréquence des périodes de garde soit acceptable. On a poli l'image de la médecine rurale même si elle ne brille pas encore de tous ses feux. Il y a eu des progrès.

Les choix des nouveaux diplômés ont-ils changé radicalement? Les statistiques récentes indiquent que non. Une étude publiée dans *The Medical Post* est révélatrice. Lorsqu'il est question des avantages d'une pratique limitée au service d'urgence, un médecin signale que : «Le médecin n'est pas lié à une population de patients et ne porte pas de téléavertisseur. Il se présente à son quart de travail, signe ensuite à la sortie lorsqu'il a fini et laisse son travail à l'hôpital au lieu de l'amener chez lui.¹»

Il ne faut pas condamner cette recherche d'un meilleur équilibre entre la vie personnelle et professionnelle (résultat, selon certains, de «l'humanisation» de la profession). Au contraire, le principe est adopté par ceux qui pratiquent depuis longtemps et veulent aussi «prendre le temps de sentir les fleurs».

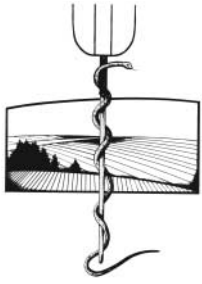
Les populations rurales ont besoin de soins. Les médecins ruraux ont besoin d'une vie. Est-il impossible de combiner les deux? L'évitement individuel d'une pratique qui envahit trop l'espace personnel est une solution illusoire, socialement viable seulement si un nombre équivalent de praticiens choisissent le contraire. Comme les services de santé relèvent de la compétence de l'État et sont financés par lui, et comme la population a des droits égaux peu importe où elle vit, s'il n'est pas équilibré, la cumulation de ces choix entraîne une tension inévitable et peut provoquer des réactions draconiennes. Nous l'avons vécu au Québec².

Si les médecins prennent des décisions sans tenir compte de ces réalités, ils prennent en fait position au sujet de leur imputabilité. S'ils décident de ne pas rendre compte au système public, ne se trouvent-ils pas, par le détour, à devoir en rendre compte à un système privé? Les lois de l'offre et de la demande ne s'encombrent pas de conscience sociale, mais elles créent un régime très différent de celui que nous connaissons aujourd'hui.

Le moment peut être venu de regarder plus loin que le slogan. La médecine rurale ne réussira jamais à satisfaire entièrement au test des désirs personnels. (Qui veut être de garde?) Il s'agit toutefois d'une responsabilité collective qui, si elle est partagée, peut être à la fois satisfaisante et viable et, en fin de compte, véritablement canadienne.

RÉFÉRENCES

1. Sylvain M. Medicine's generational shift. *Med Post* 2005;41:47.
2. Wootton J. Si c'est la loi 114, ça doit être au Québec [éditorial]. *J can med rural* 2002;7(4):252-3.



President's message. Growth in the SRPC

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April is always a busy and invigorating time for the Society of Rural Physicians of Canada (SRPC). This spring was no exception, with our 13th Annual Rural and Remote Medicine Conference attracting the largest number of attendees ever. We had 380 people in Montréal for an excellent CME event, with many hands-on learning opportunities and a wide variety of practical sessions. The SRPC is gaining a national reputation for quality, relevant CME. Many thanks to conference organizer, Dr. Gordon Brock, and the scientific planning committee: Drs. Pascal Croteau, Martin Dawes, Don Klassen, Maurice Lamarche, Keith MacLellan, Nichole Riese, Karl Stobbe, Jean Warneboldt and Keith White, and Ms. Suzanne Poirier. Thanks also to SRPC staff Lee Teperman and Robin MacLellan, who handled all the practicalities of the conference. For the early planners — mark your calendars now for April 20, 2006, in Winnipeg at the Fort Gary Hotel.

The SRPC Executive and Council met in Montréal and had outstanding attendance. Achieving wide geographic representation has taken time, but good progress is being made. With the final revision and acceptance of our Bylaws, committee chairs are now voting members of Council. These changes have resulted in a varied group of people helping to make the SRPC a strong voice for rural medicine nationally. I would like to welcome this year's Executive: President-Elect Dr. Michael Jong, Secretary Dr. Rita Affleck, Treasurer Dr. Braam DeKlerk, and Members-at-large Drs. Hugh Hindle, Sandy MacDonald and Karl Stobbe. I am also

happy to report that our membership has surpassed 2000.

SRPC CARE TO CARE PROJECT

Last year's meeting in Quebec City was the first time many of us heard about the "Care to Care Project" undertaken by the Educational Committee of the SRPC. Three SRPC members: Drs. Dale Dewar, Len Kelly and Karl Stobbe, along with Mr. Bill Curry, a Certified Health Care Administrator, travelled to Iraq to provide CME primarily to people in rural areas in Kurdistan. Two trips were made:^{1,2} one in November 2003 and another in April 2004. On their first trip they met Sahar Jasim, a 12-year-old girl with cerebral palsy and a clubfoot. The team was asked to facilitate repair of her foot and ankle. Fundraising was undertaken at the Quebec City Conference, and the results of the Quilt Project are displayed on this issue's cover. The SRPC members who lent a hand raised \$6000 for travel costs. Dr. Terry O'Driscoll designed and sewed the quilt.

Sahar travelled to Canada with her aunt Sawsan and underwent a triple arthrodesis and tendon lengthening of her left ankle and foot on Mar. 24, 2005. Support was received from Dr. Carolyn Bennett, Minister of Public Health, Ms. Donna Capper, Immigration Canada officer in Jordan, the Amal Moslem Women's Centre in Montréal, and the Montreal Shriner's Hospital.

The Educational Committee offered 30–50 hours of CME on each trip. They met in Montréal in 2005 and will

continue to explore CME as a capacity building tool in rural areas internationally.

I continue to be amazed at what the efforts of dedicated individuals in the SRPC have accomplished. The Educational Committee is one of 15 SRPC committees working on projects to support and enhance rural medicine in Canada, and beyond. It is a privilege to be part of such a committed and

caring organization.

REFERENCES

1. Kelly L, Dewar D, Curry B. Experiencing chemical warfare: Two physicians tell their story of Halabja in Northern Iraq. *Can J Rural Med* 2004;9(3):178-81.
2. Dewar D, Kelly L, Stobbe K. Rural CME in Iraq: SRPC Care to Care Project –2003. *Can J Rural Med* 2003;9(1):11-4.

Message de la présidente. Croissance à la SMRC

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Le mois d'avril est toujours occupé et stimulant pour la Société de la médecine rurale du Canada (SMRC) et ce printemps n'a pas fait exception : la 13^e édition de notre Conférence annuelle sur la médecine en milieu rural et éloigné a attiré un nombre record de participants. On a accueilli à Montréal 380 personnes pour une excellente activité d'EMC et offert de nombreuses possibilités d'apprentissage personnel et un vaste éventail de séances pratiques. La SMRC est en train de se bâtir une réputation nationale pour ses activités d'EMC pertinentes et de qualité. Tous nos remerciements à l'organisateur de la conférence, le D^r Gordon Brock, et au comité de planification scientifique : les D^{rs} Pascal Croteau, Martin Dawes, Don Klassen, Maurice Lamarche, Nichole Riese, Keith MacLellan, Karl Stobbe, Jean Warneboldt et Keith White, sans oublier M^{me} Suzanne Poirier. Nous remercions aussi les membres du personnel de la SMRC, Lee Teperman et Robin MacLellan, qui se sont occupés de tous les aspects pratiques de la conférence. Pour ceux qui commencent à planifier tôt — inscrivez dès maintenant à votre agenda la date du 20 avril 2006 à Winnipeg, à l'Hôtel Fort Gary.

La direction et le conseil de la SMRC se sont réunis à Montréal et ont

attiré une participation exceptionnelle. Il a fallu du temps pour réunir une vaste représentation géographique, mais les progrès sont intéressants. Avec la version finale et l'adoption de nos statuts, les présidents de comité sont maintenant membres votants du Conseil. Ces changements ont permis de rassembler un groupe varié de personnes qui aident à faire de la SMRC un solide porte-parole de la médecine rurale sur la scène nationale. Je souhaite la bienvenue à la direction cette année : le D^r Michael Jong, président désigné, le D^r Rita Affleck, secrétaire, le D^r Braam DeKlerk, trésorier, et les D^{rs} Hugh Hindle, Sandy MacDonald et Karl Stobbe, membres à titre personnel. Je suis heureuse de signaler que nous comptons maintenant plus de 2000 membres.

LE PROJET «CARE TO CARE» DE LA SMRC

C'est au cours de l'assemblée de l'année dernière à Québec que beaucoup d'entre nous ont entendu parler pour la première fois du projet «Care to Care», lancé par le Comité d'éducation de la SMRC. Trois membres de la SMRC, soit les D^{rs} Dale Dewar, Len Kelly et Karl Stobbe, ainsi que M. Bill Curry,

continue to explore CME as a capacity building tool in rural areas internationally.

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administrateur certifié en soins de santé, se sont rendus en Irak pour présenter des activités d'EMC principalement aux populations des régions rurales du Kurdistan. Ils ont fait deux voyages^{1,2} : un en novembre 2003 et un autre en avril 2004. Au cours du premier voyage, ils ont rencontré Sahar Jasim, fillette de 12 ans atteinte de paralysie cérébrale et qui avait un pied bot. On a demandé à l'équipe d'aider à réparer son pied et sa cheville. On a commencé à réunir des fonds au cours de la conférence de Québec et la page couverture de ce numéro illustre les résultats du projet Courtepointe. Les membres de la SMRC ont réuni 6000 \$ pour les frais de voyage. Le Dr Terry O'Driscoll a conçu et cousu la courtepointe.

Sahar s'est rendue au Canada avec sa tante Sawsan et a subi une triple arthrodèse conjugquée à un allongement du tendon de la cheville et du pied gauches le 24 mars 2005. On a reçu de l'aide du Dr Carolyn Bennett, ministre de la Santé publique, de M^{me} Donna Capper, agente d'Immigration Canada en Jordanie, du Centre des femmes musulmanes

Amal à Montréal et de l'Hôpital Shriners de Montréal.

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Les résultats des efforts de personnes dévouées de la SMRC continuent de me surprendre. Le Comité d'éducation est un des 15 comités de la SMRC qui travaillent à des projets visant à appuyer et à améliorer la médecine rurale au Canada et ailleurs. C'est un privilège de faire partie d'une organisation aussi engagée et bienveillante.

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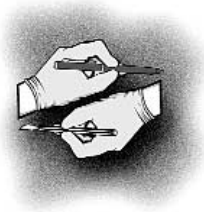
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ORIGINAL ARTICLE ARTICLE ORIGINAL

Use of seat belts in rural Alberta: an observational analysis

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Objective: This paper details an observational study that estimates rates for wearing seat belts in rural Alberta and compares them with rates derived from a similar study conducted in 1999.

Method: Direct observations of drivers and front-seat passengers of 72 593 light-duty vehicles were carried out at 334 survey locations in communities with populations of fewer than 25 000, throughout northern, central and southern Alberta. In addition to seat belt use, information collected included vehicle type, gender of drivers and passengers and, at intersections controlled by a stop sign, whether or not the vehicle came to a complete stop.

Results: The results indicate that in 2001 in rural Alberta the estimated proportion of driver and front-seat passengers of light-duty vehicles using seat belts was 76.1%. When compared with 1999 data, this represents a 6.9% increase in seat belt wearing rates. The data was desegregated further to show differential wearing rates between drivers of different vehicle types, males and females, drivers and passengers, and between those who came to a complete stop at a stop sign and those who did not. The time of day in which data collection took place also had some influence on seat belt wearing rates.

Discussion: This study contributes valuable information to programs and initiatives that aim to increase the use of seat belts in rural Alberta.

Objectif : Cet article décrit une étude par observation au cours de laquelle on a estimé les taux de port de la ceinture de sécurité en milieu rural en Alberta et les compare aux taux dérivés d'une étude semblable réalisée en 1999.

Méthode : On a observé directement le conducteur et le passager avant de 72 593 véhicules légers à 334 points de sondage dans des communautés de moins de 25 000 habitants du nord, du centre et du sud de l'Alberta. Outre le port de la ceinture de sécurité, les renseignements recueillis portaient sur le type de véhicule, le sexe du conducteur et du passager et, aux intersections contrôlées par un arrêt, sur l'arrêt complet ou non effectué par le véhicule.

Résultats : Les résultats indiquent qu'en 2001, en milieu rural en Alberta, on estime que 76,1 % des conducteurs et des passagers du siège avant de véhicules légers portaient la ceinture de sécurité. Comparativement aux données de 1999, ces chiffres représentent une augmentation de 6,9 % du taux de port de la ceinture de sécurité. On a désagrégé les données davantage pour montrer les taux différentiels de port de la ceinture entre les conducteurs de différents types de véhicules, les hommes et les femmes, les conducteurs et les passagers, et entre ceux qui ont fait un arrêt complet et ceux qui ne l'ont pas fait. L'heure du jour à laquelle on a recueilli des données a aussi eu un effet sur les taux de port de la ceinture de sécurité.

Discussion : Cette étude produit de l'information précieuse pour les programmes et les initiatives visant à accroître le taux de port de la ceinture de sécurité en milieu rural en Alberta.

INTRODUCTION

It has been established in several countries that motor vehicle crashes in rural areas are more common¹ and

more likely to result in fatalities and serious injury²⁻⁵ than those in urban areas. Over a decade of research and discussion has produced several explanations. Rural areas may not be as

accessible to emergency service personnel, and response times increase as the distance from service centres increases.⁶ Rural areas may simply not have access to the same level of medical resources as are available in non-rural areas.⁷ However, explanations for this “rural disadvantage” may also include the individual behaviours of rural vehicle occupants, such as driving while under the influence of alcohol, a greater propensity of speeding on rural backroads,^{2,8-11} and not using seat belts.¹¹

Despite the controversy and debate over the mandatory use of seat belts while driving, the effectiveness of seat belts in saving lives and reducing injury severity is well established.¹²⁻¹⁴ In fact, estimates of the potential extent of these reductions range from 39% to 60%, depending on vehicle type, size, and occupant seating position.¹⁵⁻¹⁸ Thus, with no other change in driving behaviour, employing an occupant restraint can result in a 39%–60% reduction in the likelihood of receiving a serious or fatal injury if involved in a motor vehicle collision or crash. There are few other straightforward interventions that would bring about such benefits in terms of the economic and human cost of motor vehicle crashes. This is why there have been such diligent efforts by many different organizations and institutions concerned with road safety to improve wearing rates, decrease non-wearing rates and decrease misuse of seat belts.

On July 1, 1987, after months of deliberation and despite notable public opposition,¹⁹ legislation was passed in Alberta making it unlawful to occupy a moving motor vehicle without using an occupant restraint device. In the years following this legislation, provincial wearing rates reportedly increased — attesting to the effectiveness of health policy on individual behaviour.²⁰ However, despite this improvement, roadways remain a major instrument of injury and death in Alberta. In Alberta Transportation’s 2001 Alberta Traffic Collision Statistics²¹ it was reported that 19 000 non-fatal collisions injured 27 583 people. In the same year, 341 fatal collisions caused 404 deaths. Of these 341 fatal collisions, 253 occurred in rural areas, accounting for 74.2% of all fatal crashes. Furthermore, non-restraint users were represented more strongly than restraint users, in fatal and injury-inducing crashes.²¹

Recent background of seat belt initiatives in Alberta

To address the issue of non-use of seat belts in rural Alberta the Royal Canadian Mounted Police (RCMP), working with the Alberta Occupant

Restraint Program and its partners, implemented 3 selective traffic enforcement programs (STEPS), focused on seat belts, in 2000. Each STEP used a combination of education and enforcement strategies designed to increase awareness and to encourage rural Albertans to wear their seat belts. Enforcement activities included roadside stops and increased patrolling. To integrate these activities with national efforts, the RCMP adopted the objectives regarding occupant restraint of the Canadian Council of Motor Transport Administrators, Road Vision 2010. These objectives are to: 1) raise the rates of seat belt use to 95%; and 2) reduce the number of unbelted occupants killed or seriously injured by 40% by the year 2010.²²

This study provides baseline data from the 1999 Alberta Rural Seat Belt Survey (ARSBS) and follow-up data from the 2001 ARSBS that can be used to evaluate the progress toward the objectives of STEP and other programs and initiatives aimed at improving the rate of wearing seat belts.

METHODS

National Survey of Seat Belt Use and Alberta Rural Seat Belt Survey

Each year, Transport Canada, a federal government body that develops and administers policies, regulations and services relevant to the Canadian transportation system, conducts a national Survey of Seat Belt Use in Canada.²³ This annual project provides an estimation of seat belt use among Canadians. The similarly designed ARSBS only surveys the driver and front-seat passenger due to difficulties with surveying rear-seat passengers. This design ensures that: a) the sites selected for the survey will form a representative set of intersections for the survey of seat belt usage in Alberta, and; b) the survey results from Transport Canada’s national survey and the ARSBS will be comparable. Furthermore, the same data collection method was used in the ARSBS as in the national survey.²⁴ This allowed us to achieve a similar degree of accuracy with the ARSBS as is achieved with the national survey. We compared data from the June 1999 ARSBS with the June 2001 ARSBS.

Study location

Alberta is a province in Western Canada, occupying over 661 000 square kilometers of diverse landscape, including prairies, parkland, forests and

mountains. In 1996 Statistics Canada estimated the population of Alberta at 2.6 million, of which approximately 20% lived in rural areas.²⁵

Sample

Population is an accepted indicator for determining the rurality of communities, with lower populations indicating more rural communities.^{26,27} For the purpose of this study, and within the Albertan context, communities of fewer than 25 000 inhabitants were classified as rural and included in the sample frame of the study. Thus, in terms of the Statistics Canada definition of a rural locale, the sample frame for this study included all urban areas with <25 000 inhabitants and all Census subdivisions with populations <1000.

To select the sample, the rural communities were identified by population stratum and Regional Health Authority (RHA). Alberta is divided into 9 RHAs. Each RHA is responsible for local hospitals, public health programs, community health services, and delivering health care services to residents in the region. Five strata were delineated as communities with populations of <2500; 2500–4999; 5000–9999; 10 000–14 999; and 15 000–25 000. The sampling was multi-stage. First, all urban areas with a population of <25 000 within an RHA were included in the ARSBS. A sample of Census subdivisions with a population of <1000 were also selected for each RHA. Next, the intersections (sites) were selected randomly from each community. The number of sites was selected based on the population size of the community. Finally, the observation periods were selected randomly over the period of the survey for each site.

