

# Critical Events During Land-Based Interfacility Transport

Jeffrey M. Singh, MD, MSc, FRCPC\*; Russell D. MacDonald, MD, MPH, FRCPC; Mahvareh Ahghari, BSc, MEng

\*Corresponding Author. E-mail: [jeff.singh@uhn.ca](mailto:jeff.singh@uhn.ca).

**Study objective:** The risks associated with urgent land-based transport of critically ill patients are not well known and have important implications for patient safety, care delivery, and policy development. We seek to determine the incidence of in-transit critical events and associated patient- and transport-level factors.

**Methods:** We conducted a retrospective cohort study using clinical and administrative data. We included adults undergoing urgent land-based critical care transport by a dedicated transport provider between January 1, 2005, and December 31, 2010. The primary outcome was in-transit critical event, defined by adverse events or resuscitative procedures.

**Results:** In-transit critical events were observed in 333 (6.5%) of 5,144 urgent land transports. New hypotension (4.4%) or new vasopressors (1.6%) were the most common critical events, with fewer respiratory events (1.3%). Advanced care paramedics had a higher rate compared with critical care paramedics (odds ratio [OR] 1.6; 95% confidence interval [CI] 1.1 to 2.2), especially for patients with baseline hemodynamic instability. In multivariate analysis, mechanical ventilation (adjusted OR 1.7; 95% CI 1.3 to 2.2), baseline hemodynamic instability (adjusted OR 3.7; 95% CI 2.8 to 4.9), out-of-hospital duration (adjusted OR 3.6; 95% CI 2.9 to 4.5 per log-fold increase in time), and neurologic diagnosis (adjusted OR 0.5; 95% CI 0.3 to 0.7 compared with that of medical patients) were associated with critical events.

**Conclusion:** Critical events occurred in approximately 1 in 15 transports and were associated with mechanical ventilation, hemodynamic instability, and transport duration, and were less frequent in neurologic patients. The finding that hypotension is common and predicted by pretransport hemodynamic instability has implications for the preparation and management of this patient group. [Ann Emerg Med. 2014;64:9-15.]

Please see page 10 for the Editor's Capsule Summary of this article.

A **feedback** survey is available with each research article published on the Web at [www.annemergmed.com](http://www.annemergmed.com).

A **podcast** for this article is available at [www.annemergmed.com](http://www.annemergmed.com).

0196-0644/\$-see front matter

Copyright © 2014 by the American College of Emergency Physicians.

<http://dx.doi.org/10.1016/j.annemergmed.2013.12.009>

## SEE EDITORIAL, P. 17.

## INTRODUCTION

### Background

Transport of patients between health care institutions is necessary in regionalized health care systems to ensure access to specialized resources. Transport of acutely ill patients removes them from the secure setting and resources of the hospital and may put them at risk for clinical deterioration in a mobile setting. Patients may deteriorate in transit because of progression of underlying diseases, the physical stress of transport, or care delivered before or during transport. The risk of deterioration during urgent air medical transport with dedicated transport crews is low and is consistent with the risk of deterioration during in-hospital transport.<sup>1,2</sup>

Nevertheless, transport crews are faced with the challenge of managing potentially life-threatening situations or deteriorating patients in approximately 1 in every 20 urgent air medical transports.<sup>1</sup>

### Importance

Skilled transport teams may avert clinical deterioration and adverse events through timely critical interventions<sup>2,3</sup>; therefore, measurement of critical events (encompassing both clinical deterioration and resuscitative interventions) is important. Characterization of critical events and the risk of deterioration during transport could be used to reduce medical errors, improve processes related to equipment and transport, optimize the triage and preparation of patients before transport, and match transport crews and resources to patients at highest risk. In addition, improved understanding of the risks of transport is important to inform policymaking with respect to regionalization of specialized health care services because benefits from centralization and increasing case volumes must be weighed against any increased risks associated with secondary transport.<sup>4</sup>

### Goals of This Investigation

The risk of transport is less well characterized in patients undergoing urgent land-based critical care interfacility transport.

**Editor's Capsule Summary***What is already known on this topic*

The transport of acutely ill patients between medical facilities is often necessary to ensure access to specialized care.

*What question this study addressed*

What is the incidence of critical events during urgent land-based interfacility transport?

