



Review of Ornge Air Ambulance Transport Related Deaths

Office of the Chief Coroner for Ontario

July 2013

Dear Ontarians,

It is our privilege to submit this report on the review of deaths in which concerns related to air ambulance transport were identified. The Expert Panel makes 25 recommendations in the areas of:

- Decision Making
- Response Process
- International Transports
- Communication
- Aircraft/Equipment
- Staffing
- Paramedic Training/Education/Certification
- Investigation/Quality Assurance

This Review arises from concerns expressed by Ontarians regarding our air ambulance system, and specifically, whether operational issues related to air transport might have caused or contributed to a fatal outcome in some cases. The motto of the Office of the Chief Coroner is, "We Speak for the Dead to Protect the Living;" therefore, these concerns were reviewed and addressed with the utmost diligence by the Office of the Chief Coroner.

It is our hope that this report and its recommendations will give voice to those who have lost their lives, and that from the tragedy of their deaths may come hope for a safer Ontario in which its citizens receive the highest possible level of care.

We would be remiss if we did not take this opportunity to acknowledge and mourn the four Ornge crew members who lost their lives in a helicopter crash near Moosonee, Ontario in late May, 2013. Their deaths serve as a reminder to all Ontarians of the dedication and professionalism demonstrated every day by Ornge's paramedics, pilots and flight operations and administrative staff, and their commitment to the provision of excellent air ambulance services to the people of Ontario.

Sincerely,



Craig Muir, BSc (Hons), MD, FRCSC, FACS
Regional Supervising Coroner
Chair – Ornge Air Ambulance Review



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Executive Summary

The Office of the Chief Coroner conducted a detailed review of deaths in Ontario involving air ambulance transport from January 1st 2006 to June 30th 2012 to systematically identify and review all known cases in which operational issues related to the air ambulance transport may have caused or contributed to the death.

An Expert Panel was formed under the auspices of the Patient Safety Review Committee (PSRC) of the Office of the Chief Coroner. The PSRC provided input to the Expert Panel throughout the process, including the findings and recommendations.

After screening hundreds of cases in which a death occurred following a request for air ambulance transport, the Expert Panel identified 40 cases which met the criteria for this Review. A full review of these cases was conducted independently by each member of the Expert Panel. For each case, the Panel Members were asked to provide their opinions on two separate questions:

- To what degree did the identified operational issue(s) impact the outcome of the case (No Impact; Possible Impact; Probable Impact; or Definite Impact)?
- Notwithstanding whether the operational issue(s) in the case impacted the outcome, are there recommendations that arise from the case which might improve care and prevent deaths in similar circumstances in the future?

Of the 40 cases reviewed, the Expert Panel concluded that in 32 cases there was No Impact on the outcome. In five cases there was a Possible Impact; in one there was Probable Impact; and in two cases there was a Definite Impact on the outcome.

The Expert Panel identified eight themes into which the operational issues were categorized, each of which gave rise to one or more recommendations:

- Decision-Making (5 recommendations)
- Response Process (5 recommendations)
- International Transports (1 recommendation)
- Communication (4 recommendations)
- Aircraft/Equipment (5 recommendations)
- Staffing (1 recommendation)
- Paramedic Training/Education/Certification (1 recommendation)
- Investigation/Quality Assurance (3 recommendations)

In all, the Expert Panel made 25 recommendations directed to Ornge and/or the Ministry of Health and Long-Term Care (MOHLTC).

Acknowledgments

The Expert Panel consisted of Dr. Craig Muir as Chair, Dr. Dan Cass, Dr. John Tallon and Dr. Jon Dreyer, with executive support from Ms. Emily Coleman and Ms. Dorothy Zwolakowski. The team would like to acknowledge the following for their invaluable contributions to this Review:

Families of the deceased for providing information to inform our report.

Ornge and Ministry of Health and Long-Term Care – Emergency Health Services Branch for their responsiveness to our information requests.