Data collection

Our sample population for the ARSBS consisted of those individuals driving or riding in the front seat of vehicles travelling through a pre-determined rural road segment during selected 2-hour time periods between 7 am and 5 pm, Monday through Friday, between June 21 and June 25, 2001. A rural road segment refers to a section of road passing through a rural community. Selected sections were part of intersections controlled by stop signs or traffic lights. An observer was stationed at each selected rural road segment for the predetermined 2-hour time period between 7 am and 5 pm. The following information was recorded for each light-duty vehicle (generally a vehicle <10 000 lb gross vehicle weight) that passed through the road segment: clas-

sification of vehicle (passenger car, sport utility vehicle [SUV], light truck or van/minivan); driver's gender; whether or not the driver was wearing a seat belt; front-seat passenger's gender; whether or not the front-seat passenger was wearing a seat belt; and, if the intersection was stop sign controlled, whether or not the driver brought the vehicle to a full stop. This information was gathered by direct observation and recorded on a form designed specifically for this study.

Data analysis

Univariate chi-squared analysis was conducted to determine differences in wear rates between the 2 years and driver/passenger characteristics. The level for statistical significance was established as $p < 0.05$.

RESULTS

A total of 89 962 light-duty vehicles were observed at 334 survey site locations in 130 communities within rural Alberta between the hours of 7 am and 5 pm during the 5-day survey period of June 18–22, 2001. The findings of the observational survey (see Table 1) indicate that the estimated proportion of driver and front-seat passengers of light-duty vehicles using seat belts increased by approximately 6.9% in the 2001 ARSBS from the 1999 ARSBS ($p < 0.001$), which is a relative improvement of 10.0% ($p < 0.001$).

In the 1999 data, the variables that had an impact on the rate of wearing seat belts were: whether the seat belt wearer was a driver or passenger, the type of vehicle surveyed, time of day, gender of the driver and/or passenger(s), whether or not the vehicle came to a complete stop at a stop sign controlled intersection, time of day and provincial location of the survey site. Although the rate of wearing seat belts increased overall between 1999 and 2001, these variables remained relevant to seat belt usage in 2001. Drivers were more likely to wear seat belts than passengers, and women were more likely to buckle up than men ($p < 0.001$). Occupants of minivans, SUVs and passenger cars were more likely to wear seat belts than occupants of light trucks and pick-up trucks ($p < 0.001$).

Drivers were more likely to wear seat belts in the afternoon than they were in the hours before 12 noon ($p < 0.001$). Finally, occupants of vehicles that came to a complete stop at an intersection controlled by a stop sign, were more likely to be wear-

ing their seat belts than occupants of vehicles that did not come to a full stop ($p < 0.001$). This table illustrates overall seat belt wearing rates, how the variables highlighted in the study affect wearing rates, and changes in these wearing rates between 1999 and 2001.

DISCUSSION

Estimates of seat belt wearing and non-wearing rates associated with crashes resulting in injury or fatality have been intensely debated. This is because many estimates are imbued with a few notable biases. Many studies use self-reporting as the means to establishing seat belt wearing rates.²⁸ There is a growing discontent within the research community regarding this method. Self-reporting may not be accurate, particularly in locations where seat belt wearing is legislated and punitive action is taken against non-wearers. Parada and colleagues suggest that the potential bias in self-reports is greater than that suggested by much national data, particularly in low belt use populations.²⁹ Reporting biases on behalf of police, emergency service personnel and crash investigators have also been recognized.³⁰⁻³²

These professionals' assumptions about crash dynamics and human behaviour can lead them to report inaccurate information regarding the use of seat belts by vehicle occupants. For these reasons, direct observation is considered by some to be the most reliable form of collecting data on the use of seat belts.³³ Thus, despite the increased cost and time requirements incurred by this method, this study employed direct observation.

Transport Canada's 2001 national survey suggests that Canada's seat belt wearing rates for all occupants of light-duty vehicles have remained unchanged for the last 3 years, at 90%. Although 5 Canadian provinces have seat belt wearing rates exceeding 90%, only Manitoba and the 3 Territories have rates below Alberta's 85%.²³ Thus, in the Canadian context, the rate of wearing seat belts in Alberta is low. This study suggests that it is in the rural areas of Alberta, where the issue of not wearing seat belts needs to be addressed due to the low rates of use found there, relative to the province as a whole.

The findings of this study have been useful, not only in estimating the magnitude of the non-compliance problem, but also in developing the understanding of seat belt wearing behaviour in rural

Variables	No. of observations		% wearing seat belts			
	June 1999	June 2001	June 1999	June 2001	% difference	% change
Overall†	81 968	89 962	69.2	76.1	6.9	10.0
Provincial location‡						
North Alberta	34 135	39 804	70.5	75.7	5.2	7.4
South Alberta	47 833	50 158	67.5	76.7	9.2	13.6
Occupant position‡						
Drivers only	64 042	71 101	70.1	76.8	6.7	9.6
Passengers only	18 221	19 185	66.2	73.6	7.4	11.2
Gender‡						
Male	45 597	48 955	62.5	70.0	7.5	12.0
Female	36 998	41 124	78.1	84.2	6.1	7.8
Vehicle type						
Passenger car	34 773	37 117	76.0	81.7	5.7	7.5
Van/minivan	11 436	13 204	73.3	81.1	7.8	10.6
Sports utility vehicle	6 272	7 393	74.1	80.8	6.7	9.0
Light truck and pick-up	29 487	32 248	60.1	67.4	7.3	12.1
Time of day‡						
Before noon	34 397	41 396	68.2	73.4	5.2	7.6
Afternoon	48 370	48 966	70.4	76.6	6.2	8.8
Compliance with stop signs						
Full stop	36 218	34 966	74.5	80.3	5.8	7.8
No full stop	19 414	15 205	62.3	70.1	7.8	12.5

*Due to missing values all totals will not be the same.
†Excludes unknown vehicle type.
‡Includes unknown vehicle type.

Alberta, and the degree to which change has taken place in wearing rates over the period 1999 to 2001. The variables associated with wearing seat belts help us to understand the behaviour associated with wearing seat belts and to identify groups with a higher likelihood of not wearing their seat belts. For example, males and passengers are below average belt wearers and need to be specifically targeted by educational, awareness and enforcement initiatives. Drivers of pick-up trucks (they are the same as light trucks in the survey) are much less likely to wear their seat belts than drivers of other light-duty vehicles. This may be due to the nature of this vehicle type, which is regarded as farm machinery.³⁴ Thus, seat belt programs for light truck and pick-up truck drivers may also be approached as occupational and overall farm safety issues. Increased enforcement at pre-selected times during the day may be used to address lower rates of seat belt use before 12 noon rather than after.

The findings have also contributed greatly to an understanding of regional variations throughout Alberta, in terms of health regions and RCMP jurisdictions. This is significant because of the great geographical, political and socio-economic diversity that characterizes the province. Although provincial-level initiatives remain important in order to reach large population masses with the most efficient use of resources, these regional differences highlight the need for these approaches to be supplemented by more targeted, regional and community-development initiatives.

The survey results can supply useful evaluative information for seat belt related program and initiative planners in Alberta, but should be used in conjunction with other evaluation methods. The findings of this study cannot be used as a definitive mechanism to evaluate the initiatives associated with the RCMP's selective traffic enforcement programs, because, although there is a correlation between the intervention and increased seat belt wearing, no causal relationship between the two has been established. While wearing rates in rural Alberta are one important indicator of the effectiveness of efforts taken to increase wearing rates, there is a wide array of forces that could potentially have an impact on wearing rates. Evaluation approaches that emphasize the exposure of target populations to specific interventions, such as surveys and interviews, should also be considered. These approaches can be used as process and outcome measures, to both assess program effectiveness and pinpoint ways in which programs can be improved.

Competing interests: None declared.

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Key words: Rural populations; seat belts; observational survey

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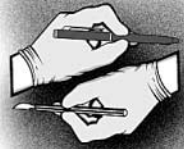
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ORIGINAL ARTICLE ARTICLE ORIGINAL

Assessing the standard of care for child and adolescent attention-deficit hyperactivity disorder in Elgin County, Ontario: a pilot study

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reviewed.

Objective: To examine the current practice of rural family physicians in managing children with attention-deficit hyperactivity disorder (ADHD).

Design: Chart review of children and adolescents with a recorded diagnosis of ADHD. The data collected include the patient's age at diagnosis, the diagnosing physician, the number and type of presenting symptoms, whether the *Diagnostic Statistical Manual, 4th ed* (DSM-IV) criteria were met, pertinent treatment regimens, family history and comorbid conditions. Participating physicians were asked to complete a questionnaire.

Setting: Elgin County, Ontario

Results: Thirty-six family physicians were contacted and 11 agreed to participate. Thirty-nine charts were reviewed. The average number of presenting symptoms was 2.9 for ADHD-inattentive subtype and 2.1 for ADHD-hyperactivity subtype. A diagnostic protocol was included in 20.5% of the charts. Of the 39 charts reviewed, 25.6% had sufficient information for the patients to meet the ADHD criteria. Family physicians diagnosed 5.1% of the cases, and the duration of time between referral to specialist and appointment was 47.2 weeks.

Conclusions: Together the lack of symptom recording, the long duration between referrals, and the low percentage of family physicians diagnosing ADHD all suggest the need for developing diagnostic protocols for family physicians and increasing their knowledge of diagnosing and managing ADHD.

Objectif : Étudier la pratique actuelle des médecins de famille ruraux en ce qui concerne la prise en charge des enfants atteints du trouble d'hyperactivité avec déficit de l'attention (THADA).

Concept : Étude du dossier d'enfants et d'adolescents chez lesquels on a diagnostiqué officiellement un THADA. Les données recueillies comprennent l'âge du patient au moment du diagnostic, le nom du médecin diagnosticien, le nombre et le type de symptômes, l'atteinte ou non des critères du *Manuel diagnostique et statistique, 4^e éd.* (DSM-IV), les protocoles de traitement pertinents, les antécédents familiaux et des problèmes comorbides. On a demandé aux médecins participants de répondre à un questionnaire.

Contexte : Comté d'Elgin, Ontario

Résultats : On a communiqué avec 36 médecins dont 11 ont consenti à participer. On a étudié 39 dossiers. Le nombre moyen de symptômes s'est établi à 2,9 dans le cas du sous-type THADA-inattention et à 2,1 dans celui du sous-type THADA-hyperactivité. On a inclus un protocole de diagnostic dans 20,5 % des dossiers. Sur les 39 dossiers analysés, 25,6 % contenaient suffisamment d'information pour que les patients satisfassent aux critères relatifs au THADA. Des médecins de famille ont diagnostiqué 5,1 % des cas et il s'est écoulé en moyenne 47,2 semaines entre la référence à un spécialiste et le rendez-vous.

Conclusions : Pris ensemble, la non-consignation des symptômes, la longueur de la période écoulée entre les références et le faible pourcentage de médecins de famille qui diagnostiquent le THADA indiquent qu'il faut élaborer des protocoles de diagnostic à l'intention des médecins de famille et améliorer leur connaissance du diagnostic et de la prise en charge du THADA.

Emotional and behavioural problems in children and adolescents are becoming increasingly prevalent.¹ The most common psychiatric disorder in children and adolescents is attention-deficit hyperactivity disorder (ADHD). The prevalence rate of ADHD is 3%–5%,² with up to 10% of boys and 5% of girls of elementary school age meeting its diagnostic criteria.³ The importance of this disorder is often underestimated. A common misconception is that ADHD is limited to childhood. In fact, 75% of adolescents with ADHD continue to experience difficulties in the home and school environment.⁴ Ten percent of children with an ADHD diagnosis have clinically significant disorders in adulthood,⁵ and 60% have difficulties with concentration.⁶ Clearly, ADHD is a condition that persists into adulthood and is associated with significant morbidity.

Currently there is a shortage of child psychiatrists in Ontario; there is approximately 1 child psychiatrist for every 6148 pediatric patients with mental health problems.⁷ In addition, Ontario child psychiatrists are disproportionately concentrated in large metropolitan centres such as Toronto, leaving them vastly under-represented in rural Ontario communities. Since only 30% of urban child psychiatrists provide outreach services to smaller communities,⁷ rural family physicians (FPs) bear the weight of dealing with the majority of childhood behavioural and emotional problems. Approximately 60% of children identified with a *Diagnostic Statistical Manual*, 4th ed (DSM-IV) disorder continue to be treated by their FPs.⁸ This emphasizes the significant position of the primary care physician in detecting and intervening in child and adolescent mental health problems. Therefore, it is critical that FPs be able to identify, assess and treat them.

A recent survey of FPs in rural and underserved Southwestern Ontario found that 80% of FPs do not feel comfortable in their knowledge and skills in managing children's mental health problems.⁹ Approximately 84% of the practitioners felt that they needed more training, principally in the areas of behavioural disorders, ADHD and problem adolescents. These FPs would like increased access to child and adolescent mental health services and additional training in child psychiatry. The survey results are not surprising given that a 1998 study, which examined the amount and type of child psychiatry in Canadian Family Medicine training programs, found that merely 4 of the 16 Family Medicine Residency teaching programs across Canada have recognized training in child psychia-

try.¹⁰ Interestingly, the Family Medicine program directors also remarked on the significance of teaching about behavioural issues, depression, suicide and ADHD.¹⁰

There is a dearth of literature on how FPs are assessing and treating children with ADHD. We decided to conduct a pilot study to determine how FPs are currently diagnosing and managing children with ADHD in rural family practices in Elgin County, Ontario. In 2002, we carried out a quality-control by objective criteria audit of the office charts of 11 of 36 FPs in Elgin County. Physicians also completed a supplementary questionnaire. The FPs' approach was compared with the current protocols recommended by the American Academy of Child and Adolescent Psychiatry (AACAP).³ Since ADHD frequently continues into adulthood⁵ and is commonly accompanied by poor psychosocial outcome and comorbid conditions,^{5,11} it is important to determine the current state of FPs' assessment and management of ADHD.

METHOD

The study comprised a chart review of children and adolescents diagnosed with ADHD by FPs in Elgin County, Ontario. Initially, 1 clinic with 5 FPs in St. Thomas was randomly selected and agreed to participate in the study. Subsequent to reviewing charts in this office, it was decided that the study would be extended to include all FPs in Elgin County, as the number of charts obtained was low. The Public Relations office at the St. Thomas–Elgin General Hospital provided a list of FPs in Elgin County. This list was compiled in February 2002, and all 36 of the physicians on the list were contacted for participation in the study. Those who agreed in the first 3 phone call attempts ($n = 11$) were included in the study and their charts were reviewed by one of the study investigators. The participating family practice offices were asked to pull the charts of all patients with a recorded diagnosis of ADHD for which treatment was sought.

In order to be included in the study, the patients whose charts were reviewed had to be under the age of 18 years at the time of diagnosis. In addition, it was necessary that the chart listed a diagnosis of ADHD and that some form of treatment was administered. Charts of patients with hyperactive, impulsive or inattentive symptoms were excluded from the study if the diagnostic term of ADHD was not used. A data collection sheet was created to facilitate the chart review process. The information

collected included the age at time of diagnosis, the diagnosing physician, the number and type of presenting symptoms, whether DSM-IV criteria were met,² the number and type of specialist referrals, as well as information on treatment regimens. Data on comorbid conditions, family history and other factors for differential diagnoses were also gathered.

To supplement the chart review, physicians were asked to complete a questionnaire that was developed by the authors, and mail it back to the project coordinators. The purpose of the questionnaire was to collect background information on the different practices as well as to examine the physicians' perspectives on how they assess and treat children and youth with ADHD.

The pilot study was conducted and all data were collected during July and August of 2002. Prior to the commencement of this project, approval was received from the University of Western Ontario's Ethics Review Board. Chart and questionnaire data were analyzed using SPSS, version 11.5.

RESULTS

Eleven physicians agreed to participate in this study, and 9 of the 11 physicians completed the supplementary questionnaire. Eight of the 9 questionnaires provided values that estimated the number of pediatric patients in the practice. The number of pediatric charts per office ranged from 347 to approximately 1000, with the average number being 583. The number of ADHD charts pulled in each of the offices ranged from 1 to 9, with the mean chart number being 3.5.

The total number of ADHD charts reviewed in this pilot study was 39, of which 76.9% were for male patients. The most common current age range was 8–12 years old (58.9%) with the mean age being 12.1 years and the median age 11 years. The age at diagnosis was recorded for 27 of the 39 charts, and the majority of the diagnoses (55.6%) were made between the ages of 0–7 years. The mean and median ages at the time of diagnosis were 7.7 and 8 years, respectively.

The average number of inattention symptoms recorded was 2.9, and the average number of hyperactivity symptoms recorded was 2.1. Charts were examined for diagnostic protocols that could have aided in the diagnosis of ADHD. In particular, the investigators looked for standardized rating scales such as the Conners' Teacher Rating Scale (CTRS-R),¹² Conners' Parent Rating Scale (CPRS-R),¹³ the SNAP-IV (revised version of the Swanson, Nolan

and Pelham [SNAP] 1983 Rating Scale),¹⁴ a checklist of DSM-IV ADHD criteria² or completed forms by school psychologists. Diagnostic protocols were included in 20.5% of the charts, and the FP made the diagnosis in 5.1% of cases. Ten patients (25.6%) had sufficient criteria in their charts to be diagnosed with ADHD (Table 1).

All patients were referred to specialists, with pediatricians (59.0%) being the most common specialists for referral (Table 1). The average duration between time of referral and appointment with a specialist was approximately 47.2 weeks.

In 64.1% of the charts, there was no mention of a family history of ADHD (Table 1). Forty-nine percent of all patients had a record of some form of psychometric testing, and, of these patients, 23.1% received the Wechsler Intelligence Scale for Children, 3rd ed (WISC-III),¹⁵ 23.1% underwent behavioural testing and 20.5% received educational tests.

Thirty-four percent of the patients had a significant past or comorbid medical and/or psychiatric condition. The most common conditions were oppositional defiant disorder (10.3%), depression and/or anxiety (10.3%), hearing loss (5.1%), learning disabilities (5.1%) and recurrent otitis media (5.1%).

Eighty-seven percent of the patients received treatment in the form of medication at some point after the diagnosis of ADHD was made. The average number of prescription changes was 1.7. The most common medication prescribed at any time

Table 1. Chart information for children and adolescents diagnosed with attention-deficit hyperactivity disorder (ADHD) by family practitioners in Elgin County, Ontario

Chart information	% of charts
Sufficient criteria for diagnosis of ADHD	25.6
ADHD-hyperactivity subtype	2.6
ADHD-inattentive subtype	12.8
ADHD-combined subtype	10.3
Diagnostic protocol included	20.5
Mention of family history	35.9
Family history positive for ADHD and/or Learning Disorder	28.2
Patient referred to	
Pediatrician	59.0
Child psychiatrist	41.0
Psychologist	12.0
Social worker	12.8
Treatment prescribed	
Ritalin	71.8
Ritalin SR	48.7

was Ritalin (Table 1). Other medications prescribed include dextroamphetamine, clonidine, and pemo-line; the latter is currently not on the market.