*What this study adds to our knowledge*

In this analysis of 5,144 urgent land-based interfacility transports in Ontario, Canada, critical events occurred in 6.5%; however, there were no deaths and only 1 incident of cardiopulmonary resuscitation, 2 defibrillations, and 4 intubations.

*How this is relevant to clinical practice*

Complications do occur but most are easily managed by the transport team. As with any medical procedure, the potential benefits and harms of interfacility transfer must be weighed when making such decisions.

Our goal was to determine the incidence of in-transit critical events during urgent land-based critical care transport of adult patients, using dedicated transport crews, and identify factors independently associated with these events.

**MATERIALS AND METHODS****Study Design and Setting**

We conducted a retrospective cohort study, using data from the provincial air medical transport agency (Ornge Transport Medicine) of Ontario, Canada. Ornge conducts more than 18,000 patient transports annually with rotary-wing (helicopter) and fixed-wing aircraft and land-based critical care transport units with paramedic crews under the direction of a transport medicine physician in a single, centralized dispatch center. The agency provides land-based critical care transport in the Greater Toronto–Hamilton Region and Ottawa, serving a catchment population of approximately 8 million people.

Patients are transported by specially trained paramedic crews, which are assigned according to the acuity of the patient and the skills, medications, or procedures required. The 3 levels of crews are primary care paramedics, advanced care paramedics, and critical care paramedics, with each level having a more advanced scope of practice based on Canadian standards<sup>5</sup> (Appendix E1, available online at <http://www.annemergmed.com>). Primary care paramedic crews are basic paramedics and can provide oxygen, start intravenous lines, and provide symptom relief for a variety

of conditions. Advanced care paramedic crews can administer more medications and perform basic airway management and invasive emergency procedures such as needle thoracotomy. The scope of practice of critical care paramedic crews includes advanced airway management and support of invasive devices such as pulmonary artery catheters and intra-aortic balloon pumps.

The electronic ambulance call report database consists of both administrative and clinical data that are recorded in transit by transport crews and then transcribed into an electronic database by trained data abstractors. All data are validated by range and logic checks and subjected to routine quality audits with high standards for data fidelity (>95% verification against original paper records). Transcription occurs routinely, and thus the abstractors were unaware of the research study or study question.

**Selection of Participants**

We included all land transports of patients aged 18 years or older conducted by Ornge in the province of Ontario between January 1, 2005, and December 31, 2010. We excluded nonurgent transports of patients to a convalescent facility or home, scheduled transports for medical appointments, treatments, repatriation, and scene calls in which crews made patient contact and delivered acute care or resuscitation on arrival at a site outside a health care facility. We also excluded transports occurring for the purpose of posthumous organ retrieval or after the patient had been declared dead by neurologic criteria.

The protocol was approved by the Research Ethics Board at the University of Toronto.

**Methods of Measurement**

An electronic database of all ambulance call reports is maintained at Ornge: clinical and administrative information is transcribed from paper charts by blinded, trained data abstractors. We queried this electronic database to extract demographic and clinical data during transport for every patient. We ascertained the use of assisted ventilation from mechanical ventilation records, including manual ventilation with a bag-valve-mask device. We defined baseline hemodynamic instability as the presence of any of the following before crew departure from the sending site: systolic blood pressure of less than 80 mm Hg, mean arterial pressure of less than 60 mm Hg, or the administration of vasopressors (dopamine, norepinephrine, or epinephrine infusions). We assigned each transport to 1 of 7 diagnostic categories (respiratory, cardiovascular, trauma, neurologic, surgical, obstetric, and other medical diagnoses) according to coding of the primary diagnosis by the paramedic crew. Straight-line distances were imputed from global positioning system coordinates of the sending and receiving sites. Patient preparation time was defined as time between the arrival of the transport crew at the sending facility to their departure, and transport duration as time between departure from the sending facility to patient handover at the receiving facility.

**Outcome Measures**

The primary outcome was the occurrence of in-transit critical events (Figure 1). As defined by previous studies, we defined

Download English Version:

<https://daneshyari.com/en/article/3228909>

Download Persian Version:

<https://daneshyari.com/article/3228909>

[Daneshyari.com](https://daneshyari.com)