Canadian Journal of Rural Medicine | Journal canadien de la médecine rurale

Winter 1999 Contents • Hiver 1999 Table des matières

Air ambulance transports to Port McNeill, British Columbia

Stephanie Moffat, MD, CCFP; Robert A. Taylor, MD, CCFP, Port McNeill Medical Clinic, Port McNeill, BC; Harvey V. Thommasen, MD, CCFP, Bella Coola General Hospital, Bella Coola, BC

CJRM 1999;4(1):21-26

[résumé]

Correspondence and reprint requests to: Dr. Harvey V. Thommasen, Comp 56, Site #8, SS1, Houston BC V0J 1Z0

This article has been peer reviewed.

Contents

- Abstract
- Résumé
- Introduction
- Setting
- Methods
- Results
- Discussion
- Conclusions
- References

Abstract

Objectives: To determine overtriage rates (where air ambulance transport could have been

avoided without compromising patient care) by reviewing the records of air ambulance transports from isolated coastal communities to the small rural hospital in Port McNeill, British Columbia, a remote coastal community on Vancouver Island. The category of patient being transported to this hospital by the air ambulance service was also examined.

Design: A 1-year chart review from Apr. 1, 1996, to Mar. 31, 1997.

Main outcome measures: Demographics of the study group, site of origin of each air ambulance transfer, whether the liaison was a community health representative (CHR) or a registered nurse, and the final diagnosis by the receiving physician were all determined. In addition, subsequent management and patient outcome were also noted. After reviewing all of this information, a subjective decision was made as to whether the air ambulance transport was necessary or not.

Results: Forty-eight separate air ambulance transfers were carried out, all by helicopter, transporting a total of 51 patients (43 adults, 8 children). Forty-eight percent of evacuations originated from 2 communities off Vancouver Island. The overtriage rate was calculated at 22%. The area of minor trauma was particularly prone to overuse of the air ambulance.

Conclusions: Just over 20% of emergency air ambulance transfers to Port McNeill Hospital probably were not necessary. This overtriage rate is consistent with that reported for air ambulance transports that take place between primary care hospitals and secondary or tertiary care hospitals.

[Contents]

Résumé

Objectifs : Déterminer les taux de surtriage (cas où l'on aurait pu éviter le transport par ambulance aérienne sans compromettre la sûreté du patient) en examinant les dossiers des transports par ambulance aérienne de communautés côtières isolées vers le petit hôpital rural de Port McNeill (Colombie-Britannique), localité côtière éloignée située sur l'île de Vancouver. On a étudié aussi la catégorie de patients transportés à cet hôpital par le service d'ambulance aérienne.

Conception : Examen des dossiers d'un an, soit du 1er avril 1996 au 31 mars 1997.

Principales mesures de résultats : On a établi les caractéristiques démographiques du groupe étudié, le lieu d'origine de chaque transfert par ambulance aérienne, si l'agent de liaison était un représentant en santé communautaire (RSC) ou une infirmière autorisée, et le diagnostic final posé par le médecin d'accueil. On a aussi noté le traitement administré par la suite au patient et

ses résultats. Après avoir étudié tous ces renseignements, on a décidé subjectivement si le transport par ambulance aérienne était nécessaire ou non.

Résultats : Quarante-huit transferts distincts par ambulance aérienne ont été effectués, tous par hélicoptère : on a transporté au total 51 patients (43 adultes, 8 enfants). Quarante-huit pour cent des évacuations provenaient de deux localités en dehors de l'île de Vancouver. Le taux de surtriage a été établi à 22 %. Le domaine des traumatismes mineurs se prêtait particulièrement à l'utilisation excessive de l'ambulance aérienne.

Conclusions : Un peu plus de 20 % des transferts d'urgence par ambulance aérienne vers l'Hôpital de Port McNeill n'étaient probablement pas nécessaires. Ce taux de surtriage est conforme à celui qu'on a signalé dans le cas des transports par ambulance aérienne entre les hôpitaux de soins primaires et les établissements de soins secondaires ou tertiaires.