None of the physicians who answered the questionnaire reported having received training in diagnosing and/or treating ADHD. However 55.6% felt comfortable diagnosing ADHD and 44.4% were comfortable treating ADHD patients. Thirty-eight percent of the physicians agreed that they follow a diagnostic protocol when dealing with a suspected ADHD patient, and these protocols ranged from referring to a pediatrician, to observing the child's behaviour in the office and to reading school reports. All 9 physicians agreed that they would refer a suspected ADHD patient to a pediatrician, and 33.3% would also consider sending the patient to a child psychiatrist. In terms of ADHD management, 33.3% of the physicians assumed primary responsibility for treating their ADHD patients, 22.2% only managed ADHD patients following pediatric referrals and 44.4% did not manage ADHD cases.

Sixty-three percent of the FPs indicated that they make prescription changes based on parent and teacher reports. Twenty-five percent base their decision on side effects, and 38% make changes on the basis of symptom severity. Thirteen percent agreed that they adjust medication doses subsequent to specialist recommendations. The duration between follow-up visits with the FP ranged from 1 to 5 months, with the average being 3 months.

DISCUSSION

According to the DSM-IV, the prevalence of ADHD among school aged children is 3%–5%.² The male:female ratio ranges from 3:1 to 4:1 depending on the subtype of ADHD.² The male:female ratio in this study (3.3:1) is consistent with reported prevalence rates. Nevertheless, when one looks at the prevalence of ADHD and the number of pediatric patients in each practice, between 140 and 233 ADHD charts should have been pulled for data collection; only 39 charts were pulled in all 11 offices. This is approximately 20% of what would have been expected assuming that the above demographic information is correct.

There are various reasons why the total number of charts reviewed may be lower than expected. ADHD may be underdiagnosed by rural FPs. As previously mentioned, 80% of rural FPs do not feel confident in their knowledge and skills in managing children with mental health needs. Many feel that

they would benefit from additional training in pediatric and adolescent problem areas, such as ADHD.⁹ This is further supported by this study's questionnaire, which found that only 55.6% of the physicians were comfortable diagnosing ADHD and 44.4% felt comfortable managing ADHD. Therefore, physicians may be lacking the confidence and skills required to detect, diagnose and manage ADHD, and this could have contributed to a low chart number.

In support of this theory, the charts of many children who were considered to have a diagnosis of ADHD lacked a list of symptoms or a copy of a diagnostic protocol that would have confirmed the diagnosis. According to the information collected in the chart reviews, only 25.6% of the patients had sufficient criteria in their charts to be diagnosed with ADHD and 20.5% of the total charts had a copy of a diagnostic protocol. The lack of information in the charts may indicate that the diagnosis was made by a physician to whom the patient was referred. It may also indicate that FPs may not know the full DSM-IV criteria for ADHD or that they do not have enough time to chart all symptoms. It could also imply that some FPs make the diagnosis based on a symptom or cluster of symptoms that resemble ADHD. Clear diagnostic protocols for ADHD, including existing questionnaires such as the SNAP,¹⁴ together with a thorough history and physical examination, may assist FPs in identifying children and adolescents with ADHD.

Many disorders tend to co-occur with ADHD. Previous studies have found that comorbidity is present in as many as two-thirds of clinically referred patients with ADHD, including up to 50% for oppositional defiant disorder, 15%–20% for mood disorders and 20%–25% for anxiety disorders.^{11,16} In this pilot study, approximately one-third of the patients were diagnosed with a comorbid condition. Oppositional defiant disorder was the most common comorbid condition, followed by anxiety and/or depression; nevertheless, they were both present in only 10% of the patients. It is possible that this divergence between the predicted rate of comorbidity and what was actually seen is due to the small sample size of the pilot study. It may be a reflection of a lack of FP confidence and/or knowledge in diagnosing mental health problems in children and adolescents. Similarly, learning disabilities, hearing loss and recurrent otitis media may certainly co-occur with ADHD, but they may also independently interfere with attention, therefore leading to a misdiagnosis of ADHD. The high prevalence of co-

existing medical/psychiatric conditions suggests that there may be a need to further educate FPs about comorbidity and how to distinguish the symptoms of other conditions from ADHD.

In this study, all patients were referred to a specialist, with pediatricians and child psychiatrists making the diagnosis in the majority of cases, and FPs diagnosing only 5.1% of the cases. However, when one looks at the long duration between referrals, the average being 47.2 weeks in Elgin County, it becomes apparent that FPs could be instrumental in diagnosing and treating ADHD quickly, thereby reducing morbidity for the child/adolescent and their families. The development of an ADHD diagnostic protocol specific for FPs could increase the probability that children with ADHD are being detected and managed much earlier in the course of the disorder.

The treatment of ADHD generally encompasses both psychosocial interventions and pharmacotherapy. In the present study, the pharmacological treatments, but not psychotherapeutic interventions, were examined. It was found that 87% of patients received some form of medication following their diagnosis with ADHD; this is in accordance with recent guidelines.¹⁷ Similarly, the first line of treatment in the majority of patients was a stimulant, and this agrees with the 1999 guidelines published in the Texas Children's Medication Algorithm Project.¹⁷ Clearly, rural FPs are treating patients with medication according to currently accepted practice guidelines. In retrospect, it would have been beneficial to examine how many patients were prescribed treatment for ADHD before being seen at the referral appointment with the psychiatrist or pediatrician.

Limitations

It is important to note that there may have been a bias in the physician population that participated in this pilot study. In retrospect, it would have been helpful to gather information on physician age, gender, education and years in practice. Although it has been found that female physicians have as broad a scope of practice as their male counterparts,¹⁸ some differences have been noted. For example, the proportion of female physicians who attend births tends to be higher than the proportion of males, regardless of years in practice in rural communities.^{18,19} One may speculate that perhaps younger and female physicians may have been more likely to have young families in their practice. Similarly, it is possible that FPs who have been educated in the

treatment of ADHD may see more children and adolescents with ADHD. For these reasons, the physicians who agreed to participate may not be representative of the 36 FPs practising in Elgin County. This supplementary information may help to determine whether the age and gender of the physician and their educational background affects the management of children and adolescents with ADHD.

A methodological limitation of the pilot study itself may have partly attributed to the low chart number. Although the FP offices were asked to pull files of all children that had a firm diagnosis of ADHD for which treatment was sought, it is likely that there were some variations in the way that this was conducted. For example, some offices may have pulled charts using recall of patient profiles while in other circumstances it is possible that if a patient was being seen at the time of the chart review, that perhaps the file was unavailable. Clearly, the lack of electronic medical records made accurate identification of charts of all ADHD patients difficult. This may have led to both under-representation and/or misrepresentation of the patient sample. Furthermore, this study must also be interpreted within the limitations of all studies conducted by retrospective chart review. A recommendation for future study of this topic would be to follow patients assessed by FPs prospectively.

CONCLUSIONS

The results of this pilot study demonstrate that FPs in Elgin County varied in their degree of success in following the AACAP's criteria of good care for patients with ADHD. It also suggests — at the very least, based on the physicians' perspectives — the need of assisting FPs with the acquisition of the requisite skills, knowledge and diagnostic tools required to manage children's mental health needs. In order to enhance the diagnosis and treatment of children and youth with ADHD a number of recommendations are proposed. Education in the area of children's mental health needs to occur at a variety of levels. More child psychiatry teaching should be incorporated into the medical school curriculum both didactically and clinically. Most importantly, family medicine residency programs need to be targeted. Of particular concern is the lack of teaching of child psychiatry in 12 of the 16 Family Medicine programs across Canada.¹⁰ Ideally the training of child psychiatry needs to occur during the Family Medicine residency programs so that future FPs

become alert to children's mental health problems early in their careers. In addition, continuing medical education of FPs would be important so that they can continue to learn about new ways to diagnose and manage children and youth with ADHD.

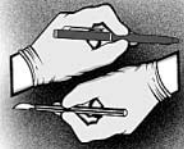
It would be invaluable to develop a protocol specific for FPs that is directed at diagnosing ADHD. This protocol would have to be easy to use and needs to take into consideration the time constraints of a busy family practice.

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Competing interests: Dr. Margaret Steele has been involved with the following companies for industry-funded research: Janssen Pharmaceuticals, Eli Lilly (current), Wyeth-Ayerst, Smith Kline Beecham, and Pfizer. She has been on National Advisory Board meetings for Janssen Pharmaceuticals and for Eli Lilly. She has also spoken for the following companies: Janssen Pharmaceuticals, Shire Biochem Inc., and Organon, and has obtained unrestricted educational grants for conferences or CME (for the UWO Division of Child Psychiatry) from Janssen Pharmaceuticals, Eli Lilly, Shire Biochem Inc., Organon, Glaxo Smith Kline, Wyeth Ayerst, Astra Zeneca, and Lundbeck. No competing interests were declared for Natalie Kotowycz or Susan Crampton.

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ORIGINAL ARTICLE ARTICLE ORIGINAL

Potential gaps in congestive heart failure management in a rural hospital

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Introduction: Congestive heart failure (CHF) is increasingly recognized as an important cause of morbidity and mortality. Previous studies in urban settings have shown that patients frequently are not receiving recommended therapy. There is a paucity of studies that have evaluated CHF management in a rural setting. We therefore reviewed hospital and outpatient care in this setting as an initial step toward improving CHF care.

Method: A retrospective chart review was used to examine the care of all 34 patients hospitalized for CHF from 2000–2001 in a small rural hospital, to assess the need for improved CHF management.

Results: The median age of the patients was 78 yr, and a number of them had many co-morbid cardiovascular risks. Similar to other studies, only 23% of patients were prescribed recommended doses of angiotensin-converting enzyme (ACE) inhibitors. Use of beta-blockers was far below expected rates. Although there was follow-up care for nearly all patients (97%), few patients had echocardiography performed (38%) or had their medications altered in the outpatient setting.

Conclusion: There is a need for improved management of CHF in the rural setting. Approaches to improving CHF care should use the continuity of care advantage provided by primary care physicians to optimize outpatient medical treatment regimens and improve access to diagnostic services such as echocardiography.

Introduction : On reconnaît de plus en plus l'insuffisance cardiaque globale (ICG) comme une cause importante de morbidité et de mortalité. Des études antérieures réalisées en milieu urbain ont montré qu'il arrive souvent que des patients ne reçoivent pas la thérapie recommandée. Les études qui ont évalué la prise en charge de l'ICG en milieu rural sont rares. Nous avons donc étudié les soins hospitaliers et externes dans ce contexte comme première étape afin d'améliorer le traitement de l'ICG.

Méthode : On a procédé à une étude rétrospective de dossiers afin d'analyser les soins reçus par les 34 patients hospitalisés pour ICG de 2000 à 2001 dans un petit hôpital rural afin d'évaluer le besoin d'améliorer la prise en charge de l'ICG.

Résultats : L'âge médian des patients s'établissait à 78 ans et certains d'entre eux présentaient de nombreux risques cardiovasculaires comorbides. Comme dans le cas d'autres études, on a constaté que les doses recommandées d'inhibiteurs de l'enzyme de conversion de l'angiotensine (ECA) étaient prescrites à 23 % seulement des patients. L'utilisation des bêta-bloquants était très inférieure aux taux attendus. Même si presque tous les patients (97 %) ont reçu des soins de suivi, peu de patients (38 %) ont subi une échocardiographie ou ont bénéficié en contexte externe d'une modification de leur médication.

Conclusion : Il faut améliorer la prise en charge de l'ICG en milieu rural. Les stratégies d'amélioration du traitement de l'ICG devraient se fonder sur la continuité des soins, avantage qu'offrent les médecins de première ligne, afin d'optimiser les régimes de traitement médical en service externe et d'améliorer l'accès aux services de diagnostic tels que l'échocardiographie.

INTRODUCTION

Congestive heart failure (CHF) is the leading cause of hospital admissions in Canada.¹ Hospitalization rates in Ontario for the fiscal year of 1996/97 averaged 287 per 100 000 people.² This disease syndrome is also a major cause of morbidity and mortality, with 1-year mortality ranging from 24% to 60% depending on age and co-morbidities.³

In recent years, the understanding of the pathophysiology of CHF has improved greatly and has led to the development of advanced methods for diagnosing and treating CHF. These medical advances and the high prevalence of the disease have been a motivating force for the development of clinical practice guidelines for the diagnosis and management of CHF. *The 2002/3 Canadian Cardiovascular Society Consensus Guideline Update for the Diagnosis and Management of Heart Failure* recommended that the diagnosis of CHF be based on clinical signs and symptoms and the use of diagnostic tools such as 12-lead electrocardiogram (ECG), digital pulse oximetry, chest radiography and echocardiography.¹ Clinical assessment of the severity by the New York Heart Association (NYHA) Classification is also considered important for effective selection of treatments. The NYHA guidelines indicate Class I with no symptoms, Class II – symptoms with ordinary activity, Class III – symptoms with less than ordinary activity and Class IV – symptoms when at rest.⁴

Medical management guidelines for CHF recommend the use of several classes of drugs, including angiotensin-converting enzyme inhibitors (ACE inhibitors), beta-blockers, diuretics and digoxin.¹ The initiating and target doses of ACE inhibitors are 1.25–2.5 mg bid and 10 mg bid, respectively, for Enalapril; 1.25–2.5 mg bid and 10 mg for Ramapril; and 2.5–5 mg od and 20–35 mg od for Lisinopril.

Large-scale clinical trials have indicated that the use of ACE inhibitors reduces relative total mortality, hospitalization, worsening heart failure and recurrent myocardial infarction (MI) by 20%–25%, thereby clearly establishing ACE inhibitors as first-line therapy for this disease.⁵ Similar evidence exists for beta-blockers for patients with heart failure and left ventricular ejection fraction = < 40%,⁶ and for spironolactone for patients with NYHA Class IIIb–IV heart failure.^{1,7}

There is increasing evidence that multidisciplinary clinics improve the management of CHF – including reduction in heart failure hospitalizations, accompanying cost savings, and improved adher-

ence to therapy.⁸ These clinics typically include nurse-led patient education, dietary and social services consultation, and drug therapy review by a cardiologist, pharmacist and/or primary care physician. Following this evidence, the CCS Consensus Guideline¹ recommends that the use of “specialized hospital based clinics staffed by physicians, nurses and other health care professionals with expertise in heart failure, should be considered for assessment and management of heart failure of higher risk individuals with heart failure.” Others have noted that patients with CHF are managed mostly in the community by primary care physicians,⁹ where there are many barriers to care, including lack of diagnostic and specialist services.^{10,11} Most CHF management studies are set in urban teaching hospitals.

This study was prompted by the observation, made in a hospital audit, that CHF was the 2nd leading cause for hospitalization in our rural practice setting. Our community in Southern Ontario has a small hospital serving a population of 6000. In addition, a province-wide practice atlas of cardiovascular care suggested that, like other settings, many hospitalized older patients at our hospital were not adherent to ACE inhibitors.² There is a paucity of studies that have evaluated CHF management in a rural setting. We therefore reviewed hospital and outpatient care in this setting as an initial step toward improving CHF care.

METHODS

The study protocol, including office follow-up, was submitted to and approved by the Ethics Review Committee of the Sunnybrook and Women’s Health Centre in Toronto.

We identified patients in our rural community admitted to the Chesley Site of the South Bruce Grey Regional Health Centre from July 2000 through June 2001 with a most responsible diagnosis of CHF. Patients transferred from another acute care hospital were excluded from this study. If patients were admitted to hospital more than once during the designated study period, the first admission was used for analysis. The study period chosen allowed for a minimum 1-year post-hospital follow-up period at the time the study was done in July 2002.

Detailed information on patient sociodemographic features, presenting symptoms, past medical history, diagnostic tests and medical therapy was gathered through retrospective chart review using a previously developed 243-item chart abstraction tool.⁵ Information regarding follow-up appointments

and outpatient diagnostic testing was extracted from the office charts of the primary care physicians.

The severity of the presenting symptoms was ascertained as the presence of dyspnea at rest, and radiographic evidence of pulmonary edema or cardiomegaly. When available, we extracted data on left ventricular ejection fraction from office charts or hospital records. Medical therapy was determined as the use and dosage of drugs such as ACE inhibitors, beta-blockers, calcium-channel blockers, ASA, digoxin and diuretics.

RESULTS

Thirty-six patients matching the study criteria were admitted during the 12-month study period. Two patients were excluded because they developed CHF after admission to the hospital; therefore, 34 charts were examined. The characteristics of the study population are summarized in Table 1. Males accounted for 65% ($n = 22$) of the patients. The age of the population ranged from 34 to 91 (median 78) years. The most frequent symptom at presentation was shortness of breath (82% of patients), of which 71% had dyspnea at rest. Other presenting symptoms are listed in Table 2.

Diagnostic investigative reports, such as chest x-ray, 12-lead ECG and echocardiography were reviewed to determine the severity of CHF (Table 2). Eighty-eight percent of patients had a chest x-ray taken within 24 hours of admission. Of these, 63% showed radiologic signs of congestive failure, including: cardiomegaly (53%), pulmonary edema (47%), vascular redistribution (47%) and pleural effusions (10%). Not all chest xrays could be done on the day of admission, which may have resulted in some negative results of x-rays that were taken after treatment of CHF. Most patients (85%) had an ECG. Thirty-four percent of the ECG records showed signs of ischemia, as determined by either ST elevation or depression in any 2 contiguous

leads. Echocardiographic reports were found for 38% of patients. Of these, 86% ($n = 11$) were done within 1 year pre- or post-admission. Fourteen patients had their left ventricular function assessed. Of these, 8 had a Grade I ventricle and 6 had left ventricular systolic dysfunction.

Almost all patients (97%) had comorbid conditions or concurrent cardiovascular risk factors (Table 3). The most common comorbidities were angina, asthma/COPD (chronic obstructive pulmonary disease) or previous MI, and the most common coronary risk factor was current or past smoking.

