

Emergency patient transfers from rural hospitals: a regional study

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Abstract

Objective: To clarify case mix, mode of transport and reasons for interfacility transfer from rural emergency departments (EDs) and to make recommendations for improved emergency health care delivery in rural settings.

Methods: This was a multi-centre descriptive study, based in 5 rural Ontario EDs. Over a 1-year period, all ED patients who required transfer to another hospital were studied. Data collection forms were completed prospectively by the most responsible nurse involved in the transfer. Main measurements included patient age, gender, place of residence, circumstances and reason for transfer, primary diagnosis, mode of transport and receiving hospital.

Results: Of 53 796 patients who presented to the 5 participating EDs, 98.4% were managed locally and 836 (1.6%) were transferred to referral centres. Most patients (86%) were transferred because they required treatment beyond the scope of the local hospital. The need for orthopedic care, CT and pediatric care accounted for 23.6%, 14.1% and 8.7% of transfers respectively.

Conclusions: These data suggest that rural family physicians may benefit from increased orthopedic and pediatric training and support. The study also identified a need for increased specialist availability in our rural setting. The high number of transfers for CT scans suggests that some rural health regions should consider acquiring a "regional" CT scanner. The development of a regional hospital, with a CT scanner and specialist resources, especially a general surgery on-call system, would reduce the need for transfer outside the region.

RÉSUMÉ

Objectif : Clarifier l'ensemble des cas pris en charge, le mode de transport et les raisons de transferts interhospitaliers à partir de départements d'urgence ruraux et émettre des recommandations pour l'amélioration de la prestation des soins d'urgence en milieu rural.

Méthodes : Il s'agissait d'une étude descriptive multicentres basée dans cinq départements d'urgence ontariens en milieu rural. Au cours d'une période d'un an, les cas de tous les patients à l'urgence qui nécessitaient un transfert vers un autre hôpital furent étudiés. Des formulaires de collecte de données furent remplis de façon prospective par l'infirmière principale impliquée dans le transfert. Les principaux paramètres comprenaient l'âge et le sexe du patient, son lieu de résidence, les circonstances et la raison du transfert, le diagnostic primaire, le mode de transport et l'hôpital recevant le transfert.

Résultats : Parmi 53 796 patients s'étant présentés aux cinq départements d'urgence participants, 98,4% furent traités sur place et 836 (1,6 %) furent transférés vers des établissements spécialisés. La plupart des patients (86 %) furent transférés parce qu'ils devaient recevoir un traitement dépassant les capacités de l'hôpital local. Les besoins de soins orthopédiques, de tomodensitométrie et de soins pédiatriques représentaient respectivement 23,6 %, 14,1 % et 8,7 % des transferts.

Conclusions : Ces données semblent indiquer que les médecins de famille en milieu rural pour-

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raient bénéficier d'une meilleure formation et d'un meilleur soutien en soins orthopédiques et pédiatriques. L'étude a également identifié un besoin d'une plus grande disponibilité de la part des spécialistes dans notre milieu rural. Le nombre élevé de transferts pour des tomodensitométries indique que certaines régions sanitaires en milieu rural devraient s'équiper d'un tomodensitomètre «régional». La mise sur pied d'un hôpital régional doté d'un tomodensitomètre et de ressources spécialisées, surtout d'un système de chirurgie générale sur appel, diminuerait le besoin de transfert à l'extérieur de la région.

Key words: emergency service, hospital; hospitals, rural; patient transfer, small hospitals

Introduction

Transfer of patients from small hospital emergency departments (EDs) to referral centres tests the adequacy and effectiveness of both the local and the larger referral health care system. These patients require careful local diagnosis and management, stabilization for transfer, medical judgement regarding the risks and benefits of transfer, coordinated safe transport and timely access to a referral centre's specialists, expertise and technology.¹

In its recommendations for rural hospitals,² the Canadian Association of Emergency Physicians (CAEP) identified key research questions, including: What patients are subjected to interfacility transport? How are they transported? and What are the reasons for interfacility transport? Patient transfers have a large impact on medical human resources, technological support, transfer systems, and local and referral centre resources. Understanding the factors influencing transfer is critical for both needs-based education and effective system planning. Given the high cost of our health care system, one would expect such vital information to be readily obtainable, but this is not the case. Currently there is no effective data system to answer important questions regarding the transfer of patients from rural hospitals to referral centres.

