ORIGINAL ARTICLE

Physician attendance during interhospital patient transfer in Ontario: 2005–2015

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Abstract

Introduction: Interhospital transfer of patients may be attended by a variety of healthcare providers, including physicians. The role of physicians in ambulance transfer in Ontario is not well studied. This study aims to describe the cohort of physicians providing intra-ambulance patient care in Ontario from 2005 to 2015. Secondary outcomes of interest were geographical characteristics of physician-attended transfers and patient characteristics.

Methods: OHIP billing data were used to find all instances of physician-attended air or land ambulance transfer from 2005 to 2015. These data were matched to physician data from the Corporate Providers Database and the Institute for Clinical Evaluative Sciences Physicians Database to describe the physicians providing intra-ambulance care. Patient and geographical data came from the National Ambulatory Care Reporting System and Registered Persons Database to describe the rurality of physician-attended transfers and patient characteristics.

Results: There were 916–1216 physician-attended transfers performed by 508–639 unique physicians in any given year. Physicians were mostly family physicians without anaesthesia or emergency medicine training (58%), with CCFP-EM physicians accounting for 17% and family medicine anaesthetists 10%. Thirty-eight per cent of physicians providing intra-ambulance care practised in rural settings. Seventy-three per cent of physician-attended land transfers originated in suburban, rural or remote hospitals.

Conclusions: Physician-attended ambulance transfer in Ontario is largely provided by family physicians in suburban to remote settings. This may have implications for the education of resident physicians in this unique skill set. Further research is needed into current education practices in intra-ambulance care.

Keywords: Emergency medicine, patient transfer, pre-hospital medicine

Introduction au résumé: Une gamme de fournisseurs de soins, y compris les médecins, sont présents durant les transferts de patients entre hôpitaux. Le rôle du médecin durant les transferts en ambulance en Ontario n'a pas fait l'objet de beaucoup d'études. Cette étude décrit la cohorte de médecins ontariens ayant dispensé des soins en ambulance entre 2005 et 2015. Les paramètres d'évaluation secondaires d'intérêt étaient les caractéristiques géographiques des transferts en présence d'un médecin et les caractéristiques des patients.

Méthodes: Les données de facturation à l'Assurance-santé de l'Ontario ont servi à relever tous les transferts par ambulance aérienne ou terrestre ayant eu lieu entre

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2005 et 2015. Ces données ont été appariées aux données sur les médecins tirées de la Base de données centrale sur les fournisseurs de services de santé et de la base de données sur les médecins de l'*Institute for Clinical Evaluative Sciences* afin de décrire les médecins qui dispensent des soins en ambulance. Les données géographiques et sur les patients visant à décrire le caractère rural des transferts en présence d'un médecin et les caractéristiques des patients provenaient du Système national d'information sur les soins ambulatoires et de la Base de données sur les personnes inscrites.

Résultats: Bon an, mal an, on compte 916–1216 transferts en présence d'un médecin effectués par 508–639 médecins uniques. Les médecins étaient pour la plupart des médecins de famille n'ayant reçu aucune formation en anesthésie ou en médecine d'urgence (58%), la proportion des médecins ayant reçu la désignation CCMF-MU était de 17% et des médecins de famille anesthésistes, de 10%. Trente-huit pour cent des médecins ayant dispensé des soins en ambulance pratiquaient en région rurale. Le point de départ de 73% des transferts en présence d'un médecin était des hôpitaux de la banlieue ou des régions rurales ou éloignées.

Conclusion: Les médecins présents durant les transferts en ambulance en Ontario sont principalement des médecins de famille pratiquant en banlieue ou dans les régions éloignées. Ces résultats pourraient se répercuter sur la formation des résidents en médecine pour acquérir ces compétences uniques. Plus de recherches portant sur les pratiques actuelles d'éducation sur les soins en ambulance sont nécessaires.

Mots-clés: Médecine d'urgence, transfert des patients, médecine préhospitalière

INTRODUCTION

There is a significant variability by jurisdiction in the organisation and staffing of patient transport. Ambulance transfer of patients may be primary transfers, from the site of injury or illness to the first hospital of contact, or secondary transfer, from the hospital of initial contact to another hospital. Primary transfer is generally the domain of the Emergency Medical Services (EMS). Secondary interhospital transfer of patients from the initial hospital to another may be done for diagnostic, therapeutic or logistical reasons. The practice of secondary transfer is generally less well studied, and this includes the role of physicians providing care during secondary transfer.