Table 4 shows medications prescribed during or within 2 months after admission. The drug class prescribed most frequently was ACE inhibitors, with 29 (85%) patients receiving this treatment either during their hospital stay or at discharge. However, of these only 24% received a target dose of ACE inhibitors as defined by the CCS Consensus Guideline.¹ Doses of ACE inhibitors were rarely increased following discharge from hospital. Most patients (82%) were also treated with a diuretic, and most commonly with the loop diuretic furosemide (93%). Only one patient was initiated

Characteristic	% (and no.) of patients* $n = 34$
Male	65 (22)
Age in years, median (and range)	78 (30–91)
<60	9 (3)
60–75	29 (10)
≥76	72 (21)

*Unless otherwise specified.

Variable	% (and no.) of patients $n = 34$
Presenting symptom as noted by the admitting physician	
Dyspnea	82 (28)
Onset at rest	71 (20)
Onset with less than ordinary exertion	3.6 (1)
Wheeze	65 (22)
Rales/crackles	56 (19)
Bilateral ankle edema	41 (14)
Chest pain	29 (10)
Nocturnal cough	29 (10)
Orthopnea	26 (9)
Neck vein distension	9 (3)
Paroxysmal nocturnal dyspnea	3 (1)
Hepatojugular reflux (positive)	0
Investigations	
Chest x-ray	88 (30)
Evidence of CHF	63 (19)
Cardiomegaly	53 (16)
Pulmonary edema	47 (14)
Vascular redistribution	40 (12)
Pleural effusion	33 (10)
ECG done	85 (29)
Ischemia (ST changes)	20 (10)
Echocardiography within 1 yr	38 (13)

on a beta-blocker in hospital or after discharge.

The in-hospital mortality rate was 15% (5 patients) (Table 5). On discharge, all patients were instructed to make follow-up appointments with their family doctors. Seventy-nine percent of the 29 patients discharged from the hospital had an identifiable office chart, and 21 of the 29 (72%) had a recorded follow-up appointment with a family physician. Eighteen percent of patients with outpatient records were referred to specialists (cardiologists or general internists), 3% had a follow-up appointment with a specialist only, and no follow-up appointment was recorded for 2 patients (7%). The majority of patients (76%) were seen for follow-up within 14 days of discharge. Outcomes at 1 year following discharge included the following: 31% of patients were readmitted at least once for CHF, and 1 patient suffered an acute MI within this time period. The overall 1-year mortality, including patients who died during their stay in hospital, was 50%. Table 6 indicates that poor renal function did not correlate with lower dosing of ACE inhibitors. A similar trend toward drug underuse was discovered when examining the use of spironolactone for treatment.

DISCUSSION

Patients admitted to the hospital with CHF were elderly, frequently had shortness of breath at rest

(NYHA Class IV), abnormal chest x-ray and ECG findings, and many co-morbid conditions. The severity of disease and high 1-year mortality rate in our study was similar to other recent studies.⁵

Echocardiography was performed less often than is recommended by the CCS Consensus Guideline, which recommends it as the primary diagnostic tool.¹ Echocardiograms allow the evaluation of left ventricular ejection fraction, which in turn allows for the classification of the underlying pathophysiology into heart failure with impaired or preserved systolic function. This classification is critical for the treatment of CHF because the medical management of the disease differs according to the underlying

Table 3. Cardiovascular risk factors and co-morbidities of the 34 patients with congestive heart failure (CHF)

Variable	% (and no.) of patients n = 34
Cardiovascular risk factor	
Angina	50 (16)
Ever smoked	47 (16)
Asthma / COPD	41 (14)
Previous myocardial infarction	41 (14)
Hypertension	38 (13)
Coronary artery disease	32 (11)
CVA / TIA	26 (9)
Diabetes	24 (8)
Atrial fibrillation	21 (7)
No. of co-morbidities	
≥3	47 (16)
2	26 (9)
1	24 (8)
0	3 (1)
COPD = chronic obstructive pulmonary disease; CVA = cerebrovascular accident; MI = myocardial infarction; TIA = transient ischemic attack	

Table 4. Medications prescribed at any time from date of admission to 2 months after discharge for the 34 patients with congestive heart failure

Medication	% (and no.) of patients n = 34
ACE inhibitors	85 (29)
Ramipril	66 (19)
Enalapril	31 (9)
Captopril	3 (1)
Lisinopril	3 (1)
On target dose of ACE inhibitors	24 (7)
Diuretic	82 (28)
Furosemide	93 (26)
Spironolactone	18 (5)
Digoxin	24 (8)
Statin	21 (7)
Alpha-blocker	18 (6)
Calcium-channel blocker	18 (6)
Angiotensin receptor blocker	6 (2)
Beta-blocker	3 (1)
ACE = angiotensin-converting enzyme	

Table 5. Outcomes and follow-up care for the 34 patients with congestive heart failure (CHF)

Variable	% (and no.) of patients
Follow-up appointments (n = 29)*	
With family physician	72 (21)
With specialist (internist / cardiologist)	21 (6)
Outcomes within 1 year of discharge (n = 29)*	
Readmission for CHF	31 (9)
Myocardial infarction	3 (1)
Died	41 (12)
*Excludes 5 patients (15%) who died during the index hospitalization	

ventricular substrate.¹² The echocardiogram is important in the elderly, in whom diastolic dysfunction is more common.

Aday delineated the influences of health care use into system, patient and physician factors.¹⁵ An important system factor that likely contributes to a low use of echocardiography is limited access to this service at our hospital (and other rural settings) compared with urban settings. For example, at a Toronto teaching hospital with onsite access to this test, 88.5% of patients had their left ventricular function assessed, with 48.5% having echocardiography during their hospital stay.¹⁴ However, patient and physician factors may also contribute to the findings. Physicians may not be ordering echocardiography appropriately, and travel for diagnostic tests may be difficult for frail elderly patients. In a study of primary care management of CHF in 15 European countries, 82% of patients had received echocardiography.⁹

The drug therapy of CHF patients was underused but very similar to that reported in both a large Ontario teaching centre and in rural Georgia.^{14,15} Most patients receive ACE inhibitors and diuretic therapy, but too few were receiving the target dose as defined in clinical practice guidelines.^{1,16} Higher doses of ACE inhibitors have been shown to reduce the risk of rehospitalization for CHF patients by over 20% when compared with low doses.¹⁷ Primary care physicians in our community setting used ACE inhibitors in a frequency and dose similar to that of the specialist-delivered care in a teaching hospital.¹⁴ However, in the office follow-up period assessed in the study, doses of ACE inhibitors were not titrated up to appropriate target doses. Other studies have shown that primary care physicians, compared with cardiologists, are less likely to prescribe ACE inhibitors and more likely to underdose these in CHF patients.^{15,18} In the European study of primary care CHF management in 15 countries,⁹ the average dose of ACE inhibitors used was 50% of target dose. Some of the reasons suggested in the literature for this

include the idea that family physicians are less likely to order the correct diagnostic procedures and therefore may not differentiate systolic from diastolic dysfunction. Family physicians also report more concern about the side effects of these drugs.¹⁰ The authors of the Toronto study¹⁴ noted that evidence for the higher ACE inhibitors doses used in clinical trials,¹⁷ although recommended by published guidelines,^{1,16} is scant. The advanced age of most patients in this cohort may also have been a factor in the ACE inhibitors doses prescribed. However, an analysis of serum creatinine and ACE inhibitors dose in this study showed that poor renal function did not correlate with lower dosing of ACE inhibitors (Table 6).

We discovered a similar trend toward drug underuse when we examined the use of spironolactone for treatment (Table 6). Only 14% of patients were prescribed this diuretic, which, when prescribed, recently was found to cause a 35% reduction in mortality and rehospitalization for CHF.⁷ Addition of low-dose spironolactone is indicated for CHF patients with systolic dysfunction who have normal renal function and serum potassium, and still have rest symptoms (NYHA Functional Class IV) on maximal medical therapy. Possible explanations for the low rate of use of spironolactone include lack of information on left ventricular function from echocardiogram, and insufficient time to incorporate new treatment information, as this cohort started in June 2000, less than 1 year after the landmark study was published.⁷ Furthermore, the use of spironolactone may not have been appropriate in this patient population. The Randomized Aldactone Evaluation Study (RALES)⁷ included mainly patients with a NYHA Class III–IV heart failure.⁷ Recent evidence suggests that the use of spironolactone in patients with better heart function (NYHA Class I and II), who are receiving target dose ACE inhibitors therapy, is associated with more adverse effects such as hyperkalemia, when compared with patients in the RALES study.¹⁹

Table 6. Renal function and the use of angiotensin-converting enzyme (ACE) inhibitors and spironolactone for the 34 patients with congestive heart failure

Creatinine level, no. of patients	Use of ACE inhibitors			On spironolactone	
	Patient not on ACE inhibitors	Patient on ACE inhibitors		Yes	No
		Not on target dose	On target dose		
< 115, n = 17	5	11	1	2	15
> 114, n = 17	0	12	5	3	14

Only 1 patient was started on a beta-blocker, clearly indicating underuse of a newer treatment that has an important impact on reducing CHF morbidity. Beta-blockers and warfarin (for CHF patients with atrial fibrillation) were the least used medical therapies for CHF in a recent evaluation of quality of CHF care in Ontario hospitals.²⁰ The guidelines on use of beta-blockers in CHF were quite new at the time of this study, and, possibly, improved use of this disease-modifying drug would be seen now.

Evidence of a high level of continuity of care in this study, as measured by almost complete follow-up with a family physician shortly after discharge, was encouraging. However, it appears that there was a lack of associated improvement in processes of care. For example, patients who were seen in follow-up seldom had their ACE inhibitors titrated to higher doses over time, and no patients were initiated on beta-blockers during office follow-up.

When considering ways to improve CHF care in rural practice, a number of different models can be examined. There is substantial evidence for the efficacy of multidisciplinary CHF clinics.⁸ Multidisciplinary CHF management has been shown to improve adherence to practice guidelines.²¹ These clinics have also been shown to reduce patient care costs, increase compliance with medications and life-style modifications, and improve quality of life.^{8,16,21} Perhaps this form of patient care has a role in CHF management in rural centres, because our results suggest there is less strict adherence to CHF management guidelines. The clinic model has been used in large urban centres; therefore pilot demonstration projects would be needed to assess how well the concept and its delivery translate to rural settings.

Another model to improve CHF care is found in a recent initiative of the BC Ministry of Health Services.²² This province-wide project focuses on CHF education for family physicians, provision of detailed guidelines and protocols to physicians, the use of a patient care flowsheet in the chart, and a self-monitoring sheet for patients. It also includes a substantial financial reward in the fee schedule for primary care physicians who follow the treatment guidelines when caring for CHF patients.

Another model could combine the effective components of multidisciplinary clinics with the broad reach of improvements in individualized primary care approaches.

A strength of the present study was the post-hospital discharge tracking of patient management and

outcomes. Most studies of CHF to date have been hospital-based and do not examine office management after discharge.

Limitations

There are limitations found within the design of this study. A retrospective chart review such as this one only results in collection of information that is recorded in the hospital or office charts. The number of cases depends on admission data and is not powered for statistical analysis. There is the possibility that different doctors record clinical symptoms and signs with different degrees of accuracy. In some cases, important clinical information such as negative physical findings may not have been recorded. Furthermore, some of the charts of deceased patients could not be retrieved in the office setting. The absence of echocardiograms on 62% of patients limits interpretation of the appropriateness of the medical therapies used. In addition, one reviewer abstracted all chart data.

CONCLUSIONS

In summary, the 50% 1-year mortality for CHF in a small rural hospital was comparable to population-based CHF mortality⁵ for the same province when age and co-morbidities were taken into account. Although some areas of practice were impressive (follow-up care) and others were similar to other settings (ACE inhibitor therapy), there is considerable room for improved CHF management. In particular, both assessment of left ventricular function with echocardiography, and the use of beta-blockers and spironolactone, were below rates expected with adherence to practice guidelines. Although this study did not examine underlying influences, potential reasons could likely be framed as system factors (such as the availability of services) and physician factors related to differences in care delivered by primary care physicians and specialists that are seen in other CHF studies. It is possible that alternative models of delivery, such as a multidisciplinary CHF clinic or the chronic disease management approach of British Columbia, may improve some aspects of care. Although these models of care appear to be poorly evaluated in rural settings, our positive experience with alternative delivery models for diabetes, a condition with similar complex management issues, encourages us to consider new models for the improvement of CHF care in rural settings.

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ORIGINAL ARTICLE ARTICLE ORIGINAL

If all ambulances could fly: putting provincial standards of emergency care access to the test in Northern British Columbia

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Introduction: Geographic access to emergency treatment remains an important public policy concern as rural emergency medical systems respond to various pressures to centralize services. Geographical Information Systems (GIS) are effective tools to determine what proportion of a given population is adequately served by existing or proposed service distributions.

Methods: This study compares 2 GIS approaches to determining whether recent standards of emergency care access established by the British Columbia Ministry of Health Services are being met in Northern British Columbia. In particular, we compare results obtained using the more commonly used straight-line, or “as the crow flies,” method with those obtained using a more sophisticated method that estimates travel time using digitally referenced road network data.

Results: Both methods reveal that provincial standards of emergency access are not being met in Northern British Columbia.

Conclusion: In terms of comparing the 2 approaches, the network technique indicated a lower level of access and was more accurate in identifying populations residing inside and outside the “golden hour” of emergency care.

Introduction : L'accès géographique aux soins d'urgence demeure une importante préoccupation sur le plan des politiques publiques au moment où les systèmes médicaux et d'urgence des milieux ruraux répondent à diverses pressions pour centraliser leurs services. Les systèmes d'information géographique (SIG) sont des moyens efficaces de déterminer le pourcentage d'une population donnée qui est adéquatement desservie par des services existants ou proposés.

Méthodes : Cette étude compare deux méthodes de SIG pour déterminer si l'on satisfait, dans le nord de la Colombie-Britannique, aux normes récentes sur l'accès aux soins d'urgence établies par le ministère des Services de santé de cette province. Nous comparons plus particulièrement les résultats obtenus par la méthode plus couramment utilisée de la ligne droite ou «à vol d'oiseau» aux résultats obtenus par des méthodes plus complexes qui estiment le temps de déplacement à partir des données référencées numériquement d'un réseau routier.

Résultats : Les deux méthodes révèlent que l'on ne respecte pas, dans le nord de la Colombie-Britannique, les normes provinciales sur l'accès aux services d'urgence.

Conclusion : Sur le plan de la comparaison des deux méthodes, la technique du réseau routier a indiqué un niveau moins élevé d'accès et s'est révélée plus exacte pour identifier les populations résidant à moins d'une heure ou à plus d'une heure de route, une heure constituant l'«étalon-or» du temps d'accès maximal pour les soins d'urgence.

INTRODUCTION

Geographic access to emergency treatment was a critical issue in the 1940s and 1950s when many rural hospitals in

Canada were built using a mix of federal, provincial and local funds. More than 5 decades later, this issue is again a key concern as the viability of many rural facilities is threatened by persis-

tent physician shortages, population decline, and centralization exercises carried out by provincial governments or delegated authorities such as regional health boards. A number of provincial governments have established guidelines intended to ensure hospital emergency department and dispatch centre closures are done in a manner that guarantee rural residents remain within specified maximum distances or travel times to the nearest emergency treatment site.¹⁻⁴ Too often, however, the issue of accurately measuring distances, travel times, and population distributions is overlooked.¹⁻³

Geographical Information Systems (GIS) are effective tools to determine what proportion of a given population is adequately served by existing or proposed service distributions.⁵⁻⁸ Two types of approaches can be employed to estimate travel time using GIS.^{9,10} One approach is based on the shortest route (i.e., by road) (referred to henceforth as the “shortest-route” approach or analysis) between point of origin and destination following representations of road networks, thus requiring sophisticated data and analytical techniques.^{5-7,11} The second approach uses “as the crow flies” measures of distance to estimate travel time.¹²⁻¹⁴ The “as the crow flies” (i.e., straight-line) measure of distance has less stringent data requirements and is easier to program, but is also less accurate because it does not consider actual travel paths.⁹ Currently, the latter technique is more widespread, and its use is supported in the literature by studies that demonstrate a high degree of correlation between results using either method.¹⁵ There are concerns, however, that the straight-line method may not be as effective in rural areas that have more limited road coverage, and where variable road conditions, climate and topography present barriers to physical movement.^{5,10,11,14,15}

These concerns apply to our study area, Northern British Columbia (BC), which we define as the jurisdiction governed by the Northern Health Authority (NHA).¹⁶ The geographic size of the study area is over 600 000 km², which represents 60% of BC’s total land mass, and is the largest territory covered by one regional health authority in Canada. Throughout this vast area, there are approximately 300 000 residents who are unevenly distributed in numerous small communities, of which only one community has a population exceeding 50 000 (Fig. 1).¹⁷

The BC Ministry of Health Services (MHS) and Planning (2002) defines their standard of emergency access as 98% of a regional authority’s population residing within 60 minutes’ travel from home to an

emergency treatment site — a variation on the “golden hour” concept.¹ The 2002 report, cited above, claims that Northern BC meets provincial standards of emergency care access. However, the straight-line method that is used to support the MHS analysis is based on crude estimates of travel time and population distribution.^{12,15} In addition, the report in question included a number of facilities that do not appear to provide ongoing emergency treatment capability. Notwithstanding concerns about the scientific basis of the golden hour principle,^{18,19} our main concerns are that the relationship between distance and travel times is analyzed directly rather than approximated, and that the mapping of population distributions relative to travel-time criteria is carried out in the most rigorous manner possible.

The first objective of this study was to retest the provincial guidelines using straight-line estimations, but with higher spatial resolution data, more up-to-date population figures, and including only facilities that offer 24/7/52 (24 hours a day, 7 days a week, and 52 weeks a year) emergency treatment. The second objective was to employ the more rigorous method of calculating travel times based on actual transportation networks, and compare these results to the straight-line analysis to determine whether the more sophisticated method is warranted to examine emergency care accessibility in Northern BC.