Introduction

Air Ambulance Services in Ontario

Throughout Ontario, sick and injured persons are transported to hospital and also between facilities by air and land ambulances. Ornge is responsible for the provision of all air ambulance transports in Ontario, as well as some critical care land transports. As with any provincial government agency, responsibility for oversight is held by the Government of Ontario. Oversight for the ambulance services delivered by Ornge is provided by the Ministry of Health and Long-Term Care (MOHLTC). Adherence with legislation, regulations and standards for air (and land) transport is overseen by the MOHLTC Emergency Health Services Branch (EHS), while the recently-created MOHLTC Air Ambulance Oversight Program administers a performance agreement with Ornge.¹

Air ambulances consist of a mixture of fixed-wing and rotary-wing (helicopter) aircraft, and most are owned and operated by Ornge. On occasion, Ornge may contract with charter operators for fixed-wing transports, depending on the availability of Ornge aircraft. Patient care during air ambulance transports is provided by paramedics with varying levels of training and skills: i) Primary Care Paramedics (PCPs), ii) Advanced Care Paramedics (ACPs) and, lii) Critical Care Paramedics (CCPs). The level of care required for a given patient determines the level of paramedic assigned to the transport, with PCPs providing care to the least critical patients and CCPs assigned to the most critical.

To coordinate and deliver care across Ontario's large and diverse geography, Ornge operates the Ornge Communications Centre. This call centre is located in Mississauga, and receives requests for both air and land ambulance services across the province. Calls are prioritized and operational and medical decisions are made in an attempt to ensure that transport occurs as quickly as possible, dispatching the most appropriate type of aircraft and paramedics. Operational decisions (such as fixed-wing versus rotary-wing, which aircraft is assigned, etc.) are made by the dispatcher at the Ornge Communication Centre in conjunction with other flight operations and supervisory staff as needed. Medical decisions concerning the urgency of the call, level of paramedics required, and priority of response when two or more calls of equal urgency occur simultaneously are made by the Transport Medicine Physician (TMP).

Air ambulance transports are of two general types. The most frequent are inter-facility transfers, in which an ill or injured patient is transported to a facility with advanced or specialized care not available at the sending facility. An example of this would be the transfer of a patient with a brain haemorrhage from a community hospital to a neurosurgical centre. The second type of response provided by Ornge involves scene calls, in which an air ambulance (almost always a rotary-wing aircraft) responds directly to the scene of an incident. A common example would be a helicopter landing at the scene of a motor vehicle collision and transporting the patient directly to a trauma centre. Sometimes these responses need to be executed as "modified scene calls." In these cases, the land ambulance initiates patient transport to the nearest hospital where they are met by the air ambulance transport team, who then transfer the patient to definitive care.

Ornge air ambulance calls are prioritized by level of urgency similar to the coding system used by land ambulances in Ontario. These codes are reflected in the Dispatch Priority Code Index System and are regulated by the MOHLTC Central Ambulance Communications. These priorities are: i) Emergent (equal to code 4), ii) Urgent (equal to code 3), and iii) Non Urgent (equal to codes 1 and 2).²

Ornge services include both land and air transport for adult and paediatric patients, and for organ donation support. Ornge averages 27,213 requests for transport per fiscal year. Approximately two thirds of these calls

¹ Ornge. Performance Agreement. Available from http://www.ornge.ca/SiteCollectionDocuments/Amended_Performance_Agreement_MOHLTC_Ornge_March_2012.pdf Accessed 08 June 2013.

² Ministry of Health and Long-Term Care – Emergency Health Services Branch. Dispatch Priority Code Index System (DPCI II). Version 1.3. February 2009.

result in a patient transport. Approximately 90% of these calls are for inter-facility transfers. A full breakdown of calls for the period of this Review was not available due to the type of information management system used at Ornge prior to upgrades that occurred in 2008-09. However, as demonstrated in Figure 1, the numbers of air transport calls are relatively consistent throughout the years for which data are available.