A review of the literature reveals few relevant Canadian studies. In their study of patient presentations to a rural Alberta hospital, De Freitas and colleagues³ found that only 0.6% required transfer. The transferred patients were mainly male, over 70 years of age, with primarily orthopedic injuries or neurologic problems. In a study of emergency visits to Sundre General Hospital in rural Alberta, Thompson and Ratcliff⁴ found that 2.8% of patients were transferred, mostly for surgical services. Fractures and dislocations accounted for 34.9% of transfers. Each of these studies was limited to transfers from one specific hospital and not an entire region. A Quebec study by Sampalis and coworkers⁵ looked at outcomes of patients transported directly to tertiary trauma centres compared to those treated in less specialized hospitals before transfer to a trauma

centre. Only a few international studies address rural transfers, and most of these relate specifically to trauma patients.⁶⁻¹¹ These studies are of limited relevance to the Canadian setting because of different health concerns, different care systems and narrow (e.g., trauma) focus.

The objective of this study was to clarify case mix, mode of transport and reasons for interfacility transfer, in order to make recommendations for improved emergency health care delivery in rural settings.

Methods

Setting

This study was carried out in the 5 hospitals in Huron County, Ontario, a rural region with a population of 60 220 people. The largest town in the region has a population of only 7500. The Huron County EDs are staffed by family physicians who do emergency work as part of their rural family practice. There are no full-time emergency physicians, but one of the hospitals has 3 family physicians with CCFP(EM) certification. At the time of the study there were 4 general surgeons (3 full-time-equivalent [FTE]), 3 internists (2 FTE) and 7 GP anesthetists. A semi-retired gynecologist moved to the area during the study. Huron County has no organized on-call system for specialty services, and off-hours anesthesia, surgery and internal medicine services are provided on an episodic, as-available basis. One of the region's hospitals does not have an active operating room and none of the hospitals have a CT scanner.

Huron County is beach and cottage country and has a large seasonal tourist population. In the winter, weather conditions complicate patient transfers. The highways may be closed for 1 or 2 days at a time and, at such times, air transport is also impossible. The primary referral centres are located in Stratford and London. Stratford General Hospital is a regional hospital with 24-hour on-call internal medicine, obstetrics, general surgery, pediatrics and anesthesia services. London Health Sciences Centre, St. Joseph's Health Centre, and Children's Hospital of Western Ontario, in London, are all tertiary care centres.

Data collection

At the time of this study, computerized patient transfer data was not available; therefore, a data collection form was developed. The data collection form was pilot-tested and modified during the 3 months prior to the study. Data elements included patient age, gender and residency (local or visitor); reason for transfer (diagnostics, medical treatment or surgery); circumstances around transfer (treatment beyond scope of hospital, service unavailable at time of transfer, patient or family request); main diagnosis responsible for transfer; mode of transport and transport attendants; and receiving hospital. To assure accurate data capture, the most responsible nurse involved in each transfer completed the data form at the time of transfer. The ED head nurse and medical records staff at participating hospitals audited the data collection and provided demographic information. Diagnoses were coded using the ICD-9¹² classification system¹³ and were grouped into non-overlapping categories by an experienced medical records technician. The study was conducted between July 1, 1997, and June 30, 1998. Because the study did not involve human experimentation it was considered exempt from ethical review.

Results

Table 1 shows that 53 796 patients presented to the participating EDs during the study period and that 836 (1.6%) were transferred to referral hospitals. Most patients were transferred to regional centres, but 89 (10.6%) went to other Southern Ontario hospitals (Table 2). The mean age in the transfer group was 40.7 years (Fig. 1). Males comprised 56.1% and local residents 77.0% of transfers.

In 717 cases (85.8%), patients were transferred because

they required treatment beyond the usual scope of the rural hospital. In 100 cases (12.0%), patients were transferred because they required treatment that was within the scope of the hospital but unavailable at the time of presentation. This included 40 patients for surgery (4.8% of transfers), 11 for anesthesia (1.3%) and 8 for internal medicine (1.0%). Twenty-six patients (3.1%) were transferred because a bed was not available, including 15 (1.8%) who could not be admitted because of a hospital closure due to a multiply-resistant organism brought in by a patient. Only 33 transfers (3.9%) resulted from a patient or family request.

Reasons for transfer were divided into 3 groups: surgical treatment, medical treatment and diagnostics. Of the 836 patients transferred, 487 (58.2%) were transferred for surgical treatment, and 197 of these (23.6% of all patients transferred) required orthopedic care (Table 3). Of 309 patients (37.0%) transferred for medical treatment, 73 (8.7% of all patients transferred) required pediatric care — mak-

Table 2. Data on referral hospitals during the study period

Referral hospital	Location, population	Transfers, no. (and %)
London Health Sciences Centre*	London, 302 679	329 (39.3)
Stratford General (Regional referral centre)	Stratford, 27 311	168 (20.1)
St. Joseph's Health Centre*	London	104 (12.4)
Children's Hospital of Western Ontario*	London	140 (16.7)
Other		89 (10.6)
Not stated		6 (0.7)
Total		836 (100)

