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Are health care facilities in rural Newfoundland and Labrador prepared to handle cardiovascular emergencies?

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Abstract

Objective: To determine the level of preparedness for handling cardiovascular emergencies, in terms of equipment and training, of rural treatment centres in Newfoundland and Labrador by comparison with recommendations in the literature.

Method: A questionnaire was mailed to all rural health care facilities in Newfoundland and Labrador located in small communities of 1000 to 2000 people and providing emergency care for a catchment area of approximately 7000 people. All of these facilities were located at least 1.5 hours (by road, boat or air) from a regional health care centre and did not have a specialist in internal medicine on site. The survey was designed to determine the availability of cardiac equipment and whether staff had training in advanced cardiac life support (ACLS).

Results: Thirty-one (91%) of the 34 facilities responded to the survey. In total, 52 (18%) of the 283 registered nurses and 82 (73%) of the 112 physicians at these facilities were trained in ACLS. Of the 31 facilities that responded, 28 had a 12-lead electrocardiograph, 26 had a defibrillator, 26 had facsimile machines, 23 had ACLS transport equipment and 21 had an intravenous pump. Twelve of the centres had pulse oximeters, 9 had transcutaneous pacemakers, 8 had automatic blood pressure cuffs, and only 6 had electrocardiographs with computer interpretation; at 15 of the centres, thrombolytic therapy was available, and at 9, central lines could be inserted.

Conclusions: Many of the rural facilities offering emergency care in Newfoundland and Labrador are well equipped, whereas others may need to consider updating or purchasing equipment. The level of ACLS training among staff members could be increased.

Résumé

Objectif : Déterminer dans quelle mesure les centres de traitement rural de Terre-Neuve et du Labrador sont prêts à traiter des urgences cardiovasculaires pour ce qui est du matériel et de la formation comparativement aux recommandations contenues dans les écrits.

Méthode : On a posté un questionnaire à tous les établissements ruraux de soins de santé de Terre-Neuve et du Labrador situés dans de petites communautés de 1000 à 2000 habitants et fournissant des soins d'urgence à un bassin d'environ 7000 personnes. Tous ces établissements étaient situés à au moins 1,5 heure d'un centre régional de soins de santé (de route, eau ou air) et n'avaient pas spécialistes en médecine interne sur place. L'enquête visait à déterminer si le centre disposait de matériel cardiaque et si le personnel avait reçu de la formation en soins cardiaques spécialisés.

Résultats : Trente et un (91 %) des 34 établissements ont répondu au sondage. Au total, 18 % des infirmières autorisées et 73 % des médecins de ces établissements avaient reçu de la formation en soins cardiaques spécialisés. Sur les 31 établissements qui ont répondu, 28 disposaient d'un

électrocardiographe à 12 dérivations, 26, d'un défibrillateur, 26, d'un télécopieur, 23, de matériel de transport pour soins cardiaques spécialisés et 21, d'une pompe intraveineuse. Douze des centres disposaient de sphygmo-oximètres, 9, de cardiostimulateurs transcutanés, 8, de sphygmomanomètres automatiques et 6 seulement d'électrocardiographes à interprétation par ordinateur. À 15 des centres, on disposait d'une thérapie thromolytique et 9 pouvaient insérer des lignes centrales.

Conclusions : Beaucoup des établissements de Terre-Neuve et du Labrador qui offrent des soins d'urgence sont bien équipés, tandis que d'autres devront peut-être envisager de moderniser leur équipement ou d'en acheter. On pourrait rehausser le niveau de formation des membres du personnel en soins cardiaques spécialisés.

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Introduction

In Newfoundland and Labrador, rural health care facilities provide emergency medical care for approximately 50% of the population. These facilities are, on average, 1.5 hours by road, boat or air from a secondary care centre that can offer internal medicine specialist support.[1] These smaller centres must provide the initial management and stabilization for any cardiovascular emergency that occurs in their respective areas, regardless of severity. Such responsibility necessitates that the rural centre be equipped adequately to handle most cardiovascular emergencies. As part of a study designed to assess the availability of thrombolysis in rural Newfoundland and Labrador, a survey was conducted to assess the preparedness of rural emergency departments to handle cardiac emergencies.

Emergency care in rural Newfoundland and Labrador is provided by 3 types of medical facilities: the small rural hospital, which on average has between 3 and 5 physicians and 14 beds; the 24-hour clinic, with 2 to 4 physicians and 2 holding beds; and the satellite clinic, usually staffed by a physician and a registered nursing assistant and open only during "business hours" with the physician on 24-hour call. These facilities are located in communities of 1000 to 2000 people and, on average, serve a catchment area of approximately 7000 people each.[1] The physicians in most of these facilities are on salary. Although in a few of the communities there may be a private general practitioner not working out of the hospital, nearly all emergency care is provided by the facilities just described.