DATA AND METHODS

In accordance with the MHS definition of emergency services, we chose to exclude facilities that, as of June 2004, do not remain open or provide on-call

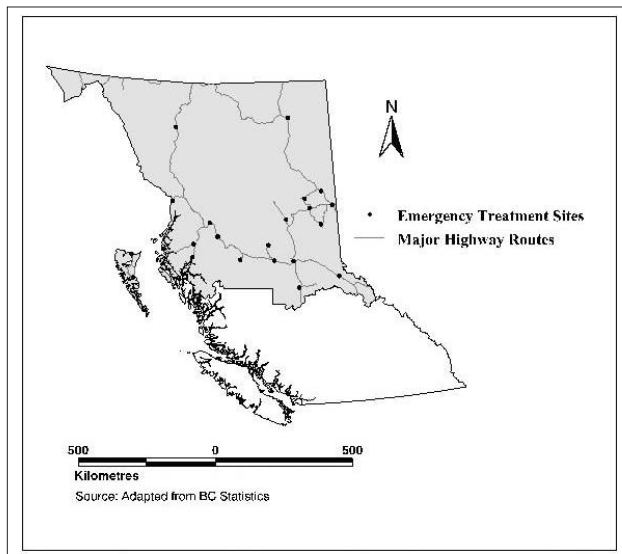


Fig. 1. Northern Health Authority, British Columbia, Canada, 2004.

services 24/7/52.¹ Hospital data were collected from the Canadian Healthcare Association's *Guide to Canadian Healthcare Facilities, 2002/03*.²⁰ From this document we compiled an initial list of 19 facilities operated by the NHA that were classified as providing 24/7/52 emergency service. An additional 3 facilities were added to our list following phone calls to all smaller facilities in the region that had not reported this attribute in the directory. As a result, our study included a lower number of facilities than the 35 listed in the Ministry's report. Each eligible facility was manually geo-referenced based on the street address of the facility.

Block level population data for the study area were downloaded from Statistics Canada using GeoSuite 2002.²¹ Blocks are defined as the "area equivalent to a city block bounded by intersecting streets."²² The points representing block centroids (i.e., the geographic centres of the block polygons) contain the attribute of total population. The block scale was chosen because it is the finest scale at which population estimates are available, and because there is no suppression or rounding of population data. Postal code data for the entire study area were obtained online from the Canadian Census Postal Code Analyzer 2001 database.²³ The postal code polygons were used to adjust population estimates obtained from the block level data using the shortest-route analysis technique.²⁴

Route network data that included all roads in BC were obtained from DMTI Spatial Inc.²⁵ According to DMTI's data standards, speed limits for each road segment were estimated based on road type and proximity to population density based on the 1996 Census of Canada. Ferry routes, trails and temporary roads were listed at 10 km/h, gravel roads in sparsely populated areas and ramps at 50 km/h, and major or arterial roads and secondary highways in sparsely populated areas at 60 km/h. Road types that were assigned a speed limit of 80 km/h included gravel roads in populated areas, major/arterial roads in populated areas, secondary highways in populated areas and primary roads. Expressways had an estimated speed limit of 100 km/h. As with any model input, GIS data were reviewed thoroughly to confirm that there were no non-standard outlier values (e.g., we discovered that the speed rates for ferry routes had to be revised to conform to DMTI's own standards).

The facility table, postal code table and block data table were imported into ArcView v. 3.2, a GIS program,²⁶ and event themes were created. This means that the latitude and longitude coordinates in

the 3 tables were converted by the software into 3 GIS point layers, in which each point represented the location of a facility, the centroid of a block, or a postal code area.

We conducted a straight-line analysis by creating 50-km buffers around the 22 hospital points in ArcView. This means that each facility became the centroid of a circular "polygon" with a 50-km radius. (An object in a vector-based GIS, such as ArcView, is technically a string of x,y coordinates joined together by straight lines. Even radial buffers, therefore, which appear on a computer monitor or in print as circles, are correctly referred to as "polygons.") The block centroids that were contained by the buffered facility polygons were then clipped, or selected from the point layer set, allowing us to sum the population within the 50-km buffers.

To conduct the shortest-route analysis, we first imported the road network data and the block data table into a Web-based network calculator program called the Distance Analyzer Interface (DAI)²⁷ developed at the University of Northern British Columbia (UNBC). The DAI allows the user to import attribute data and query the network calculator for distances or travel times. The DAI calculated 1-hour travel time from each of the 22 hospitals along every possible route. The results were examined on an interactive map-viewing page created in the GIS laboratory at the UNBC with funding from the North West Data Sharing Network,²⁸ and then exported as a shapefile for analysis using ArcMap, a commercial GIS program.²⁹

Next, a 1-km buffer was created around the road segments, resulting in a new GIS polygon layer. The blocks contained partially or entirely within the buffered route layer were selected using the "Select By Location" tool, and a new table was created. The selected block populations were then summed to give the total population within 1 hour of emergency hospital care.

We further fine-tuned the shortest-route analysis by employing postal code data to account for situations where blocks were only partially contained by the route buffer. Postal code areas are higher resolution than blocks, but do not have population data associated with them. In ArcView, a BC block data table was joined to a table of all NHA postal codes to create an event theme. This results in a set of postal codes containing population statistics. The postal code locations that fall within the buffered route layer can then be separated from this set using a procedure in ArcMap referred to as a "clip overlay." Each point contained in the route polygon was

selected, and a new table representing all postal codes within 1 hour of emergency services was created. As an illustration, suppose a block containing 10 postal code polygons was partially contained by the route buffer, and 6 of these postal code polygons were located within the route buffer. In this instance, 60% of the population in the block would be considered within the golden hour, rather than the entire population of the block, as estimated without the postal code adjustment.

In order to estimate the improvements in measurement accuracy made when employing the shortest-route analysis compared with the straight-line approach, 3 measures were reported. The *rate of false positives* is the population that resides inside the 50-km facility buffer identified by the straight-line technique, but that were identified as residing more than 1 hour from emergency treatment according to shortest-route analysis, expressed as a percent of the total positives identified using the straight-line technique. The *rate of false negatives* is the population residing outside the 50-km facility buffers that was identified as residing less than 1 hour from emergency treatment according to the shortest-route analysis, as a percent of total negatives identified using the straight-line technique. Finally, the *rate of misclassifications* is the sum of false positives and false negatives as a proportion of the total study population. Population estimates of false positives and false negatives were obtained using the "Select By Location" tool in ArcMap.

RESULTS

The results of the straight-line distance analysis indicated that 18 222 people in Northern BC, or 6.4% of the population in 2001, live farther than 1 hour from emergency care. Using shortest-route analysis and the route buffer technique without adjusting for partial coverage, the number of residents living outside the golden hour increased to 29 388, or 10.4% of the population. By further fine-tuning the network method using postal code locations, the population residing outside the golden hour rose to 30 322, or 10.7% of the population.

In terms of quantifying the improvements in accuracy that resulted from using the shortest-route analysis, we estimate that 17 620 of the 265 041 residents reported to be within the golden hour using the straight-line method would, in fact, have to travel more than 1 hour to the nearest emergency centre. This is a rate of false positives of 6.6%. We also estimated that 6454 of the 18 222 residents reported

to be beyond the golden hour using the straight-line method would have to travel less than 1 hour for emergency treatment, or a rate of false negatives of 35.4%. In total, the rate of misclassification using the straight-line method was 8.5% (i.e., 24 074 of 283 263 Northern BC residents).

Fig. 2 provides an illustration of the difference that the shortest-route analysis makes, showing the lack of precision associated with the straight-line approach in identifying how many people reside within a 1-hour automobile trip of the Lakes District Hospital in Burns Lake, BC. In this case, the shortest-route approach identified 2260 of 6961 residents (32.5%) within a 50-km radius of the hospital who are more than 1-hour from the hospital when the actual road network was used to calculate travel time, as indicated by the area route polygons.

DISCUSSION

Our findings suggest that Northern BC is significantly underserved in terms of 24/7/52 emergency care, and that the provincial MHS had substantially underestimated the number of residents outside the golden hour by using less rigorous data and methods of GIS analysis. The findings are even more striking considering the generous interpretation of the golden-hour concept employed to conduct the shortest-route analysis (i.e., 60 min of travel one way, with no consideration of the time needed for an ambulance to respond to an emergency call). Although the standards outlined by the BC MHS are only guidelines and not considered mandatory, they do raise an important question: What would it take to meet these guidelines in Northern BC? Given the results of our analysis, it would seem that

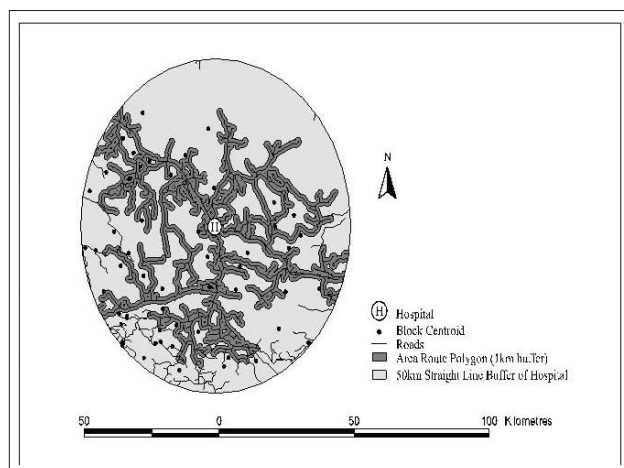


Fig. 2. Identification of "false positives" using shortest-route (by road) analysis within a 50-km aerial buffer around Lakes District Hospital, Burns Lake, BC, 2001 Census data.

adequate delivery of emergency services would require substantial reinvestment in Northern BC to address substandard access.

Our results clearly show several benefits to employing shortest-route analysis. Most importantly, the more rigorous analysis suggests that nearly 25 000 residents had been misclassified using the straight-line approach. This number includes approximately 18 000 people who are within a 50-km radius of an emergency treatment facility, but whose travel to the facility is estimated to take more than 1 hour due to road conditions. In the example cited above using shortest-route analysis within a 50-km buffer around the Lakes District Hospital in Burns Lake (Fig. 2), nearly one-third of the population identified as within the golden hour using the less accurate straight-line method were considered to be more than a 1-hour drive using the shortest-route analysis. In effect, the nearly 18 000 individuals identified as “false positives” reside on the low-density fringe of the region’s largest urban settlements, highlighting important consequences in terms of the costs and logistics of service delivery when low-density residential development is allowed to occur within or just beyond municipal limits.

The shortest-route approach is useful for more than identifying gaps in access; it also provides more accurate information with which to make decisions about emergency health service planning. For instance, results such as those reported here would add credibility to requests for additional funding in demonstrably underserved areas. The results produced from the DAI and GIS overlay techniques could be used to pinpoint existing treatment centres presently without 24/7/52 emergency capacity that could be upgraded in order to meet the provincial emergency access guidelines. It could also be used to determine an optimal distribution of a specified number of ambulance stations for which funding has been secured. Likewise, the analysis presented in this paper should be regarded as concrete evidence of the added costs of allowing low-density housing to occur on the fringe of urban settlements, and point to the need for greater coordination between health authorities and municipal and regional levels of government. Finally, the detailed information generated using GIS and shortest-route analysis could be linked to clinical outcomes data as a means of estimating the risk of additional distance or response times for specific conditions or types of trauma at the regional and sub-regional levels.

Additional advantages of GIS and shortest-route analysis techniques are their adaptability. For exam-

ple, the methods employed in this study can be adapted to account for seasonality, temporary geographic barriers and changing road conditions. Likewise, the analysis can be revised to capture variability in the supply of eligible treatment locations, such as during periods when a community hospital’s emergency department is closed due to temporary physician shortages. Such considerations are particularly important for emergency health care in rural and remote regions like Northern BC.

Using the most accurate methods available for calculating travel time and population distribution is imperative when considering access to such a vital service as 24/7/52 emergency care. This is especially the case in rural and remote settings where greater transportation and service provision challenges are the norm. Shortest-route approaches are more costly and complex to develop, but the results of our analysis demonstrate the considerable benefits that these techniques have over more commonplace straight-line GIS methods. We argue that policy regarding health service delivery and accessibility in rural and remote areas would be better informed by the use of shortest-route analysis.

Limitations

The analysis treats all emergency treatment sites as equivalent in terms of service capabilities, which is unrealistic given the differences in size and staffing of facilities throughout the study area. There is no indication, for instance, of temporary emergency department closures that are known to affect smaller facilities in rural and remote settings.

The road network data supplied by DMTI Spatial Inc. has 2 potential shortcomings. First, the coverage in very remote parts of Northern BC is often inadequate. However, this had a very limited impact on the overall results considering that the compact nature of smaller and remote settlements, the small populations involved and the fact that a number of very remote settlements are well outside of the golden hour whether or not the road network data coverage representing these areas is comprehensive. The second shortcoming is the travel speed attributes, which correspond to posted speed limits rather than emergency response conditions. We determined that the slower speed limits are justified as approximating unexpected delays that may be encountered on any given ambulance response, as well as compensating for the inflated estimation of the golden-hour concept employed by the BC MHS.

Another concern is that the estimation of route

network travel time using the DAI does not necessarily stop at 60 minutes, but instead “back tracks” to the vector node nearest to, but not beyond, the point at which a 60-minute trip is completed. There is potential for the nodes to be distributed at a lower density in more remote areas, which may result in a larger margin of error in approximating 1 hour of travel.

Finally, when performing buffer routines there is always the question of how to handle situations in which a polygon, such as a block or postal code, is only partially contained. There is no standard procedure for handling these cases. Our approach with the straight-line buffer technique was to include block polygons only if the block centroid was contained. We did so because blocks are typically small in area, but we acknowledge that they are comparatively larger in less dense settings. When conducting the shortest-route analysis, the blocks contained by the 1-km road buffer were counted as within the 1-hour travel time, regardless of whether the centroid was also contained. The use of postal codes to adjust for the area of the block outside of the buffer addresses some of these concerns, but assumes a uniform distribution of population within blocks. It should be noted that the postal code adjustment only resulted in a reduction of 934 residents (less than 1%) of the 253 875 initially regarded as within 1 hour of emergency treatment. This low level of adjustment attests to the small area size of blocks, and hence their utility for this sort of analysis.

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THE PRACTITIONER LE PRATICIEN

Country cardiograms case 27

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This article has been peer
reviewed.

A 20-year-old woman arrived by ambulance at the emergency department of a rural British Columbia hospital. She had been found with a decreased level of consciousness beside an empty bottle of amitriptyline pills (it is thought that she took over 5000 mg). Her estimated weight is 50 kg.

Her pulse is recorded at 140 beats/min, with a fair volume. Blood pressure is recorded at 133/81 mm Hg.

Her breathing is laboured and slow. While attention is being paid to ABCs and the resuscitation commences, a 12-channel ECG is obtained (Fig. 1). Soon afterward, the patient begins to have seizures.

What is your analysis, and are there any implications for treatment?

For the Answer, see page 191.

Competing interests: None declared.

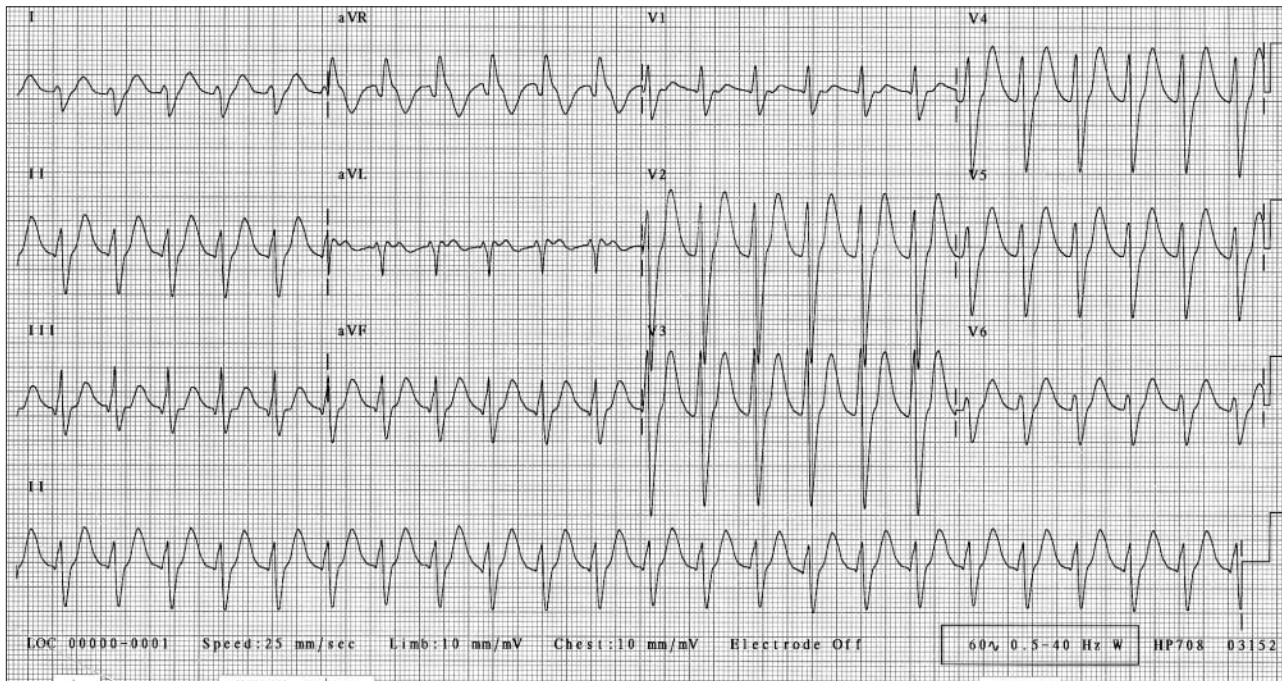


Fig. 1. Results of first ECG, taken during resuscitation of the patient.



THE PRACTITIONER

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The occasional removal of an ingrowing toenail

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The ingrowing toenail is a painful foot condition that can be treated by most rural physicians. If it is not too severe, conservative management can be initiated first. If the situation is not improving or is worsening, removal of the nail plate with destruction of the nail matrix, by either surgical or chemical matricectomy, is indicated. Neither matricectomy technique is particularly complicated. Quick healing, minimal postoperative morbidity, high success rates and cosmetically acceptable results are the rule. Risks associated with the procedure include infection, chronic ulcer formation, pain, prolonged healing, irregular nail regrowth and recurrence. Patients should be aware of these risks before the matricectomy is performed.

L'ongle incarné est un problème de pied douloureux que la plupart des médecins ruraux peuvent traiter. Si le cas n'est pas trop grave, on peut commencer par un traitement conservateur. Si la situation ne s'améliore pas ou se détériore, l'ablation de la tablette unguéale conjuguée à la destruction de la matrice, par matricectomie chirurgicale ou chimique, est indiquée. Les deux techniques de matricectomie ne sont pas particulièrement compliquées. En règle générale, la guérison est rapide, la morbidité postopératoire est minime, les taux de réussite sont élevés et les résultats sont acceptables sur le plan esthétique. Les risques associés à l'intervention comprennent l'infection, la formation d'ulcères chroniques, la douleur, le temps prolongé de guérison, la repousse irrégulière de l'ongle et la récédive. Il faut informer les patients de ces risques avant de pratiquer la matricectomie.