Currently, in Ontario, urgent interhospital patient transfers are arranged by the sending and receiving hospitals through the local EMS system or through the provincial air ambulance service, ORNGE. ORNGE provides air ambulance services throughout Ontario and ground transport for critical care patients in the Greater Toronto, Peterborough and Ottawa regions. ORNGE vehicles are manned by primary, advanced and critical care paramedics as well as specialised nursing staff for paediatric transfers. Physicians are not used routinely as ambulance crew by ORNGE, but the sending facility may send a physician in an ORNGE vehicle as medical escort, if ORNGE paramedic/nursing staff are not available.[1] For transfers not arranged through ORNGE, the selection of personnel attending transfer in the EMS vehicle is at the discretion of the sending facility: paramedics, nurses, respiratory therapists or physicians may attend. This decision depends on the needs of the patient, the personnel demands of the sending facility and the resources available, among other factors.[2]

While 80% of interhospital transfers in Ontario are non-urgent,[3] for the purposes of this paper, physician-attended transfers in Ontario were generally assumed to be urgent or emergent; in non-urgent cases, waiting for appropriate paramedic transfer would be preferred to physician-attended transfer. There are no studies in the published literature exploring frequency of physician attendance during ambulance transfer of patients within Ontario. Physician attendance in ambulance transfer is a component of some EMS systems: physicians attend 5% of calls in the STARS Air Ambulance Service in Western Canada,[4] and physician-staffed air ambulances are routine in some Australian and European jurisdictions.[5-7] Rural general practitioners in Norway routinely attend ambulance calls and aid paramedics with on-scene assistance.[8,9]

In the authors' experience, physician attendance in ambulance transfer in Ontario ranges from routine to exceptionally rare, depending on physician specialty and geography. How often, and

by which physicians, this service is being performed may have implications for resident training in this unique skill set. This study uses retrospective data from the Institute for Clinical Evaluative Sciences (ICES) database to describe the cohort of physicians who provided care to patients during ambulance transfer from 2005 to 2015. Secondary outcomes include geographical characteristics of transfers in which physicians provided care and characteristics of the patients being transported. We hypothesised that most physicians providing this service would be family doctors practising in rural and remote parts of Ontario.

METHODS

The ICES is a not-for-profit research institute that is a recognised entity under the Personal Health Information Protection Act and that houses multiple linked data sets in a secure environment. Data holdings include physician billings, hospital discharges, emergency room attendance, demographic information on patients and physicians, the census, vital statistics, publicly funded home-care services, publicly funded drugs and some large population-based surveys such as the Canadian Community Health Survey. Patient-level data are linked through an anonymised key number.

The Ontario schedule of benefits contains a billing code for physician attendance in ground ambulance transfer, K101 'Ground ambulance transfer with patient per quarter hour or part thereof,' and another for air transfer, K111 'Air ambulance transfer with patient per quarter hour or part thereof'.[10] Using data for a 10-year period from 1st January 2005 to 31st December 2015, OHIP data were obtained for all instances of K101 or K111 billing codes. All units of either K111 or K101 billed by the same physician for the same patient on the same or adjacent days were considered together as a single transfer.

The OHIP data specified the diagnosis, as given by the attending physician at time of billing, and the number of 15 minute units billed. For each transfer, the National Ambulatory Care Reporting System database was searched for an emergency department discharge for the same patient on the same or previous day as the transfer. The rurality index of Ontario (RIO) score for this emergency department was used to describe the rurality of the point of origin. The RIO score is a commonly used measure to describe rurality in healthcare policy considerations. It is a composite measure derived from population (density and absolute) and travel times to basic and advanced referral centres, yielding a score of 0 (most urban) to 100 (most remote) for each census metropolitan area in Ontario.[11] Where no emergency department discharge could be identified, the RIO score of the patient's home municipality was pulled from the Registered Persons Database (RPDB) and