*University tertiary care centre

Table 1. Regional hospital characteristics, emergency visits and transfer data during study period, July 1, 1997, to June 30, 1998

Community, population	Hospital	Active beds	CAEP definition*	CAEP Rural Level†	Distance (km) to nearest primary referral centre		Emergency visits, no.	Transfers, no.
					Stratford	London		
Clinton, 3183	Clinton Public	17	Rural Close	4	53	83	9 729	99
Exeter, 4264	Exeter South Huron	21	Rural Close	4	66	54	12 776	315
Seaforth, 2285	Seaforth Community	23	Rural Close	4	54	86	6 088	75
Wingham, 3003	Wingham and District	27	Rural Remote	5	88	118	10 471	117
Goderich, 7399	Alexandra Marine and General	78‡	Rural Remote	5	74	103	14 732	230
Huron County total, 60 220		166					53 796	836

* CAEP definition: Rural Close = communities that are within about 80 km or 1 hour transport in good weather from a major regional hospital; Rural Remote: rural communities about 80–400 km or 1–4 hours transport in good weather from a major regional hospital.¹
 † CAEP Rural Level: Level 4 = a basic rural acute care hospital ED; Level 5 = a divisional rural acute care hospital ED.¹ Note: Levels 4 and 5 hospitals both have acute care beds, but level 5 hospitals offer more services, such as surgery, general anesthesia and intensive care.¹
 ‡ Includes 20 regional psychiatric unit beds.

ing this the largest medical subgroup (Table 4). Overall, 164 patients (19.6% of all patients transferred) were transferred for diagnostic imaging; this included 118 patients for CT (14.1% of all patients transferred), 18 for ultrasonography (2.2% of all patients transferred), 11 for ventilation perfusion scanning (1.3% of all patients transferred) and 21 for other studies (some patients had more than 1 imaging test). Table 5 shows the most common diagnoses resulting in transfer, listed by category. Of note, fractures accounted for the largest number of transfers, and hip fractures ($n = 46$) were the most common injury.

Four hundred and seventy-three patients (56.6% of transfers) travelled by land ambulance, 354 (42.3%) by private vehicle, 5 (0.6%) by helicopter and 1 (0.1%) by fixed-wing air ambulance. In 47 cases (5.6%), physicians attended the transfer and in 211 cases (25.2%) nurses from the referring hospital accompanied the ambulance transfer crews.

Discussion

Our study showed that from 1% to 2.4% of ED patients at the 5 hospitals required transfer (1.6% overall). This indicates that the local hospitals managed 97.6% to 99% of cases without having to refer patients for investigation or treatment. This low transfer rate is consistent with that reported in other studies.^{3,4}

Huron County has a population of over 60 000. If this were regarded as a single community with a central hospi-

tal, such a hospital probably would have a CT scanner, nuclear scanning equipment, and sufficient anesthetists, surgeons and internists to provide 24-hour on-call service. These resources would reduce transfers out of the county and allow more patients to be treated closer to home.

Imaging resources differ dramatically in Canada from the United States, where many small hospitals like those in this study have their own CT scanners. Our data suggest that better imaging resources in rural communities would reduce the need for transfer, and the data also support the CAEP recommendation that CT scanners should be more available in rural Canada.² In neighbouring Bruce County, with similar hospitals and population demographics, Walkerton (pop. 4939) became, in 1999, the smallest community hospital in Canada to have a CT scanner. The impact of the Walkerton CT scanner on transfers out of that region will have important implications for other similar regions, including Huron County.

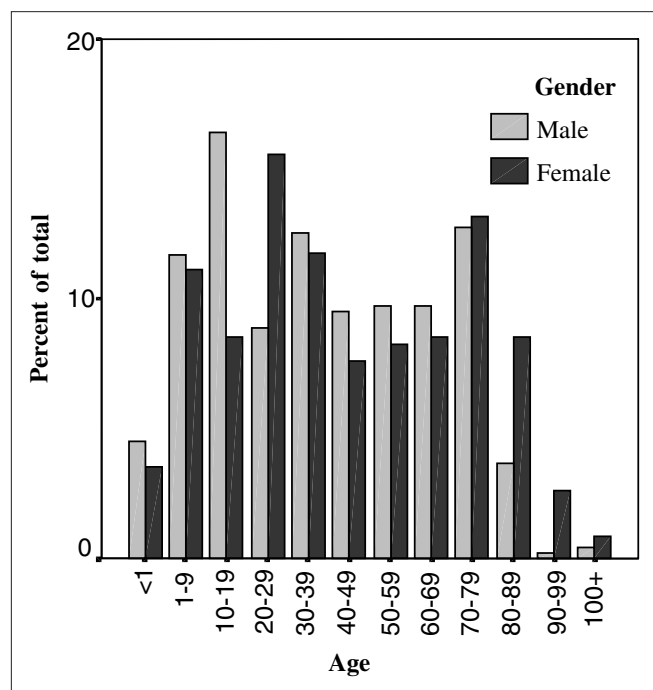


Fig. 1. Emergency transfers by age and gender

Table 3. Transfers for surgical treatment ($n = 487$)