INTRODUCTION

Onychocryptosis, more commonly known as "ingrowing toenails," is a relatively common foot problem that typically manifests as inflammation of tissue along the side of a toenail. The big toe is most often affected, and it is the lateral border adjacent to the second toe that is the side that is most commonly involved.¹⁻³ The presenting complaints are inflammation-related — pain, swelling, erythema (with or without discharge) and granulation tissue formation. The condition can affect walking and lead to absenteeism from work. A variety of treatment options exist, ranging from advice on how to keep pressure off the area to removal of the entire nail with ablation of nail bed to ensure the nail plate never grows back. This article will review the most

popular treatment options for ingrowing toenails.

TOENAIL TERMINOLOGY

The nail unit consists of the nail plate, nail bed, nail matrix, the proximal and lateral nail skin folds (Fig. 1, Fig. 2). The nail plate is the conspicuous, hard, smooth, rectangular shaped structure which is commonly referred to as the nail. The nail plate covers, and is adherent to the nail bed. The nail matrix is the site where the nail plate originates and from which it grows out distally. The distal half of the nail matrix is visible through the proximal border of the nail plate as a whitish, half-moon shaped area known as the lunula. The proximal half of the nail matrix is covered over by the proximal nail skin fold. The toenail plate typically grows

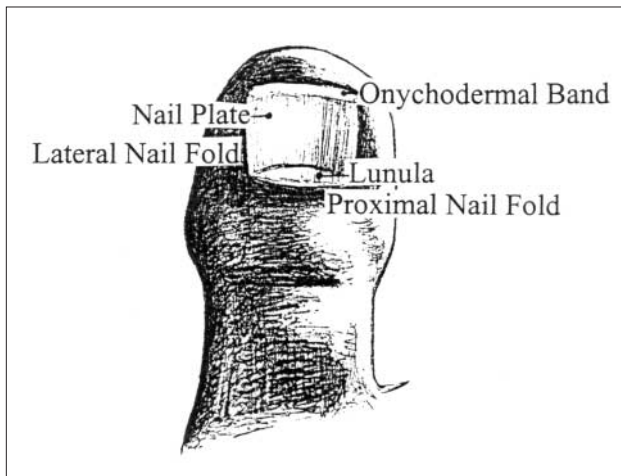


Fig. 1. Dorsal view of great toe.

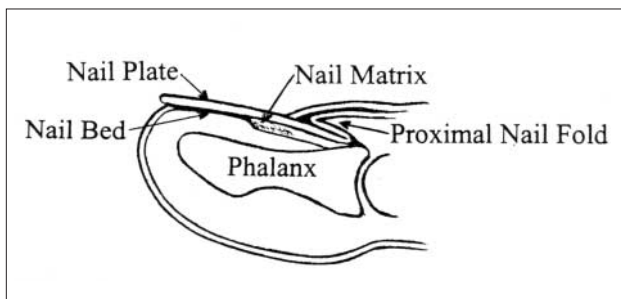


Fig. 2. Lateral view of great toe.

out over the nail bed at a rate of about 0.2 mm per week. This means that it takes 12 to 18 months for a toenail to move from matrix to distal free edge. Total destruction of the nail matrix results in an inability of the digit to produce a nail plate. Partial destruction results in variable nail plate generation. The free distal edge of the nail plate is visible as a whitish-yellow line at the end of the nail — the onychodermal band.⁴

PATHOPHYSIOLOGY OF INGROWING TOENAILS

The inflammatory changes associated with ingrowing toenails arise because the nail plate punctures or traumatizes the skin at the side of the nail. The nail-damaged skin attempts to heal itself by producing highly vascular granulation tissue, which, over time, becomes heaped up over the ingrowing toenail plate. The site is at high risk of developing cellulitis because microbes gain access through the traumatized skin. The goal of treatment is to stop the nail from pressing/piercing into the soft tissue.¹⁻³

A staging system has been developed to grade severity of ingrowing toenails.^{3,5-7} Ingrowing toenails associated with slight erythema, edema and pain are

in stage 1. The lateral and medial nail borders will be mostly clear of inflamed skin in stage 1 ingrowing toenails. Ingrowing toenails associated with obvious erythema, edema, pain and discharge are stage 2. There may or may not be co-existing cellulitis in this stage. In stage 3, there is erythema, edema, pain, discharge, as well as skin hypertrophy with or without granulation tissue in the area of the lateral skin fold (Fig. 3).

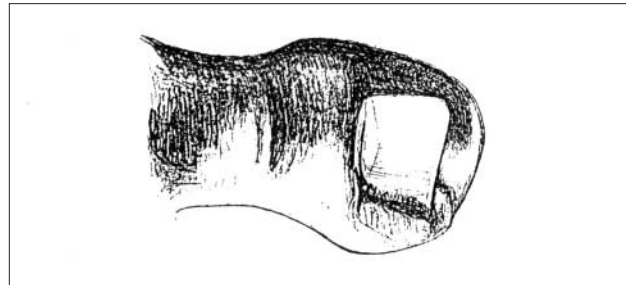


Fig. 3. Stage 3 ingrowing toe nail.

RISK FACTORS FOR INGROWING TOENAILS

A number of risk factors are associated with the development of ingrowing toenails. These include poor or tight-fitting shoes, abnormally curved nails, improper nail trimming, congenital mal-alignment of the nail and abnormally thickened nails (onychogryphosis) resulting from infection (e.g., onychomycosis), ischemia or trauma.

Tight-fitting shoes result in the tissue adjacent to the nail being forcefully squeezed and rubbed against the nail plate for long periods of time. Adolescents and young adults are affected more often than other age groups. It is believed that nails in this age group become softened by excessive perspiration and are more prone to split and crack, producing flesh-piercing spicules. Older people also develop ingrowing toenails, and it is believed that the problem here is multifactorial. Older people are more likely to have thickened, abnormally curved and ingrowing toenails. They are also more likely to have poor vision and limited mobility, resulting in poorer ability to trim the nails in the recommended fashion.

TREATMENT OPTIONS

A number of different methods have been described for the treatment of ingrowing toenails (Box 1).^{5,5-10} The treatment chosen by a physician will vary according to the severity of the inflammation, the presence or absence of infection, the nature of the

ingrowing toenail, patient considerations, as well as physician skill, experience and preference.

Box 1. Treatment options for ingrowing toenails

1. Conservative measures — observe and / or push back lateral skin fold.
2. Cotton wad inserted under lateral edge of nail plate.
3. Removal (avulsion) of the entire nail plate.
4. Partial removal (avulsion) of the offending nail-border part of the nail plate.
5. Partial or complete removal of nail plate followed by destruction (ablation) of the nail matrix to prevent regrowth by using:
 - a. caustic liquid (eg phenol, sodium hydroxide)
 - b. surgery (wedge excision of nail matrix)
 - c. cryotherapy
 - d. laser
 - e. cryotherapy.

Stage 1 ingrowing toenails can be treated conservatively. The patient is told to avoid wearing tight-fitting shoes; avoid trimming the nail plate so far back that the edge or corner presses into adjacent tissue; soak the toe in warm water daily and apply topical antibiotics to the inflamed area. They are also instructed to push back skin daily to allow the nail plate to grow out past the distal lateral skin-fold border. Packing or splinting of a thinly rolled wisp or wick of cotton into the involved lateral nail skin fold from the proximal nail base to the distal end of the nail plate can also be tried. To minimize discomfort, topical anesthetic (e.g., EMLA cream [AstraZeneca]) can be applied for 30 minutes before the splinting procedure. The cotton splint is left in place for up to 4 months. It is removed once the distal edge of the nail plate grows beyond the lateral nail fold. Done properly, nail splinting is said to have a cure rate of almost 80% for stage 1 ingrowing toenails.

Conservative measures are less likely to work for recurrent stage 2 ingrowing toenails, and not indicated for stage 3 ingrowing toenails. For these, surgical removal of the portion of nail plate that is damaging tissue and inciting inflammatory process is usually necessary. Total nail plate removal is rarely indicated. Obvious advantages of just removing a section of nail plate adjacent to inflamed tissue include 1) less tissue is traumatized, and 2) less nail bed surface area is exposed. An exposed nail bed can be quite tender.

Simply removing the nail plate is not a very effective way to manage ingrowing toenails because recurrence occurs in over 70% of cases. To prevent recurrence of the problem, destruction of the nail matrix (matricectomy) by either aggressive surgical

excision or with chemical cautery is necessary after the entire or just the troublesome part of the nail plate has been removed. Chemical agents used for chemical matricectomy include phenol, ethanol and sodium hydroxide.

Of the 3, phenol matricectomy is by far the one most commonly used chemical matrix-ablating agent. In fact, it has been used for over 50 years.^{10,11} Phenol, also known as carbolic acid, is an aromatic benzene compound. It is a weak organic acid that is both hydrophilic and lipophilic. Liquified phenol is a very stable compound that lasts for many years when stored in an airtight bottle. Phenol is highly soluble in organic solvents, which explains why isopropyl alcohol is commonly used in the immediate treatment of phenol burns on skin. Phenol is not absorbed systemically through the skin. Applied topically, phenol denatures and precipitates proteins within the upper skin layer. However, it does not produce full-thickness skin damage. The usual concentration used for chemical matricectomy is 80%–90%.

A recent Cochrane review¹ of surgical treatments for ingrowing toenails came to the conclusion that simple nail avulsion combined with the use of phenol is more effective at preventing symptomatic recurrence of ingrowing toenails compared with invasive excisional surgical techniques that do not employ phenol. However, the authors admit there is a need for more well designed trials to confirm that the use of phenol really is preferable to surgical excision.¹

Reported⁷ rates of nail plate regrowth after phenol matricectomy range from 16%–28%. Reported rates of nail plate regrowth after invasive excisional surgical techniques range from 18%–29%. Critics of phenol matricectomy state that it is associated with unpredictable tissue damage, prolonged healing and/or draining and prone to postoperative infections. This has led to recent reports exploring other techniques such as sodium hydroxide, cryotherapy, electrocautery and laser to ablate the nail matrix.^{5,9,12}

These other techniques may eventually prove to be associated with faster healing times, less pain, less drainage, and less postoperative infection rates. Until then, phenol cautery and surgical excisional matricectomy will continue to be the most popular methods to ablate the nail matrix.

HISTORY AND PHYSICAL EXAMINATION

A. History

Ask about allergies, particularly those to local anesthetics, immunizing agents, and to antibiotics. Ask

about tetanus status, and update appropriately. Ask about the presence or absence of diabetes, peripheral vascular disease, long-term steroid use, collagen vascular disease and HIV, because removal of a toenail in such patients is more likely to be complicated by development of chronic ulcers or serious infections due to poor healing ability.

B. Physical examination

Ensure the involved body part is in a secure resting position on top of a plastic-backed absorbent pad, and ensure there is good direct lighting of the wound site. Document the neurovascular status of the digit and foot by checking for a dorsalis pedis and posterior tibial artery pulsation. The absence of one or more pedal pulses or presence of dystrophic skin changes would make one suspect peripheral vascular disease. During examination, stage the severity of the ingrowing toenail problem. Sometimes excising the distal aspect of the offending nail border will provide immediate relief, especially if you can push away the lateral skin-fold tissue and cut away the nail plate that is obviously penetrating the skin. After examination, inform the patient whether or not surgical removal of the nail plate is indicated.

C. Informed consent

Review complications associated with removal of the nail plate and matricectomy, including allergic reaction to the anesthetic or medications to be used, infection of skin and, rarely, of bones of the foot, bleeding, pain, scarring and disfiguring of nail bed and lateral nail skin folds. Explain the procedure you plan to use to remove the ingrowing nail plate and destroy the nail matrix. Answer any questions the patient may have; and obtain written consent as per institution policy. Schedule the procedure appointment.

D. Decision to use antibiotics

Some authorities recommend daily soaking with dilute povidone-iodine, others recommend oral and/or topical antibiotics be started.^{5,12} Antibiotics are commonly prescribed in the setting of stage 2 and 3 ingrowing toenails. How long one should be on antibiotics before the offending toenail is removed is contentious. How many people one must treat to prevent potentially serious infections like an osteomyelitis is unknown. Some people believe antibiotics are not necessary and that the problem will resolve once the nail is treated. Reyzelman and

associates recently studied this issue.¹³ One group of patients had immediate chemical matricectomy with phenol and received 1 week of antibiotics after the procedure was completed. The second group received antibiotics for 1 week and then had phenol matricectomy. The third group had matricectomy without antibiotics. Mean healing time was shortest for the first group (1.9 wk), and longest for the second group (2.3 wk). The difference in mean healing time between the first (1.9 wk) and third group (2.0 wk) was not statistically significant. This study suggests that you can book nail removal and matricectomy within a day or two of seeing the patient; and it also suggests oral antibiotics do not play a major role in decreasing healing time or decreasing post-procedure morbidity. Until more studies are available, most physicians will probably continue to prescribe oral antibiotics if the tissue surrounding the ingrowing toenail looks infected, or if the patient has significant risk factors for developing infection.

Microbes responsible for cellulitis include bacteria (e.g., *Staphylococcus aureus*), yeast (e.g., candidiasis), and fungi (e.g., *Trichophyton rubrum*). Staphylococcus is the pathogen most commonly cultured from infected ingrown toenails. Cephalexin (500 mg qid) and cloxacillin (500 mg po qid) are the most commonly prescribed oral antibiotics in the setting of infection associated with ingrowing toenails.^{7,11-13}

PROCEDURE

Equipment necessary for removal of toenail and phenol ablation is summarized in Box 2, and consists basically of a suture set plus the phenol.

A. Preparation

The patient is positioned so that the knee is flexed and foot is lying flat on the end of the bed or table. Using sterile technique, clean the wound and surrounding area with an antiseptic skin solution (e.g., chlorhexidine 2% with 4% isopropyl alcohol [e.g., Dexidin 2 Solution] or Betadine Surgical Scrub [7.5% povidone-iodine solution]) and then wash off the area with sterile sodium chloride solution (0.9%).

B. Technique

1. Removal of nail with phenol matricectomy^{9,11-13}

A partial nail-border removal is preferred over a total nail removal. Total nail plate avulsion is rarely indicated.^{11,13} It should be considered in cases where

Box 2. Equipment for removal of ingrowing toenails

Sterile and non-sterile gloves
Antiseptic skin preparation solution (e.g., povidone-iodine)
Sodium chloride solution (0.9%)
4" × 4" (10 cm × 10 cm) sterile gauze sponges
Anesthesia equipment:
3-mL syringe
10-mL syringe
18-gauge needle for drawing up anesthetic
30-gauge 0.5" needle for infiltrating skin
27-gauge 1.5" needle for deeper infiltration
Local anesthetic of choice
Suture set
Fenestrated drape
Iris scissors
Bandage scissors
2 straight hemostats
Sterile rubber band (if desired)
Sterile cotton-tipped swabs
Scalpel with #11 blade
Sterile elastic tourniquet
Dressing materials
Telfa pad
Antibiotic ointment
Sterile 2 × 2 gauze
Kling dressing material
≥ 80% phenol (carbolic acid)

both sides of the toenail are covered with heaped up granulation tissue indicating significant ingrowing bilaterally.

1. Anesthetize the toe with standard digital nerve block ("ring" block) technique using 1% or 2% lidocaine solution without epinephrine (Fig. 4). Epinephrine is to be avoided because it is purported to cause ischemia and gangrene via digital artery vasospasm. Infiltrate 0.5 mL of local anesthetic subcutaneously at the base of the involved toe using a 30-G needle and 3-mL syringe, into the dorsum, the medial and lateral aspects of the digit. Change to a larger 27-G needle and 10-mL syringe and deposit up to 2–4 mL of local anesthetic solution deeper into each of the above-mentioned 3 sites — aspirating first, to ensure a blood vessel has not been entered. Children would, of course, require smaller amounts of local anesthetic.
2. Since blood inactivates phenol, minimizing bleeding is desired. This can be accomplished by wrapping a rubber band tourniquet (e.g., a penrose drain or glove finger) around the base of the toe. Some authorities state a tourniquet is not required, but others say the use of a tourni-

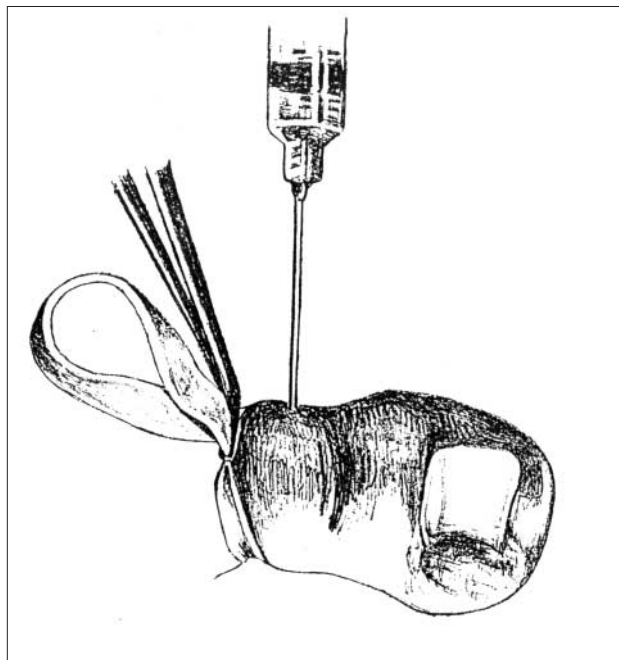


Fig. 4. Digital ring block.

quet prolongs local anesthetic effect, and aids in maintenance of a blood-free field. Unfortunately, prolonged application of a tourniquet can cause distal toe ischemia and necrosis. Therefore, the tourniquet should be used for as short a period as possible. Most people seem to agree that 20 minutes or less will not cause any problems in a healthy young adult, particularly if the tourniquet is not on too tightly. Wrap the rubber band around the digit and hold it in place with a hemostat directed away from the toe nail area. Others recommend exsanguinating the digit before applying the tourniquet, by wrapping a half-inch Penrose drain from the tip to base of the toe in a winding, overlapping fashion and then securing it at the base of the toe with a hemostat. Wait 10 minutes or so for the anesthetic to take effect. If the toe remains tender, inject a little more local anesthetic. Apply a fenestrated drape over the foot and position it so that the involved toe is protruding out through the drape.

3. Once the digit is anesthetized, slide the flat side of the scissors or some other kind of flat dissecting instrument (e.g., a nail elevator) under the nail plate and lift up gently as you advance proximally all the way back to the base of the proximal nail skin fold. This breaks up the adhesions that exist between the nail and under-surface of the nail plate.

- Using the smallest blade of scissors available so as to avoid unnecessarily cutting the tender underlying nail bed, cut the nail plate longitudinally one-quarter or so of the distance from the lateral margin, back to the base of the proximal nail skin fold (Fig. 5). If the entire nail plate is being removed, this step is not necessary.