Table 1: Charactertistics of physician-attended patient transfers

	Study year										
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total number of unique physicians	611	610	639	626	537	512	532	512	529	508	543
Total number of land transfers	1072	1093	1177	1134	983	893	956	924	955	961	1019
Total number of air transfers	34	32	39	45	15	23	17	13	12	17	11
Land transfers by RIO band (per cent of annual total)											
Urban (0-9)	25.0	29.0	27.0	30.7	28.6	31.7	27.2	22.0	24.6	23.1	24.9
Suburban (10-39)	44.9	41.7	43.4	41.9	44.5	44.7	44.6	50.4	48.8	48.4	44.7
Rural (40-64)	24.3	24.4	24.5	22.7	22.5	20.3	23.0	23.5	22.7	24.2	25.3
Remote (65+)	5.8	4.9	5.1	4.8	4.4	3.3	5.3	4.0	3.9	4.3	5.1
Air transfers by RIO band (per cent of annual total)											
Urban (0-9)	15.6	30.0	13.2	20.0	7.1	21.7	18.8	23.1	25.0	17.7	27.3
Suburban (10-39)	15.6	13.3	15.8	24.4	7.1	26.1	25.0	23.1	8.3	17.7	0.0
Rural (40-64)	9.4	10.0	18.4	13.3	21.4	4.4	12.5	23.1	25.0	5.9	18.2
Remote (65+)	59.4	46.7	52.6	42.2	64.3	47.8	43.8	30.8	41.7	58.8	54.6

RIO: Rurality index of Ontario.

used to capture the rurality of the point of origin of the transfer. This was designed to capture transfers from remote communities where the point of origin could be a nursing station rather than a hospital. Some data within the RPDB are verified through data from the Canadian Institute of Health Sciences.

To characterise the physicians, encrypted billing numbers were used to find corresponding data from the Corporate Providers Database (CPDB) and the ICES Physician Database. Physician specialty was gathered from the CPDB and reported as registered with the corresponding regulatory colleges. Family Medicine Anaesthetists were defined for our purposes as any physician registered as a family physician with the Ontario College of Family Physicians who had billed with anaesthesia billing codes, as found in the OHIP database, during that year. The CPDB also contains both a RIO score for physician practice and a binary variable for a rural practice setting (population under 10,000); these were gathered to describe physician geography.

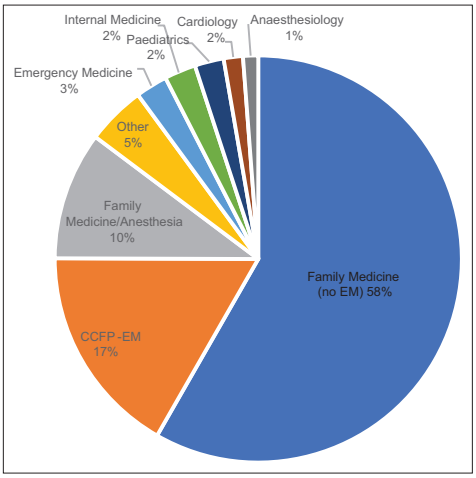


Figure 1: Physicians participating in transfers by specialty.

All datasets were linked using unique encoded identifiers and analysed at the ICES at Queen's University. This study was approved by the Institutional Review Board at Sunnybrook Health Sciences Centre, Toronto, Canada, and the Queen's University Health Sciences and Affiliated Teaching Hospitals Research Ethics Board, Kingston, Canada.

RESULTS

There were 916–1216 physician-attended transfers performed by 508–639 unique physicians in any given year. This represented between 1.68% and 2.11% of the 30,328 physicians in the OHIP database in 2015. The number of unique physicians in the cohort study is presented in Table 1 along with the population of Ontario physicians in 2015 for comparison. A total number of air and ground transportations per year are also provided in Table 1.

When viewed by specialty, 59%–74% of these physicians were family physicians without EM designation. CCFP-EM-trained physicians are the second largest group at 11%–25%. No other specialty makes up more than 5% of the cohort in any year. The study cohort is presented by specialty in Figure 1.

Physicians practising in remote settings (as defined by a RIO score >65) were overrepresented in this population (4.4%–7.6%) in comparison to the population of Ontario physicians as a whole (1.2%). Rural physicians