Service required	No. (% of 836)
Orthopedics	197 (23.6)
General surgery	85 (10.2)
Obstetrics*	54 (6.4)
Plastic surgery	43 (5.1)
Ophthalmology	37 (4.4)
Neurosurgery	20 (2.4)
ENT	17 (2.0)
Trauma care	15 (1.8)
Other	38 (4.5)
Total	506 (60.5)†

* Most obstetric transfers were not included in this study because maternity patients were most often admitted and then subsequently transferred.
† More than one service was required in some cases.

Table 4. Transfers for medical treatment ($n = 309$)

Service required	No. (% of 836)
Pediatrics	73 (8.7)
Neurology	64 (7.7)
General internal medicine	43 (5.1)
Intensive care	36 (4.3)
Coronary care	36 (4.3)
Psychiatry	31 (3.7)
Other	40 (4.8)
Total	323 (38.6)*

* More than one service was required in some cases.

The large number of fracture-related transfers may indicate that rural physicians need better postgraduate training and continuing medical education in orthopedic and fracture care. More accessible telemedicine might allow expert review of x-rays before and after locally performed fracture reduction. Also notable is the large number of transfers for hip fracture. Hip fracture surgery is offered at only 1 of the 5 study hospitals, and the surgeons who perform these operations are not always available. Better regional orthopedic services would facilitate local management of hip fractures and other complicated fractures. The episodic nature of local specialist availability can be a major challenge for the care of patients presenting to rural hospital EDs, and a regional shared-call system for anesthesia and general surgery could also reduce the need to refer patients with fractures and other acute illness.

Interhospital transport of critically ill patients presents major challenges for the physicians and nurses involved.¹³ In this study, local physicians and nurses often accompanied trans-

ferred patients. This temporarily depletes local resources and has implications for hospital function and staffing.

Limitations and future research

The nature, frequency and impact of transfers from rural hospitals to referral centres will vary according to local physician expertise, hospital resources, distance, transfer systems and referral centre support. The results of this study are therefore most applicable to communities like Huron County. Of note, this study deals with patients transferred from the ED; it does not include transfers of patients admitted to hospital and then transferred the following day (121 patients). Most obstetric transfers were not included in this study as maternity patients were most often admitted and transferred subsequently.

This study suggests the need for more extensive emergency patient transfer data. A computerized ED transfer database would facilitate important policy decisions concerning the provision of emergency care and the transfers between rural, regional and referral hospitals. An economic analysis and study of specific medical benefits and risks would help determine whether it is more effective to enhance rural staffing and resources or to maintain the current model of transfer to referral centres.

Conclusions

In this multicentre rural study, only 836 (1.6%) of 53 796 patients required transfer to referral centres. Most patients were transferred for specialized services, including 23.1% for fracture care and 14.1% for CT. Enhanced orthopedic skills for rural physicians might reduce the need for transfer. Improved imaging resources and on-call specialty services at selected rural hospitals would also reduce the need for transfer outside the region and facilitate closer-to-home treatment.

Competing interests: None declared.

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Table 5. Diagnosis resulting in transfer (N = 836)

Diagnosis	No. (%)
Fractures	193 (23.1)
Head injury or Skull fractures	43 (5.1)
Lacerations or Crush injuries	40 (4.8)
TIAs or Stroke	30 (3.6)
Pregnancy-related conditions, other than premature labour*	30 (3.6)
Myocardial infarction and unstable angina	26 (3.1)
Bronchitis, Pneumonia, COPD or Asthma	23 (2.8)
Spine fracture or trauma	22 (2.6)
Appendicitis	18 (2.2)
Eye trauma	17 (2.0)
Abdominal pain	16 (1.9)
Seizures	14 (1.7)
Premature labour*	14 (1.7)
Multiple trauma	14 (1.7)
Drug overdose or poisoning	14 (1.7)
Schizophrenia or psychoses	13 (1.6)
Intracranial hemorrhage	12 (1.4)
Bowel obstruction	12 (1.4)
Gastrointestinal bleeding	12 (1.4)
Headache	12 (1.4)
Chest pain	12 (1.4)
Major depression	11 (1.3)
Other	222 (26.6)
Not stated	16 (1.9)

* Most obstetric transfers were not included in this study because maternity patients were most often admitted and then subsequently transferred.
TIAs = transient ischemic attacks; COPD = chronic obstructive pulmonary disease

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