[Contents]

It is believed that the 1870 Franco-Prussian War marked the start of medical air evacuation, when hot-air balloons were supposedly used to carry the wounded from the besieged city of Paris.1,2 Over the past century, air transportation has continued to gain prominence during military conflicts and was an integral component of both the Korean and the Vietnam wars.3,4 More recently, emergency air medical evacuation has established itself in the civilian medical forum particularly in the area of trauma, and its use has translated into a decrease in both morbidity and mortality.5,6 Air ambulance evacuations of ill or injured patients has become a common mode of medical transport in the 20th century throughout most of rural Canada.2 Because air ambulance services continue to be expensive, guidelines on implementation need to be enforced to ensure reasonable, cost-effective use. Selecting patients requiring urgent/emergency air transport (as opposed to routine transport) is a challenge that faces the on-call physician in many rural communities across this country.7

Air ambulance transfers, particularly of trauma victims, from rural and community hospitals to tertiary centres has been studied.2,6,8 The literature on its use in the prehospital setting before direct patient-physician contact remains scarce. The purpose of this study was to determine the overtriage rate by reviewing, over a 1-year period, air ambulance transfers from surrounding, isolated communities to a small rural hospital located on northern Vancouver Island. In so doing it was possible to determine the accuracy of physician assessments by phone.

[Contents]

Setting

Port McNeill & District General Hospital is located in the logging community of Port McNeill, British Columbia. Port McNeill is situated on Vancouver Island approximately 200 km north of Campbell River (Fig. 1). The Port McNeill & District Hospital is an acute care, 10-bed rural hospital, which is optimally staffed by 5 family physicians/general practitioners. There are no specialists working at the hospital.

The hospital serves a population of at least 5000 people, spread out over an area exceeding 10 000 km2. This hospital is the natural referral site for emergency air ambulance transfers from numerous surrounding isolated communities located both on Vancouver Island, on small coastal islands and on the mainland coast. Access to Port McNeill for the inhabitants of these communities is by either logging roads or scheduled flights/boats. Noteworthy outpost communities include Oweekeno, Guilford, Sointula and Kingcome (Fig. 1). Oweekeno, a southern Kwakuitl settlement of approximately 50 individuals is the furthest and most isolated of the outpost communities, lying 120 km due north of Port McNeill. Guilford is a small island community, 45 minutes by boat from Port McNeill.

The decision to evacuate a patient to Port McNeill using the provincial air ambulance service is based on dialogue among the physician on call and the nurse, the community health representative (CHR) or (rarely) the patient. The CHR is typically someone who is appointed by a native band to organize and take care of medical matters. This person may or may not have rudimentary nursing or medical training. Once the decision to transfer has been made and a hospital bed secured, the British Columbia Ambulance Service in Victoria is notified. They then assume responsibility for the details of the evacuation: making decisions such as what kind of air ambulance to use (e.g., helicopter versus fixed-wing transport), and which emergency medical personnel to dispatch. The transport coordinator does not, as a general rule, question the appropriateness of the transfer.

In British Columbia, specially trained paramedic ambulance personnel typically make up the air ambulance transport team. Physicians are expected to accompany the majority of neonatal transports and they tend to accompany about half the transports of older children. Paramedics typically manage the adult transports by themselves. With respect to air ambulance transports to Port McNeill, the usual scenario is that one of the local helicopter companies is chartered to do the pick up and delivery; a local ambulance attendant is sent to tend the patient. A physician may or may not go along depending on the severity or complexity of the problem. The patient is delivered to a helicopter landing pad located adjacent to the hospital.

Details of the emergency air medical evacuation are recorded by the paramedic or ambulance attendant on an "AirEvac" form. Details of the patient's emergency room visit are recorded on the emergency form by nursing and staff physicians. Details of a patient admission and hospital stay are recorded on the hospital chart.

[Contents]

Methods

Air ambulance transfers from surrounding communities to Port McNeill & District Hospital over a 1-year period (April 1996 to April 1997) were reviewed retrospectively. Those few transports to Port McNeill organized from another hospital (e.g., Campbell River & District General Hospital, Port Hardy Hospital) where another physician obviously had already assessed the patient were excluded from the study. The "AirEvac" record, the emergency sheet and the admission history (for patients admitted to hospital) for each air ambulance transfer were reviewed. The demographics of the study group, site of origin of each air ambulance transfer, whether the liaison was a CHR or a registered nurse and the final diagnosis of the receiving physician were determined. In addition, subsequent management of the patients (i.e., admission versus immediate discharge, active management versus monitoring only, transfer to a tertiary facility) and patient mortality were noted. After reviewing all this information, a subjective decision was made as to whether the air ambulance transport was necessary or not. The chart audit was performed and the subjective judgement as to appropriateness of air ambulance use was made by the primary author (S.M.).