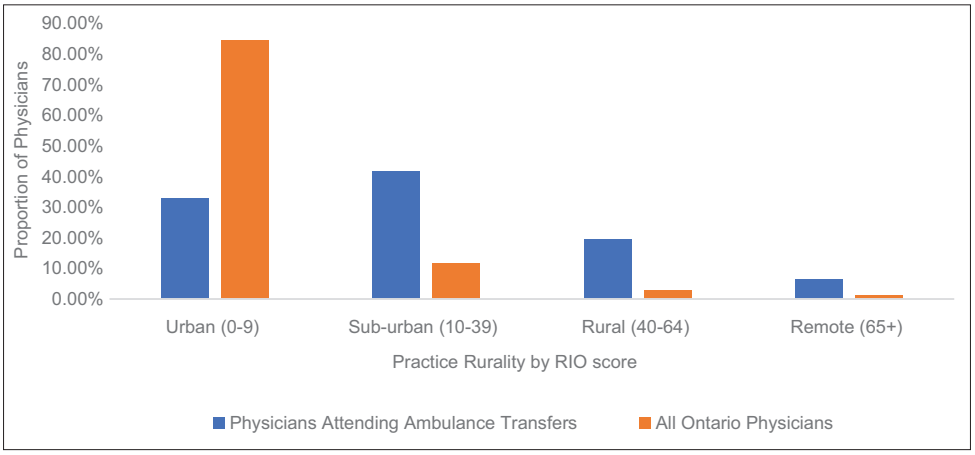


Figure 2: Physician rurality: Physicians attending ambulance transfers versus all Ontario physicians. RIO: Rurality index of Ontario.

(RIO score 40–64) are similarly overrepresented, being 18%–20% of the cohort and 2.8% of Ontario physicians. About 73%–78% of the cohorts were physicians practising in urban or suburban settings, defined as a RIO score of 39 or less. Nearly 35%–40% of physicians providing intra-ambulance care were practising in communities of 10,000 people or fewer, depending on the year. The study cohort is presented by RIO score in Figure 2, along with the population of Ontario physicians in 2015 for comparison.

When viewed by rurality of transfer origin, a similar distribution is seen, with remote transfers making up 4.7% of land transfers and suburban origins comprising a plurality at 45% of land transfers [Figure 3].

When viewed by age, the patients transported with physician attendance were mostly adults aged 18–64, who comprised 52%–54% of patients in any given year. The proportion of paediatric patients fell from 19% in 2005 to 9.5% in 2015, while the proportion of patients 65 years or older rose from 28% to 39% [Figure 4].

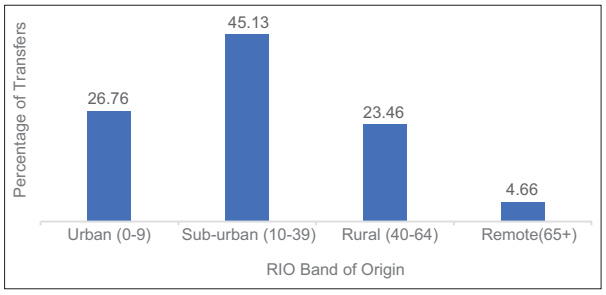


Figure 3: Land transfers by rurality.

Transfers were also analysed geographically and by mode of transport in Table 1. Over 95% of physician-attended transfers were by ground transport, and this proportion rose over the decade studied. Land transfers tended to be relatively suburban and air transfers relatively remote. About 31%–64% of air transfers originated in remote settings versus 3.3%–5.8% for land transfers. Conversely, 42%–50% of physician-attended land transfers began in suburban settings, while these made up 0%–26% of physician-attended air transfers.

DISCUSSION

Clinical practice guidelines give conflicting guidance about attendance of ambulance transfers. The Canadian Association of Emergency Physicians states that caring for critically ill and injured patients in ambulance should be within the skills of physicians providing emergency care in rural settings.[12] Other clinical practice guidelines from the US and UK critical care societies recommend physician attendance for unstable patients, preferably physicians with training in transport medicine and suggest anaesthesia or critical care as areas from which to draw physician expertise.[13,14] The Canadian Paediatric Society advises that the optimal team for transfer of critically ill neonatal patients consists of specialised nursing and respiratory therapy with neonatologist remote support.[15] While the data regarding optimal transport practices are overwhelmingly