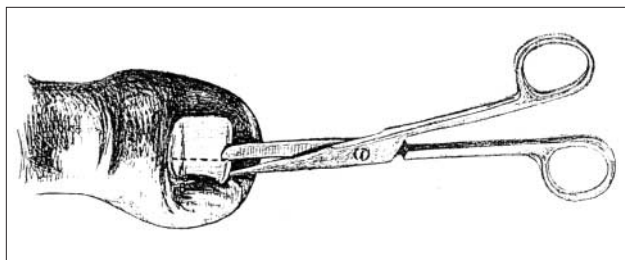


Fig. 5. Cut nail plate to base of nail.

- Again, insert the flat side of the scissors all the way back to the base of the nail plate under the proximal nail skin fold. Now, lift up the involved nail plate section until there is a definite sensation of giving way, as the nail plate separates from the nail matrix.
- Grasp the nail as far proximally as possible with a needle driver or hemostat, lift and move side to side, and then pull it out (Fig. 6). The base normally has a somewhat irregular appearance. Normally the nail is discarded. Send off the nail if fungal infection (onychomycosis) is suspected, for fungal culture and potassium hydroxide preparation. Send the nail for pathology if you are worried about malignancy or some other rare condition.

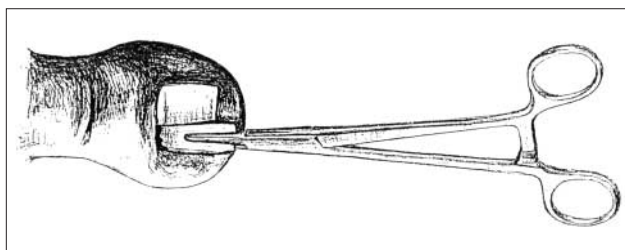


Fig. 6. Remove nail plate wedge.

- Carefully check under the lateral and proximal nail skin folds to ensure there are no nail spicules, or nail-plate fragments remaining attached to the nail matrix.
- Control bleeding with pressure and then mop up the area until there is a relatively dry field.

- Dip a sterile cotton swab into a bowl containing liquefied $\geq 80\%$ phenol, saturate the cotton bud, allow the excess to drip away, and then put it under the proximal nail fold. Vigorously massage the phenol-soaked cotton bud into the nail matrix area (Fig. 7).

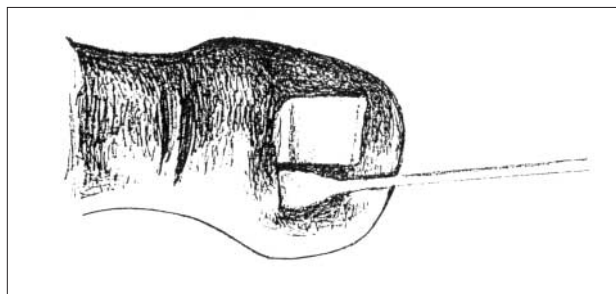


Fig. 7. Apply phenol-soaked swab.

- Take care not to let excess phenol drip onto normal adjacent skin because it can traumatize that tissue as well. Quickly mop up any liquefied phenol that overflows onto normal skin. Some authorities recommend applying petroleum jelly (e.g., Vaseline) to surrounding good tissue to protect and minimize chemical burning of surrounding skin.
- Roll the cotton swab back and forth across the exposed nail matrix for about 30 seconds.
- Remove the phenol-soaked swab and repeat the process with a new phenol-soaked sterile cotton swab. Try to ensure that each part of the nail matrix is exposed to phenol for at least 1 minute. Boberg and associates recently determined optimal times and concentrations necessary to destroy the germinal matrix without causing further soft-tissue damage.¹¹ They found that the application of 89% phenol solution for as little as 1 minute was enough time to cause full-thickness necrosis of the epithelium. Applying phenol beyond this time resulted in more intense necrosis of the underlying dermis. Their study suggests the 5-minute application suggested by most reports is too long, and may account for prolonged drainage associated with the use of phenol matricectomy.
- The entire process should not last longer than 3–5 minutes. Blood typically turns black on contact with phenol. Remember that too much blood reduces the effectiveness of phenol by preventing it from coming directly into contact

with the nail matrix tissue. If there is a lot of oozing or bleeding, apply phenol for up to 5 minutes; if there is no bleeding, 3 minutes is long enough. A well cauterized nail matrix tissue should turn a whitish colour.

14. Cut away exuberant granulation / hypertrophic tissue along the lateral nail border with a scalpel or tissue scissors. Apply pressure with a gauze until the bleeding has settled, but some authorities recommend cauterizing the pared-down granulation tissue with phenol, electrocautery or silver nitrate.⁷
15. If the tourniquet is still on, release it now and apply compression with sterile 4" × 4" (10 cm × 10 cm) gauze until the bleeding stops. Bleeding is usually slight, but if there is a lot of granulation tissue bleeding, compression for 10 or more minutes may be required.
16. After bleeding has been controlled, re-cleanse the wound area with a saline-soaked sterile gauze, and copiously irrigate the base of the nail and area under the proximal and lateral skin folds with saline to dilute and wash away excess phenol. Some authorities recommend neutralizing the phenol further by lavaging the area with 70% isopropyl alcohol.¹⁴

2. Removal of nail with surgical matricectomy

Proceed as per removal of nail with phenol matricectomy above to Step 8.

9. Using a #15 scalpel blade, cut down vertically into the nail matrix from proximal to distal alongside the remaining nail. Then excise the matrix tissue that has been exposed by the removal of the nail plate strip. To access matrix tissue located under the proximal nail skin fold, a 0.5–1-cm incision is made from the corner of the paronychia and the skin fold is then elevated. A single 4/0 nylon suture can be used to close this incision (optional).
10. Irrigate the area with normal saline.

Some practitioners combine surgical matricectomy with phenol matricectomy; e.g., apply phenol to the surgically resected matrix area for less than 3 minutes. Whether or not combining the 2 techniques yields better outcomes is unclear as we were

unable to find any publications that specifically addressed this methodology.

C. Postoperative wound care

Dry off the wound with sterile gauze, apply antibiotic ointment (e.g., Polytopic [Polymyxin B, Bacitracin] or Bactroban [mupirocin 2%]), and cover with a non-stick dressing (e.g., 2" × 2" Telfa), a sterile gauze dry dressing, and wrap in place with Kling dressing material. Amorphous hydrogel dressings (e.g., Intrasite Gel) should probably be avoided because a recent study showed that this dressing is associated with the development of hypergranulation.¹⁵

Elevate the foot for 20 to 30 minutes before discharging the patient home, and remind him or her to elevate the foot as much as possible for the first 24 to 48 hours.

The patient should be reminded about the risk of infection and told to return if signs of infection arise — erythema, discharge, pain and swelling. The patient should change the dressing daily. Apply topical antibiotic ointment with each dressing change and cover with non-stick and sterile dry dressing.

Systemic antibiotics started before removal of the nail are to be taken for a total of 10–14 days. Cloxacillin or cephalexin are commonly used prophylactic antibiotics in this situation. Unfortunately, there is little scientific data available on this aspect of wound care.

Ibuprofen (200–400 mg po tid), acetaminophen (325–650 mg po qid), or acetaminophen with codeine are usually all that is required for analgesia after removal of the nail plate. The duration of postoperative pain varies with initial stage of ingrowing toenails. People with stage 2 and stage 3 ingrowing toenails treated with phenol matricectomy have pain that lasts on average 5 and 17 days, respectively.⁹

A routine follow-up appointment to review the wound is recommended in the next day or two. Visits after that can be negotiated based on rate of healing and patient preference. The wound will look raw, but the erythema and serosanguinous discharge should remain localized to the operative nail bed area. Inform the patient that it may take up to 6 weeks for total healing to take place. The patient should be able to walk comfortably within a few days, and should be able to return to work and sports activities after a couple of weeks.

Sterile saline can be used to wash off the wound the first few days. After that the area can be washed with soap and water in a shower. Some recommend avoiding baths, swimming or soaking the toe for 2

weeks. Dilute povidone iodine used to be a popular wound care agent but its usage has declined due to concerns that it may interfere with tissue proliferation and wound healing.¹⁵ The wound can be left open to the air after the first few days, as some authorities believe it will heal more quickly this way. Continue to apply topical antibiotic twice a day until healing is well underway. Last but not least, remind your patient about conservative measures they can take to prevent recurrences in the future.

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Competing interests: None declared.

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PODIUM: DOCTORS SPEAK OUT LA PAROLE AUX MÉDECINS

The country doctor's lament

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Many strategies have been put forth to attract physicians to work in rural areas. Yet the lament of the rural physician seems unchanged except that the chorus is getting louder: it is getting more difficult to attract new graduates to country medicine. Established rural physicians are getting tired, and there often seems to be little prospect of summer locum relief, let alone long-term help.

Barriers to recruitment of rural physicians are well known: fear of practice without back-up, expectation of long hours with no relief, lack of private time in a small community, and variable rates of financial remuneration. A perceived or real lack of respect emanating from the tertiary care centres is a factor as well. Consultants accepting referrals from "out of town" have generally never practised in remote settings and have therefore never experienced the myriad pressures on a rural physician to transfer patients in. Many patients and their families perceive that the specialist in the big hospital must, by definition, provide better care than their poor country cousins down the road. This may be very far from the truth but that is often impossible to convey to patients, moreso their families who just want the best opinion for their loved ones. Country doctors may feel uncomfortable with adhering to standards of care felt mandatory by consultants in the city. An occasional rapid sequence intubation is not enough to maintain proficiency in the procedure. Yet rural physicians working in under-staffed settings cannot easily maintain their

skills because they can't leave their communities.

A newer stanza in the lament of the rural physician is that "they don't make them like they used to." Country doctors who have been at work for a decade or more have noticed that new graduates have lifestyle concerns. There is a reluctance to do obstetrics and emergency medicine, and there is an expectation of some time off after a night at the hospital. One-in-two call is not an option. This concept is foreign to the "last generation" of country doctors. When they started practice they accepted responsibility for providing continuous medical care to their communities no matter how many other physicians were around to share the load. One might ask legitimately who is in fact responsible for providing a community with medical care. The responsibility has by default fallen to a given community's available medical practitioner(s), who feel obliged to provide uninterrupted care regardless of the number of sequential sleepless nights they may be taking upon themselves.

New graduates are generally unwilling to accept this responsibility. At the risk of incurring the wrath of my rural colleagues, I would argue that the new generation has the right attitude. Unfortunately, a side-effect of looking for practice opportunities with a good lifestyle is that, as country medicine often can't provide it, rural communities are left searching for doctors. Those physicians who have been shouldering the load over a decade or more of fiscal restraint are still shouldering the load. What will happen when they retire?

There are many features of the country doctor's job that appeal to medical students: they like rural rotations because "they get to do everything." They often have a great deal of independence. Memorial University of Newfoundland's Family Medicine residents compete for the chance to do 7 months of their training in Labrador. Similarly, Memorial has pioneered a program of Emergency Medicine and Enhanced Skills, a combination of 1 year of EM training and 6 months of further skills acquisition in preparation for rural practice. Alberta has a program of skills maintenance for rural physicians that has attracted more applicants than they can take.

What appears to attract some potential generalists to train in rural areas is the same thing that keeps them from practising country medicine for a lifetime. "Getting to do everything" while having a preceptor is a far cry from "having to do everything" without back-up. Yet the paradox suggests a path for recruiting rural doctors. Advertising bulletins sent out by recruiters in Australia and New Zealand, as well as remote Canadian areas, appeal to a sense of adventure. The phrase "Would you like

to take a helicopter to work?" always catches my eye in the blue pages of *CMAJ*. More physicians might be drawn to rural and remote work, with the promise of variety and challenge, if their lifestyle needs were met. Providing good financial remuneration is critical, but just as important is attention to time off and a reasonable call schedule. This is what the new grads seem to be saying.

A challenging country practice with abundant, flexible time off, both for personal enrichment and CME, would be irresistible to many. It could produce a generation of country doctors who are well rounded, well rested and rich in skills. This is a combination that could become a state of life and work that many of our residents, casting around for a career, would want to have. Someone other than the sleepless country physician looking for relief needs to organize and implement this. They're too busy. Perhaps the politicians have the time. With "new money for health care" as an oft-repeated refrain from our federal government, perhaps we can change the lyrics of the country doctor's lament.

Competing interests: None declared.



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PODIUM: DOCTORS SPEAK OUT LA PAROLE AUX MÉDECINS

Medical training in Canada

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The medical training process in Canada has become bloated. The training period has increased to the point where a bright high school student at a Careers Day talk shook his head incredulously when advised that it would be a minimum of 10 years before he could practise medicine independently as a GP, and probably nearer to 13 years if he specialized. He chose a different career.

One constantly hears that the South African trained physicians are considered to be competent and well trained, yet curiously they were competent to function independently as a general practitioner (GP) after only 7 years —

those who would not be able to master medical training.¹ With the passage of time and the continued efforts to regulate medical school admission, the selection process has become increasingly convoluted, expensive, time consuming and, arguably, irrelevant.

Students (who can afford it) now attend special classes to improve their MCAT exam marks. They take a year off (and thereby add another year to their medical training) to fit in the volunteer work that will allow them to “polish” their CVs. Often they sit the MCAT exam more than once to “upgrade” their mark.

So in 2005, some 118 years after the model for training medical students in North America was established, maybe the time has come to take a look at the model, and instead of trying to continually upgrade the old one, let’s crack the mold and start afresh.

Realistically this would not be a huge shift if the “pre-med” degree was simply dumped as a prerequisite and the medical degree course expanded to include the necessary knowledge not already in the current 4-year degree. Even if the medical degree expanded to 6 years, the medical students would save a full 2 years over the present system.

Just a thought!

Competing interests: None declared.

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... LET’S CRACK THE MOLD AND
START AFRESH.

a full 3 years less than their Canadian counterpart. (The current extension of the residents’ training to 2 years in South Africa was a purely political move to force these physicians to work in government hospitals for an extra year. As happened in Zimbabwe, it has done much to encourage physicians to leave the country.)

The North American system of having a “pre-med” degree as a requirement for admission dates back to 1877 when John Shaw Billings was setting up the medical school training program with William Osler at the Johns Hopkins Medical School. It was his belief that this was necessary to filter out



RESIDENTS' PAGE PAGE DES RÉSIDENTS

The SRPC's Annual Rural and Remote Medicine Conference: a resident's perspective!

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This past April marked the 13th Annual Rural and Remote Medicine Conference held by the Society of Rural Physicians of Canada (SRPC) and the 1st anniversary of the creation of the SRPC's Resident Committee. The Resident Committee was pleased to have a strong presence at the conference, with over half of our fledgling Committee members in attendance. There were 96 residents and medical students attending.

This conference brought so much to the Resident Committee, as well as to

Was it because of the rare chance to participate in procedure-oriented workshops alongside experienced physicians? Or was it the competence of experienced rural generalist instructors? Or could it be simply that these down-to-earth, real, practising, community physicians were also people who took an interest in us?

Whatever it was, it motivated us to search for financial support from program directors (or all within ear-shot!) to attend the annual conference.

And, I daresay, this environment has filled us with something more. It has fostered a desire to contribute back to the SRPC community in some, however small, manner. The Resident Committee was pleased to help organize 3 presentations at the event, with the unfailing support of the SRPC. These presentations, mostly focused on practice management issues, were well-received by the residents and medical students who attended.

As we try to solidify the memories and experiences gained from the Montréal Conference, we also look ahead to next year, to the next SRPC Conference, and to another venture in medical learning.

We hope to see you all in Winnipeg in 2006!

**OR, COULD IT BE SIMPLY THAT THESE
DOWN-TO-EARTH, REAL, PRACTISING
COMMUNITY PHYSICIANS WERE ALSO
PEOPLE WHO TOOK AN INTEREST IN US?**

residents and medical students at large. This annual event has inspired most of us to enlist in, and contribute to, the SRPC.

Whether it was placing our first central line into a mannequin or sharing a beer with rural program directors at the Resident-Student Social, something drew us to this organization.



OUT BEHIND THE BARN DANS LE FEU DE L'ACTION

Phoney phishing and pharming

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Unfortunately, these terms do not refer to an idyllic rural lifestyle. They are Internet-based scams where a thief tries to steal your identity or raid your bank or credit card account.

For example, I recently received several email messages from the Royal Bank of Canada warning of security problems with my account. They said that I could correct the problem by logging into my account using an Internet address link in the message. They also include a number of handy tips about how I can avoid future security problems. There's just one problem — I've never had a Royal Bank account!

This is an example of "phishing," where a scam artist sends an email message to thousands of email addresses. They hope to find a few individuals who actually use the financial institution mentioned in the message and are naive enough to reply to the message with their bank account or credit card numbers, passwords or other personal information. If they do, the thief then tries to steal their identity, or withdraw money from their bank account.

PHISH FINDING

The message looks very official, and often includes graphics that the thief has copied directly from the real institution's Web site. It is usually vaguely addressed to "Dear <your email address>" or "Dear Valued Customer," and will appear to come from a legitimate email address (e.g., support@rbc.com). There will be a sense of urgency to the message, implying some loss of service if you do not respond immediately.

PHONEY INTERNET ADDRESS

The message contains an official-looking, but false Internet address (e.g., <https://login.royalbank.com>). When I viewed the "source code" of the messages I received, the actual address was completely different than the one displayed. It was located, not in Canada, but in the Czech Republic. Most Canadian banks and credit card companies have encountered this type of scam. Articles about phishing stress that these institutions never send out this sort of email message.

NEVER CLICK

Never click on the link or anywhere else inside the message. Even if you do not provide any personal information on the target page, the connection may enable the thief to download a "Trojan Horse" virus to your computer. This may allow them to steal personal information at a later time. You can minimize this risk by always keeping your anti-viral software up to date. This trick is known as "pharming."

NEVER REPLY

Never reply to the email message itself. That just confirms that your email address is still active and makes you the target for future scams.

DELETE THE MESSAGE

Delete the message immediately. That prevents some other curious member of your family from making the mistake that you have hopefully avoided.

REPORT THE SCAM

If you have a relationship with the bank or credit card company listed in the message, contact them to report the

scam. To be safe, look up their correct phone number in the phone book or on a previous financial statement. Or go to their real Web site, by typing in the address yourself.

BE SCEPTICAL

On a related note, never purchase anything offered for sale in an unsolicited email promotion, even if it appears legitimate. If you believe that the offer is real, write down the company's address and type it yourself. This avoids being redirected to a phoney Web site.