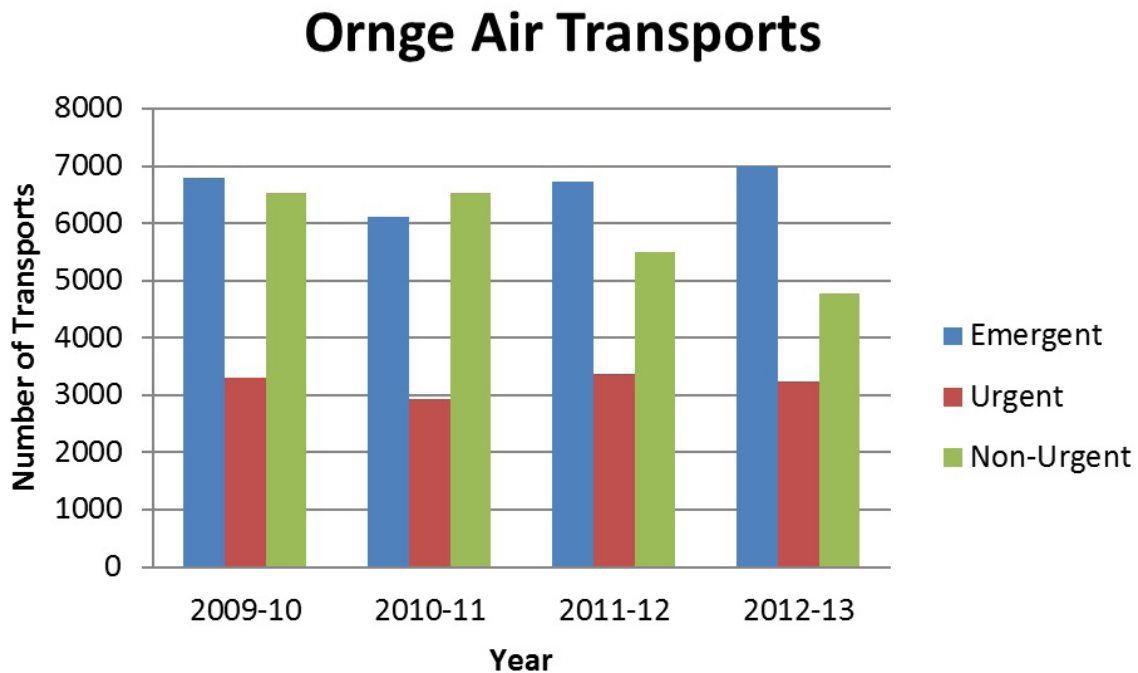


Figure 1. Number of air transport calls to Ornge per year from 2009-2013.

Enhancing Public Confidence in Ontario’s Air Ambulance System

Ontarians rely upon our health care system when they are ill or injured. Public confidence in that system is of critical importance. Ontario’s air ambulance system is a key component of the health care system, and is of particular importance to those living in remote communities located a long distance from specialized medical services.

This Review was undertaken in order to examine concerns related to air ambulance transport in Ontario, to identify any cases in which operational issues related to Ornge may have caused or contributed to a death, and to make recommendations to improve the quality of air ambulance transport with a view of preventing future deaths. It is hoped that, through the process of this Review and the implementation of its recommendations, public confidence in Ontario’s air ambulance system will be enhanced.

Overview

i) Background Leading Up to the Review

In late 2011, concerns began to arise regarding Ornge, and in particular, its management and oversight. In addition to allegations of fiscal mismanagement, questions were raised by politicians and members of the public as to whether the issues at Ornge were affecting care provided to patients. Around the same time, the MOHLTC-EHS Branch notified the Office of the Chief Coroner of a number of cases in which a death had occurred during or after air ambulance transport, and in which there were concerns that operational issues (such as delays in launch, or configuration of the cabin of the aircraft) may have had a negative impact on the care provided.

Ornge became the subject of greater public scrutiny after the release of the Auditor General's Report in March, 2012. Subsequently, a legislative review committee was struck and a criminal investigation by the Ontario Provincial Police into financial concerns at Ornge was announced.

The Office of the Chief Coroner issued a news release in June, 2012, stating that it had commenced investigations into approximately 10 deaths identified by EHS Branch where air ambulance services had been considered of potential relevance. Preliminary conclusions at that time revealed that the air transport service performance had not materially affected the outcome in any of the cases for which our investigation was complete.