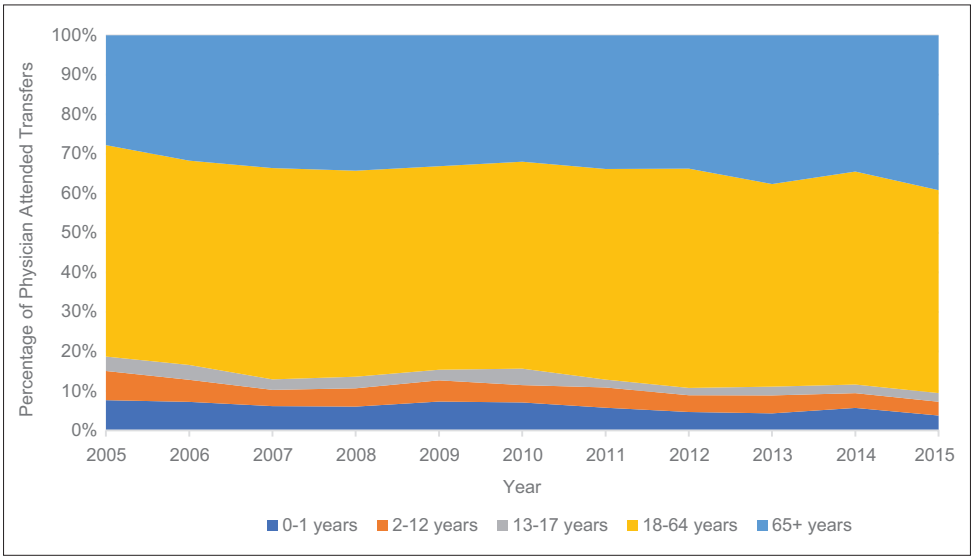


Figure 4: Patients by age category over time.

observational and of moderate quality,[16] the expert consensus is that transport of critically ill patients should be done by specialised teams.[17]

We found that by specialty, physician attendance for ambulance transfers was provided primarily by family physicians, most of whom do not have CCFP-EM designation. Rural and remote physicians are over-represented in this cohort, compared to the population of Ontario physicians, highlighting the importance of intra-ambulance care as part of rural and remote medical practice. However, at least 69% of physician-attended transfers began in suburban or urban settings in any given year, and 73%–78% of physicians provide this care practise in urban or suburban settings.

Training of physicians to care for patients during ambulance transfer should be addressed in family medicine training programs. Restricting it to CCFP-EM programs or to rural/remote medicine fellowships would not adequately capture the cohort of physicians who require this skill set. There are no comprehensive surveys of family medicine residency training programs in Ontario or Canada regarding whether they train residents in intra-ambulance care. The family medicine residency program at the authors' home institution (Queen's University) does include simulation training specifically targeted at this skill set. The College of Family Physicians of Canada does not specifically address pre-hospital or intra-ambulance care within their priorities for training of family medicine residents.[18] The Royal College of Physicians of Canada Emergency Medicine training stream does include pre-hospital medicine as a training objective.[19]

The proportion of physician-attended transfers done for paediatric patients fell over this time period, from 18.7% to 9.5%. Paediatricians became a smaller proportion of the physicians providing intra-ambulance care as well, falling from 3.4% to 0.7%. This may be due to a concerted effort in Ontario to co-ordinate transfer of critically ill children through the CritiCall system and make greater use of specialised paediatric retrieval teams and ORNGE, which generally use a combination of specialised paramedics, nurses and respiratory therapists, rather than paediatricians.[15,20,21]

Over the decade studied, the landscape of remote EMS services evolved in Ontario as the Ontario Air Ambulance Services Co. (since renamed ORNGE) was founded in 2005, and capacity was expanded over the study period. This may reflect the decrease in air transfers attended by physicians but appears to have had no discernible effect on patterns of physician attendance for ground ambulance transfer.

Limitations

We relied on physician billing data to identify when physicians were present for ambulance transfer of patients. As such, cases in which the attending physician did not bill would not be captured. Physicians in salaried positions or under other alternative billing arrangements would be captured if they shadow billed for their services but otherwise would be missing from this data set. It is possible that physician groups that are disproportionately on alternative billing arrangements, such as rural and remote physicians, account for more of this cohort than our data capture. Physician location data may be inaccurate for physicians with more than one practice location or those who are working primarily in locum positions. The clinical indications that determined the requirement for physician attendance during transfer could not be determined from our data set. An analysis of these decisions is a recommended area for future research. Given the variation in EMS systems within and between provinces, these data cannot be extrapolated to other Canadian provinces or territories. For example, the presence of the STARS Air Ambulance Service in Western Canada suggests that practice patterns regarding physician attendance in ambulance transfer are likely substantially different in Western Canadian provinces.[4]

CONCLUSIONS

In Ontario, there were approximately 1000 transfers per year attended by physicians during our study period. The physicians performing these transfers were largely family physicians working in suburban or rural settings. Further research is needed to address the training that family medicine training programs are providing in this area and the clinical and logistical circumstances which give rise to the need for physician-attended transfer.

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Conflicts of interest: There are no conflicts of interest.

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