[Contents]

Results

Between April 1996 and April 1997, there were 48 separate air ambulance transfers by helicopter to Port McNeill & District Hospital (Table 1). The sites initiating the greatest number of patient transfers were Oweekeno (27%) and Guilford (21%). Almost half of the air ambulance transfers from Guilford were for the same patient (an elderly woman).

In all, 51 patients, ranging in age from 15 months to 83 years, were transported; one particular incident involved the air ambulance transfer of 4 patients. Eight (16%) of the patients (4 girls, 4 boys) were under 14 years of age (mean 6.1 years, standard deviation 4.8 years), constituting the pediatric population. The adult population included 43 patients (15 [35%] women, 28 [65%] men) with a mean age of 43.4 years (standard deviation 17.3 years). Five patients were each air evacuated twice during the study period, in 3 cases for the same or a similar complaint. One patient, the elderly female from Guilford, was transported 4 times for the same complaint (congestive heart failure) and died after her last admission.

Data on patient outcome revealed that most transported patients were also admitted to Port McNeill Hospital (Table 2). Thirty-one patients (61%) were admitted, 25 of whom received some form of active treatment (e.g., thrombolysis, antibiotics) over an average hospital stay of 5.6 days (standard deviation 5.2 days). The remainder of admitted patients were hospitalized overnight for

observation and discharged the following day. Eleven patients (22%) were seen solely in the emergency department and discharged the same day. After initial stabilization at Port McNeill hospital, 4 adults and 1 child were transported on the same day to a tertiary centre for further management (10% of cases). Over the 1-year period, 4 patients (8%) died after air ambulance transfer to Port McNeill hospital, 3 on the day of transport and the fourth 5 days after admission to hospital. There was 1 pediatric fatality (drowning) and 3 adult deaths (aortic dissection, congestive heart failure, hepatorenal syndrome).

The most frequent physician diagnosis was that of minor trauma in 15 (29%) of the patients (Table 3). Seven patients (14%) presented with symptoms that necessitated work-up for myocardial infarction. Five patients (10%) manifested other cardiovascular complaints. Similarly, respiratory disease, abdominal pain and toxic ingestion accounted for 10% each of the diagnoses. Use of air ambulance transfer was deemed in retrospect inappropriate in 11 patients (22%), 5 of whom originated from Oweekeno. Nine of the patients had sustained very minor trauma that was neither life nor limb threatening. The other 2 cases of inadequate patient selection involved the transport of young men, one from Oweekeno whose condition was subsequently diagnosed as bronchitis and the other from Guilford who required nonurgent, routine transport only for cast and pin removal.

[Contents]

Discussion

Our study found that air transport was inappropriate in 22% of the cases. Accepting overtriage rates as high as 25% to 74% has been advocated to avoid compromising patient care by undertriaging.9 However, these other reports on air ambulance use primarily dealt with interhospital transport.5,9 Our study appears to be the first describing the unique situation of a patient population that is being transported by air ambulance from isolated, coastal communities to a nearby rural hospital.

The relative acuity of disease in this patient population was not as high as in other studies on air ambulance transport.6,9 This finding is not unexpected given the unique prehospital environment in which this service functions in the Port McNeill area.

The physicians on call at Port McNeill & District Hospital do not have the luxury of properly screening those patients who present initially to outpost health centres, other than through rudimentary assessments by phone. This form of communication can be misleading and is fraught with biases. Limits in the training of a CHR or registered nurse, physician inexperience with rural medicine, physician lack of experience with the geography of the area, and physician inability to experience the "gestalt" of the patient over the phone are all factors that could contribute to early evacuation. As always, physicians must err on the side of caution; the onus is

on them to determine if emergency transport is, in fact, necessary.

Unfortunately, in this retrospective analysis, the indications that led to transport were inconsistently documented by the physician on the emergency/admission records. Factors that might have had an impact on decision-making include the perceived severity of the illness (as gauged over the phone) and its likelihood of progression, the age, medical history and premorbid state of the patient, their geographic isolation and, in the case of trauma, the mechanism of injury.

In cases in which the potential for serious consequences does exist, even remotely, patient transport becomes mandatory. For example, any patient complaining of chest pain questionably of cardiac origin quite rightly needed to be transported; opting for watchful waiting would have been irresponsible and indefensible. Similarly, those with significant abdominal pain were assessed as relatively urgent because of the occasional acute abdomen. Trauma patients complaining perhaps of only minor neck pain required, at minimum, physical examination by a physician to rule out a cervical-spine injury. Such a case, if films showed a fracture, would be upgraded to major trauma. However, the necessity of obtaining films might only have become apparent after direct physician contact. In contrast, other forms of minor trauma such as simple lacerations, low-back strain and potential closed extremity fractures should be, theoretically, less problematic. In reality, it is precisely in this diagnostic category that most cases of inappropriate air transport were documented (82%). Overtriaging in these cases appeared from the charts to be primarily a reflection of an overestimation of the severity of the trauma. Obvious abuse of the system was very rare, but did occur with the transfer of one patient for cast and pin removal who clearly did not require air ambulance service.