Studies on the use of rural emergency departments support the assumption that they should be equipped to handle most cardiac emergencies.[2-4] In Newfoundland and Labrador, 31 rural facilities provided initial treatment for 390 people with acute myocardial infarction in 1992.[1] Regardless of the size, staffing and equipment available, personnel at these rural health facilities

are called upon to handle a variety of demanding cardiac emergencies and need to be prepared to do so.

Very little has been published on the equipment and services necessary to prepare a distinctly rural medical facility to deal with cardiac emergencies.[5] Resources such as the publication Guidelines for Establishing Standards for Special Services in Hospital: Emergency Units6 provide guidelines for equipping the general emergency room. However, these resources do not address directly the unique requirements that distance to referral hospitals imposes on equipping rural treatment centres. As a result, Thompson (a rural family physician) and Warnica (a cardiologist), both from Alberta, published a list of equipment that should be available to handle cardiac emergencies in the "well-equipped rural hospital emergency room."[5]

In our study we used these guidelines to determine the degree of preparedness of rural acute care facilities in Newfoundland and Labrador for handling cardiac emergencies. Specifically the study was designed to:

- determine the degree to which the equipment suggested by Thompson and Warnica[5] is available in rural hospital emergency departments in Newfoundland and Labrador
- determine the degree to which the physicians and nurses in rural Newfoundland and Labrador have received advanced cardiac life support (ACLS) training
- provide a reference against which facilities may compare themselves and which they can use in planning for future resource allocation.

Methods

A questionnaire survey using addresses from the 1992-1993 edition of the Canadian Hospital Directory7 was mailed to the chief medical officer and head nurse of all 14 rural hospitals, all 9 health centres with 24-hour emergency services and 11 satellite clinics in rural Newfoundland and Labrador. For the purposes of this study, a facility was defined as rural if it did not have a specialist in internal medicine on staff. All of the communities had far fewer than 10 000 people and were at least 80 km away from a regional referral centre. The larger communities that were excluded had 10 000 people or more and had a full range of specialists available to provide secondary or tertiary care.

The Dillman technique[8] for survey collection was employed to maximize the response rate. The article by Thompson and Warnica[5] was used as a guideline to determine whether the rural sites were prepared adequately to deal with cardiovascular emergencies. Only equipment and the availability of thrombolysis were assessed in this study. The questionnaire inquired about the availability of the following equipment and procedures: defibrillator, automatic defibrillator, 12-lead electrocardiograph (ECG), ECG with computer interpretation, facsimile machine, wall protocols, transcutaneous pacemaker, automatic blood pressure cuff, intravenous pump, ACLS transport equipment, insertion of central lines, pulse oximeter and thrombolysis. In Thompson

and Warnica's study,[5] ACLS training for physicians and nurses was also considered a requirement for the most effective management of these emergencies and was therefore included in the questionnaire.

The data were analysed with Epi-Info software;[9] the analysis consisted of measuring the frequency of availability of each of the recommended equipment and skills. The data were analysed as a whole, as well as by type of site (rural hospital, 24-hour clinic and satellite clinic). The availability of equipment as a function of ACLS training of physicians was also determined.

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Results

Thirty-one (91%) of the 34 sites responded: all of the hospitals and 24-hour clinics, and 8 of the 11 satellite clinics. The responses represented 112 physicians and 283 nurses.

Table 1 shows the number and percentage of facilities that had the recommended equipment, and Table 2 the number and percentage of physicians and nurses with ACLS training. There was no relation between the rate of ACLS training and the availability of equipment at the sites, except in the case of defibrillators: at the 26 sites with defibrillators, a mean of 70% of the physicians had ACLS training, whereas at the 4 sites without defibrillators, none of the physicians had such training ($p = 0.001$, Student's t-test).

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Discussion

ACLS training is not necessary for the provision of acute cardiac life support, but it does provide an indication of standardized training.[10] At the rural facilities from which we received responses, 18% of the nursing staff and 73% of the physicians reported having received ACLS training. At this level of ACLS training among nurses, it may not be possible to have an ACLS-qualified nurse on duty 24 hours a day or to find a nurse with enhanced training to call back to provide specialized care to a patient in a cardiac emergency.