Following this, concerns regarding the role of Ornge in a number of additional deaths were brought to the attention of the Office of the Chief Coroner. In response to these private and public concerns, the decision to conduct a more comprehensive review was announced on August 15, 2012. The Review was initiated by Dr. Dan Cass, then Deputy Chief Coroner – Investigations (now Interim Chief Coroner) and Chair of the Patient Safety Review Committee of the Office of the Chief Coroner, and led by Dr. Craig Muir, Regional Supervising Coroner, Sudbury Office.

ii) Purpose

The purpose of this Review was to systematically identify and review all known deaths involving air transport by Ornge between January 1, 2006, and June 30, 2012 in which there was a potential impact of Ornge operations on patient outcome. The Expert Panel was asked to review the facts surrounding these individual cases and:

- Provide an opinion as to whether the operational issues regarding air ambulance transport could potentially have caused or contributed to the outcome; and
- Notwithstanding the conclusion regarding impact, to make recommendations arising from these cases aimed at preventing future deaths.

iii) Statutory Basis for the Review

The work of the Office of the Chief Coroner is governed by the *Coroners Act* which provides the statutory basis and mandate for reviews, and for the dissemination of recommendations arising from them:

Chief Coroner and Duties

4. (1) The Lieutenant Governor in Council may appoint a coroner to be Chief Coroner for Ontario who shall, [...]

- (d) bring the findings and recommendations of coroners' investigations and coroners' juries to the attention of appropriate persons, agencies and ministries of government;

Duty to give information

10. (1) Every person who has reason to believe that a deceased person died,
- (a) as a result of,
 - (i) violence,
 - (ii) misadventure,
 - (iii) negligence,
 - (iv) misconduct, or
 - (v) malpractice;
 - (b) by unfair means;
 - (c) during pregnancy or following pregnancy in circumstances that might reasonably be attributable thereto;
 - (d) suddenly and unexpectedly;
 - (e) from disease or sickness for which he or she was not treated by a legally qualified medical practitioner;
 - (f) from any cause other than disease; or
 - (g) under such circumstances as may require investigation,

shall immediately notify a coroner or a police officer of the facts and circumstances relating to the death, and where a police officer is notified he or she shall in turn immediately notify the coroner of such facts and circumstances. R.S.O. 1990, c. C.37, s. 10 (1).

Coroner's investigation

15. (1) Where a coroner is informed that there is in his or her jurisdiction the body of a person and that there is reason to believe that the person died in any of the circumstances mentioned in Section 10, the coroner shall issue a warrant to take possession of the body and shall examine the body and make such investigation as, in the opinion of the coroner, is necessary in the public interest to enable the coroner,
- (a) to determine the answers to the questions set out in subsection 31 (1);
 - (b) to determine whether or not an inquest is necessary; and
 - (c) to collect and analyze information about the death in order to prevent further deaths in similar circumstances.
- 2009, c. 15, s. 7 (1).

Expert assistance

15. (4) Subject to the approval of the Chief Coroner, a coroner may obtain assistance or retain expert services for all or any part of his or her investigation or inquest. R.S.O. 1990, c. C.37, s. 15 (4).

Investigative powers

16. (1) A coroner may,
- (a) examine or take possession of any dead body, or both; and
 - (b) enter and inspect any place where a dead body is and any place from which the coroner has reasonable grounds for believing the body was removed. R.S.O. 1990, c. C.37, s. 16 (1); 2009, c. 15, s. 8.

Idem

- (2) A coroner who believes on reasonable and probable grounds that to do so is necessary for the purposes of the investigation may,

- (a) inspect any place in which the deceased person was, or in which the coroner has reasonable grounds to believe the deceased person was, prior to his or her death;
- (b) inspect and extract information from any records or writings relating to the deceased or his or her circumstances and reproduce such copies therefrom as the coroner believes necessary;
- (c) seize anything that the coroner has reasonable grounds to believe is material to the purposes of the investigation. R.S.O. 1990, c. C.37, s. 16 (2).

Recommendations

18. (2) The coroner may make recommendations to the Chief Coroner with respect to the prevention of deaths in circumstances similar to those of the death that was the subject of the coroner's investigation. 2009, c. 15, s. 10.