Once the decision to transport a patient is made, the dilemma of determining which patients would specifically benefit from air evacuation then arises. In fact, it was clear that, despite longer transport time, the services of a ground ambulance crew would have sufficed for many of the patients over the 1-year period. However, geographic constraints as in the case of island communities often made this option impossible. The physician would then have been faced with a choice between 2 extremes. Either transport without any medical back-up on a scheduled flight or boat (for example, the following day) or air ambulance evacuation with its advanced care and thus implicit financial costs. If the physician perceived the former as inadequate for patient care for whatever reason, the latter would then be the only recourse.

That communities isolated by water depend more heavily on air evacuation is certainly borne out in this study with Oweekeno and Guilford together accounting for 48% of the air evacuations over the study year. A confounding factor, however, is that both these sites rely on CHRs (rather than registered nurses) as their liaisons with the Port McNeill physicians. The advanced training of registered nurses and their presumably greater experience with various patient presentations would likely influence the accuracy of the report a physician receives by phone. As a result, in communities serviced by registered nurses, a physician may have a higher threshold before initiating transport and may more comfortably elect to have patients make their own way to either

the hospital or medical clinic on a nonurgent basis.

In light of the communication and geographic biases influencing air transport into Port McNeill, an overtriage rate of 22% is probably acceptable. As mentioned earlier, the area of minor trauma was most susceptible to overtriaging. This might be improved through case-by-case reviews and scheduled regular auditing sessions for CHRs, registered nurses and staff physicians. Teaching CHRs simple measures such as first aid wound care and the documentation of pulses in an extremity soft-tissue injury (query fracture) might reduce significantly any inappropriate air ambulance transports.

There are a number of limitations to this study. The 22% overtriage rate is determined by subjective means and not by any standardized triage measurement tool. A prospective study would have been preferable to a retrospective study, mainly because we could have asked physicians to indicate specifically the concerns that led them to initiate an air evacuation and their impressions upon receiving the patient. At the same time, the outcome when phone communications result in routine rather than air ambulance transport could also have been recorded and evaluated. This would also have allowed for determination of an undertriaging rate.

[Contents]

Conclusions

This study shows that the air ambulance transport system is being used to transfer patients with a wide variety of problems. Just over 20% of emergency air ambulance transfers from surrounding, isolated, communities to Port McNeill & District Hospital were probably not necessary. Nonessential use of the air ambulance service is particularly prevalent in minor trauma. Geographic considerations, qualifications of liaison personnel at the referring site, and the experience of accepting physician probably play a role in rates of use.

[Contents]

References

1. Green RL. The carriage of invalid passengers by air. Br J Hosp Med 1977;17(1):32,35-7.
2. Macnab AJ, Freeman J, Sun C. Air evacuation: costs, benefits, and priorities. BC Med J 1995;37(4):251-6.
3. Neel SH. Helicopter evacuation in Korea. US Armed Forces Med J 1955;6:691-702.
4. Neel S. Army aeromedical evacuation procedures in Vietnam: implications for rural America. JAMA 1968;204(4):309-13.
5. Urdaneta LF, Miller BK, Ringenberg BJ, Cram AE, Scott DH. Role of an emergency

helicopter transport service in rural trauma. Arch Surg 1987;122(9):992-6.
6. Moylan JA. Impact of helicopters on trauma care and clinical results [review]. Ann Surg 1988;208(6):673-8.
7. O'Malley RJ, Watson-Hopkins M. Monitoring the appropriateness of air medical transports. Air Med J 1994;13(8):323-825.
8. Leicht MJ, Dula DJ, Brotman S, Anderson TE, Gessner HW, Parrish GA, et al. Rural interhospital helicopter transport of motor vehicle trauma victims: causes for delays and recommendations. Ann Emerg Med 1986;15(4):450-3.
9. van Wijngaarden M, Kortbeek J, Lafreniere R, Cunningham R, Joughin E, Yim R. Air ambulance trauma transport: a quality review. J Trauma 1996;41(1):26-31.

© 1999 Society of Rural Physicians of Canada