Proficiency in the handling of acute cardiac emergencies is lost over time. As a result, the administrators at many rural facilities prefer that physicians, who usually provide emergency cardiac care, complete ACLS training. Nonetheless, only 73% of these physicians had such training.

Rural hospitals were the best-equipped facilities, followed by the 24-hour emergency clinics and satellite clinics respectively. Some of the hospitals and 24-hour emergency clinics had not availed

themselves fully of the more recently developed technology that can offer distinct advantages in the delivery of acute cardiac care in a rural setting, technology such as automatic defibrillation and computer-assisted ECG interpretation. Some 24-hour clinics and satellite clinics did not have equipment that might be considered necessary for the delivery of acute cardiac care, such as defibrillators, 12-lead ECGs and ACLS transport equipment.

The American Heart Association has stated that "Early defibrillation is the link in the chain of survival most likely to improve survival."[11] However, 3 of the 9 twenty-four-hour clinics and 2 of the 8 satellite clinics did not have the equipment necessary to provide this intervention. In many rural situations the on-call physician is not always "on site." In addition, facilities designed to provide transient acute care may be called upon to provide more prolonged and advanced care in times of inclement weather, when safe transport is not possible. In situations in which a physician is not readily at hand, the availability of an automatic defibrillator would allow a trained nurse to initiate treatment of ventricular arrhythmias. However, only 10 of the 31 facilities had automatic defibrillators available.

Twenty-eight of the 31 sites surveyed had a 12-lead ECG; however, only 6 sites had a computer interpretation feature on these machines. Thompson[12] concluded that ECG interpretation by computer alone is accurate often enough to warrant purchase of the necessary equipment by small rural hospitals. In addition, he reported that ECG interpretation by a physician with computer assistance is better than interpretation by either one alone. Twenty-six of the 31 facilities had fax machines, which allow an ECG to be sent to a consultant for help with interpretation.

Wall-mounted protocols that are updated regularly may be valuable in situations where ACLS skills are not used regularly enough to guarantee accurate memorization. Only 18 of the 31 facilities made use of this inexpensive, yet potentially valuable tool.

Emergency cardiac transcutaneous pacing is indicated in the treatment of symptomatic bradycardia and prophylaxis of conduction disturbances that occur during acute myocardial infarction.[10] This resource was available to 8 of the 14 rural hospitals and 1 of the 11 satellites clinics.

Automatic blood pressure monitors may be useful in rural situations where hands are few. This piece of equipment was found in only 8 of the 14 rural hospitals and in none of the other facilities.

An intravenous pump is necessary for the safe delivery of drugs such as heparin and streptokinase, for which carefully controlled infusion is needed. This device was available in all of the rural hospitals, 6 of the 24-hour clinics and only 1 of the satellite clinics.

This study has not addressed whether disparities in equipment and training affect outcomes. A study comparing outcomes at the more poorly equipped sites and the better-equipped sites would be both interesting and important.

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Limitations

There were several limitations to this study. The data were gathered by means of self-reporting questionnaires, so participants may have overstated or understated the actual situation. However, data were often available from 2 sources at each site, which allowed for double-checking. The question about ACLS training asked only what percentage of the physicians and nurses had received ACLS training. There was no differentiation between those who had recently completed training and those who may have been trained years ago; responders may have taken current accreditation to be the critical issue rather than training at any time. Thompson and Warnica's[5] recommended equipment list was designed primarily for "equipping rural hospitals for cardiovascular emergencies." Parts of their list may be inappropriate for the satellite clinic setting, but we hope that it serves as an initial discussion point.

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Conclusions

Health care facilities are facing significant cutbacks in financial resources, and it is therefore difficult to recommend spending money for equipment and training that may not be used every week. However, research has demonstrated that the time to delivery of ACLS, especially defibrillation and thrombolysis, plays a major role in determining the outcome of a cardiac emergency.[10,13,14] GPs can diagnose acute myocardial infarction effectively,[15] safely perform thrombolysis in rural settings[16-19] and transport affected patients.[20,21] Therefore, it seems reasonable that all health care facilities that deal with acute cardiac emergencies should have, or make plans to acquire, a 12-lead ECG (preferably with computer interpretation), a defibrillator with automatic options, basic ACLS equipment, a facsimile machine and ACLS training for their staff.

This study was not done to identify individual facilities having inadequate resources for the delivery of emergency cardiac care. Rather, it was designed to provide a means by which individual facilities can compare themselves to an established standard and to other facilities. It is hoped that this paper will be used by physicians and administrators to audit their facilities and resources and to assist them in the necessary planning to ensure that they are spending their resources in a manner that will best meet the needs of the population they serve.

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