PASSWORD PROTECTION

Change your passwords frequently and include characters and numbers. For important Web sites involving financial information, do not use any software program (including MS Windows) that saves passwords. Always select the "log off" option at the end of a visit to a financial Web site. For extra secu-

rity, clear your browser's cache memory immediately after the visit. You can do this in Internet Explorer by clicking on Tools > Internet Options > Delete Files. There is a similar feature in other browser programs. Another benefit of occasionally clearing this "cache file" is that it may speed up your browser's response time.

CANADIAN BANKERS ASSOCIATION

The bilingual CBA Web site (www.cba.ca) contains excellent information about various ways to avoid identity theft. Click on the "protecting your personal information online" link. They also have a convenient list of their member institutions to help you report an attempted identity theft. Most financial institutions have additional security and contact information on their own Web sites.

Competing interests: None declared.

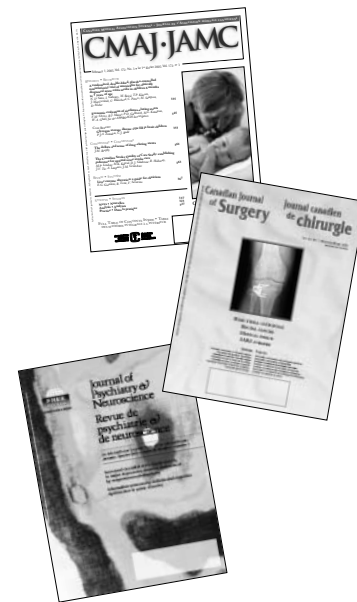
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INAPPROPRIATE ANTIBIOTIC USE

To the Editor:

Is it really accurate to refer to a score of itinerant doctors and moonlighting residents from the specialties of radiology and psychiatry as “family doctors”?¹ That’s like calling a doctor who works in Toronto who does a one-week locum in Canada’s North a “rural physician”!

**Paul Bonisteel, MD, CCFP,
FCFP**
New Harbour, Nfld.

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1. Worrall G, Young B, Knight V. Inappropriate use of antibiotics for acute respiratory tract infections in a rural emergency department. *Can J Rural Med* 2005;10(2): 86-8.

[Response:]

Dr. Bonisteel’s comments are true; most of the doctors who staff small rural emergency departments are not trained FPs. Unfortunately, that is the situation all over the country at the moment and, as our study showed, they are not serving our patients in an evidence-based way. It is a pity that CFPC-trained doctors are not willing to do this type of work; I don’t know why, and I cannot offer any solution.

**Graham Worrall, MB BS, MSc,
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Memorial University

of Newfoundland
St. John’s, Nfld.

DIAGNOSING PULMONARY EMBOLISM IN A RURAL SETTING

To the Editor:

I read with interest the article entitled “Diagnosing pulmonary embolism in a rural setting,” by John Bosomworth.¹ I would like to make a clarification and a comment.

With respect to the work-up of suspected pulmonary embolus in pregnancy, Dr. Bosomworth states that a V/Q scan involves a smaller radiation dose than a CT scan. This is only true when speaking of the total dose to the mother and embryo together. The embryonic dose alone is actually smaller in a CT pulmonary angiogram than in a V/Q scan, roughly 0.06–0.14 mGy, versus 0.9–1.8 mGy for V/Q.^{2,5} The risk to the embryo with respect to radiation exposure would thus be lower from a CT pulmonary angiogram of the mother than a V/Q scan (where the risk is already quite low), and the mother’s dose would be the same as that for any other young woman undergoing CT pulmonary angiography.

The other risk relating to CT would be that associated with intravenous contrast agent administration. There is the always present but small risk of a contrast agent reaction, as well as the theoretical risk of inducing hypothyroidism in the baby from

iodinated contrast agent given late in pregnancy. These risks would need to be balanced against the risks associated with delayed diagnosis of pulmonary embolism, as well as the benefits of CT in providing alternate diagnoses as compared with V/Q scanning when determining the next appropriate test.

As Dr. Bosomworth alluded to, there have been significant advances in the detection of pulmonary embolism since the original PIOPED data were published 15 years ago.⁴ Advances in multidetector CT have made it possible to detect small pulmonary emboli with a sensitivity and specificity approaching or equal to that of conventional angiography.^{5–8} We are at the point now where incidental findings of pulmonary emboli in asymptomatic patients are a not uncommon occurrence. Increasing numbers of experts are questioning the clinical significance of these findings,^{9,10} and whether or not they warrant the risks of anticoagulation therapy. For an excellent discussion on this topic, I recommend Lawrence Goodman’s recent editorial on this very topic.⁵

Ian Silver
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Queen’s University
Kingston, Ont.

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1. Bosomworth J. Diagnosing pulmonary embolism in a rural setting. *Can J Rural Med* 2005;10(2):100-6.

2. Huda, W. When a pregnant patient has a suspected pulmonary embolism, what are the typical embryo doses from a chest CT and a ventilation/perfusion study? *Pediatr Radiol* 2005;35(4):452-3.
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[Response:]

Ian Silver has correctly pointed out that in the process of diagnosing pulmonary embolism during pregnancy, clinicians often choose V/Q scanning as the investigation of choice because of a mistaken perception that CT pulmonary angiography imparts a larger radiation dose to the fetus. Dr. Silver also points out that with improving CT technologies, specificity and sensitivity improve to the extent that we have difficulty interpreting the significance of emboli found incidentally. These same improving technologies allow for even more reduced fetal radiation exposure as subsequent studies are published.^{1,2} These articles suggest

that, while fetal doses are low in V/Q scanning, they are very low in CT pulmonary angiography. The decision for investigative modality based on radiation dose alone would therefore favour CT.

Iodinated contrast material used in CT pulmonary angiography readily crosses the placenta and could, as Dr. Silver suggests, transiently suppress neonatal thyroid function if given in late pregnancy. Such an effect is probably rare, clinically, although it has been shown in infants of mothers treated with amiodarone³ and when iodine-containing antiseptics are used in mothers or infants.⁴ This problem and the issue of contrast reaction are small considerations arguing against the use of CT.

Since both investigative modalities impart very little risk to the fetus, there should probably be no difference in the diagnostic work-up between pregnant and non-pregnant patients.⁵ The potential for harm in either over- or under-diagnosis of thromboembolic disease in pregnancy mandates a definitive diagnosis, which is best achieved in following the same diagnostic algorithm as for non-pregnancy.

All that being said, the rural physician must still take into consideration the opinion of colleagues in referral centres, who may continue to favour V/Q scanning in pregnancy. Several measures can be taken to reduce radiation exposure from V/Q scanning:⁶

- A normal perfusion scan (performed first) requires no subsequent ventilation scan.
- Administered radionuclide is excreted in the urine and pools in the bladder adjacent to the fetus. The patient should be well hydrated and encouraged to void frequent-

ly to minimize fetal radiation exposure.

- The dose of the perfusion agent could be reduced up to one-half if the patient is able to tolerate longer imaging times.

**John Bosomworth, MD, CCFP,
FCFP**
Princeton, BC

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NURSE PRACTITIONERS

To the Editor:

It recently came to my attention that there is an inaccuracy in the article by Worster and colleagues.¹ The authors state: "Only 3 Canadian provinces (Ontario, Alberta, and Newfoundland and Labrador) have passed legislation supporting the APN role." (p. 91).

Based on our research and information gathering in conjunction with provincial associations we know that 10 provinces/terri-

tories (Alberta, Saskatchewan, Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland and Labrador, Yukon and the Northwest Territories) have passed legislation supporting the nurse practitioner role.

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Change Management
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Communications
Canadian Nurse Practitioner
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REFERENCE

1. Worster A, Sarco A, Thrasher C, Fernandes C, Chemeris E. Understanding the role of nurse practitioners in Canada. *Can J Rural Med* 2005;10(2):89-94.

[Response:]

Since the time of our manuscript preparation other provinces approved NP legislation. They include:

Manitoba

(www.crnmb.mb.ca/extendinfo.php)
Approval is expected in the Spring 2005 for new regulation to support the NP role.

British Columbia

(www.rnabc.bc.ca/pdf/np_regulatory_framework.pdf)
Approval is expected by Fall 2005 for legislation to support

NP practice.

Prince Edward Island

(www.anpei.ca/default.asp?mn=1.10)

The Registered Nurses Act, Bill No. 14, was unanimously approved in December 2004 but has not been proclaimed until all regulations have been developed and approved, including: Registration, Education, Professional Conduct Review and Nurse Practitioner.

Saskatchewan

(www.srna.org/nurse_practitioner/documents/2005_RNNP_scope_of_practice.pdf)

Registered Nurse (Nurse Practitioner) - RN (NP) practice was supported as of Apr. 30, 2004.

Northwest Territories and Nunavut

(www.rnantnu.ca/legislation.htm)
In January 2004, the 'Nurse Practitioner' title and regulatory standards became legislated supporting NP practice.

Quebec

(www.ooiiq.org)
Quebec established legislation supporting practice of NPs in 2003.

New Brunswick

(www.nanb.nb.ca/index.cfm?include=nursePractitioner)

The *Nurses Act* (1984) was amended to enable the practice of NPs in July 2002.

Nova Scotia

(www.crnns.ca/documents/nurse_practitionercompetencies.pdf)

The Registered Nurses Act (2001, s. 19) sets out the criteria for registered nurses who are able to practise as NPs in Nova Scotia.

Yukon

(www.yrna.ca/pdf/standards.pdf)
No legislation supporting NPs at present.

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FOR THE RECORD

In the nurse practitioner article¹ published in the Spring 2005 issue of *CJRM*, coauthor Arlene Sardo's name was misspelled. We apologize for any inconvenience this may have caused. — Ed.

REFERENCE

1. Worster A, Sarco A, Thrasher C, Fernandes C, Chemeris E. Understanding the role of nurse practitioners in Canada. *Can J Rural Med* 2005;10(2):89-94.



THE PRACTITIONER LE PRATICIEN

Country cardiograms case 27: Answer

Charles Helm, MD
Tumbler Ridge, BC

The situation described is a challenge for a lone emergency department physician practising in a remote area. Although tricyclics are no longer the first-line treatment for depression, they are still commonly used to treat conditions such as chronic pain syndromes and fibromyalgia. Overdose from tricyclics is therefore less commonly seen than in previous decades (they were introduced in the 1960s) but will continue to occur.

If the estimated dosage and patient weight are correct, it is clear that complications can be expected from this potentially lethal overdose. Close and prolonged attention will need to be paid to seizure management, fluid balance, electrolyte balance, and alkalinization

of serum pH. Airway control with assisted ventilation will likely be needed. Into this mix must be thrown the potential for significant cardiotoxicity and dangerous arrhythmias.

Illustrated in the Question section (page 171) and repeated here, Figure 1 displays a regular wide-complex tachycardia, rate 139 beats/min, with QRS duration 0.14 seconds. P waves cannot be identified. There is no evidence of dissociated P waves, capture beats or fusion beats to “rule in” ventricular tachycardia. QRS morphology shows deep S waves in many leads, with some degree of concordance in precordial leads V1–V6. Significant right axis deviation is present, with axis in the 4th quadrant, of 200 degrees. Tall T waves are present.

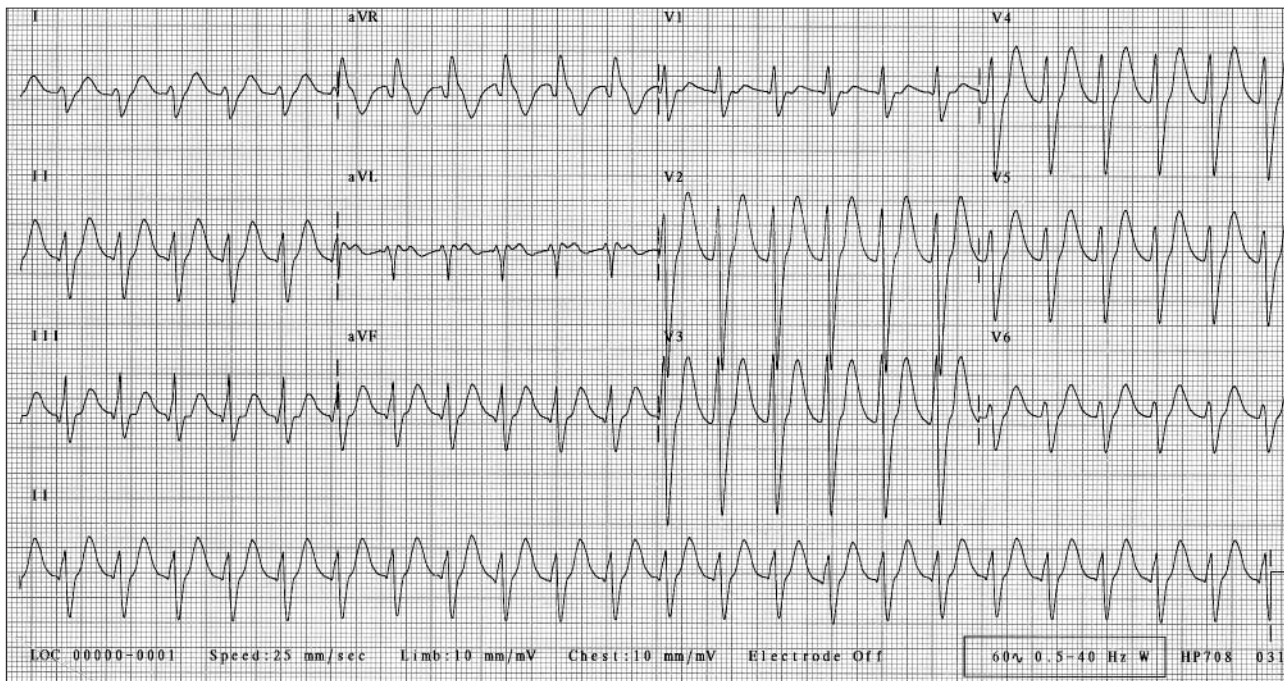


Fig. 1. Results of first ECG, taken while resuscitation of the patient was being initiated.

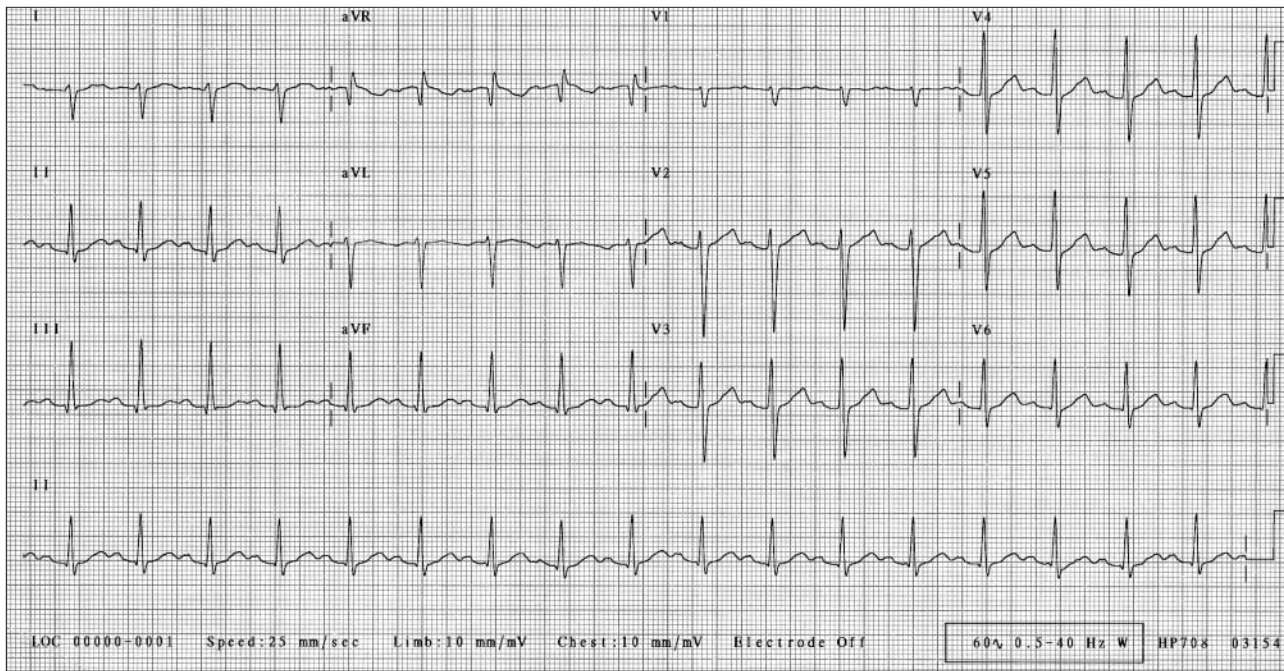


Fig. 2. Results of ECG taken 4 hours after resuscitation procedures were begun. ECG displays sinus tachycardia, heart rate 105 beats/min, first degree A-V block with P-R interval 0.21 seconds, QRS duration 0.10 seconds, and QTc of 0.46 seconds.

This case illustrates the importance of knowing the context in interpreting an ECG. The differential diagnosis for a case of regular wide-complex tachycardia includes ventricular tachycardia and supraventricular (including sinus) tachycardia with bundle-branch block or aberrancy. Without the above history, the approach might prevail of assuming ventricular tachycardia until there is good reason to think otherwise, even though the rate of 139 beats/min is slower than would be expected for this diagnosis, and the degree of QRS widening is likewise less than could be expected.

In the context of the history provided, however, awareness of the common ECG effects of tricyclic overdose is useful. The most common arrhythmia is sinus tachycardia due to an anticholinergic effect. The PR interval is typically prolonged, and non-specific QRS widening from delay in the bundle-branch system is common, with an associated axis shift to the right. T wave abnormalities are common.

If it is accepted that normal P waves could be concealed in the preceding tall T waves, it is apparent that these common tricyclic overdose effects can account for all the ECG abnormalities seen in Fig-

ure 1 and are a more likely explanation than ventricular tachycardia.

The lonely emergency physician could therefore conclude that there are enough other life-threatening issues to deal with urgently in this case, without reaching immediately for the paddles or cardiac drugs. Ongoing monitoring and follow-up ECGs would be essential because of the real possibility of more serious blocks and arrhythmias such as ventricular tachycardia, torsade de pointes, and ventricular fibrillation.

In this case, heart rate, QRS duration, axi, and T wave amplitude slowly returned toward normal as resuscitation proceeded. P waves, previously concealed in the preceding T waves, became apparent (Fig. 2).

Following intensive resuscitation, including prolonged ventilation, this patient made a successful recovery.

For the Question, see page 171.

Acknowledgement: The author is indebted to Dr Mario Halemar for clinical details on this case.