Disclosure to the public

18. (3) The Chief Coroner shall bring the findings and recommendations of a coroner's investigation, which may include personal information as defined in the *Freedom of Information and Protection of Privacy Act*, to the attention of the public, or any segment of the public, if the Chief Coroner reasonably believes that it is necessary in the interests of public safety to do so. 2009, c. 15, s. 10.

iv) Expert Panel

An Expert Panel was formed under the auspices of the Patient Safety Review Committee of the Office of the Chief Coroner. The assistance of experts was obtained to ensure a comprehensive approach to the analysis, conclusions and recommendations. The Panel was chaired by Dr. Craig Muir, Regional Supervising Coroner, North Region, Sudbury Office, who is a former Chief of Surgery in Niagara, a general surgeon, and a commercial, multi-engine, instrument-rated pilot. Membership of the Expert Panel consisted of Dr. Dan Cass - Interim Chief Coroner for Ontario, Dr. John Tallon - Vice President of Medical Programs for British Columbia Emergency Health Services and Dr. Jon Dreyer - Emergency Department Lead for the South West Local Health Integration Network, Research Director of the Western University Division of Emergency Medicine, and Chief of Staff at Four Counties Hospital in Newbury.

v) Terms of Reference

The Terms of Reference developed for the Review state, in part, that the Panel was to examine appropriate cases to determine whether "issues pertaining to air ambulance transport by Ornge could potentially have caused or contributed to the outcome." The Expert Panel was to review individual cases and:

1. "provide an opinion as to whether the operational issues regarding air ambulance transport had an impact on the outcome; and,
2. make recommendations arising from these cases aimed at preventing similar deaths in the future."

For each case identified, reviewers were asked to provide an opinion as to whether air transport had "No Impact; Possible Impact; Probable Impact or Definite Impact" on the outcome. The full version of the Terms of Reference can be found in the Appendix.

Methodology

The focus of this Review was to examine deaths in which operational issues related to air ambulance transport may have caused or contributed to deaths, and to identify themes and recommendations aimed at improving care and preventing similar deaths in the future. Examples include, but were not limited to:

- delays in, and/or appropriateness of, decision-making regarding transport;
- delays in launch or coordination of transportation efforts;
- availability of appropriate paramedic staffing; and
- equipment issues (e.g. configuration of the aircraft's cabin).

The Review did not seek to identify or review cases in which the concerns related solely to the quality of care provided by individual paramedics, as such concerns at the level of the individual provider do not tend to lend themselves to the identification of system solutions. That being said, while performance issues of individual paramedics were beyond the scope of the Review, when such issues were identified in the cases reviewed, they were considered in order to inform systemic recommendations around paramedic education and certification.

The following sections describe the identification of potential cases and the process by which final cases were selected for detailed review.

Inclusion Criteria

The time period for cases included in the Review was January 1, 2006 to June 30, 2012. The review period start date was chosen to coincide with the creation of the independent agency (later renamed Ornge) mandated to provide air ambulance services in Ontario. Deaths were considered for review if concerns regarding air ambulance transport were identified by one or more of: an investigating coroner and/or Regional Supervising Coroner; a family member of the decedent; the MOHLTC-EHS Branch, Ornge, or a member of the public (including Members of Provincial Parliament).

Process for Identification of Cases

It was of paramount importance to make every effort to ensure that all potential cases were identified for consideration for the purposes of this Review. In addition to cases already known to the Office of the Chief Coroner, a request was made to the MOHLTC-EHS Branch, Investigative Services to forward all pertinent case reviews which they had undertaken. A similar request was made to Ornge to identify cases which met the Review's inclusion criteria. Media reports were tracked and communication from individual families and/or Members of Provincial Parliament were cross-referenced to ensure that all of these cases were considered. Many cases were ultimately identified by more than one of the above sources. CritiCall Ontario (the Ministry of Health and Long-Term Care's emergency consultation and referral service) was also approached for input of cases but staff were unable to identify cases specific to Ornge operational issues.

These multiple sources and searches required cross-referencing and sometimes further searches to ensure all relevant documentation was obtained before potential cases were moved on to the vetting process.

Vetting Process

The Terms of Reference for the Review state: "A case definition and audit tool will be developed with input from Panel members. Using the audit tool, a preliminary review of identified cases will be conducted by Drs. Muir and Cass." However, as the review of cases began, it was decided that all members of the Panel would participate in the vetting procedure, in order to ensure a full and fair process. This change occurred within the provisions of the Terms of Reference, which state that, "The Terms of Reference may be modified by the Chair of the Patient Safety Review Committee and/or the Chief Coroner."

Each case was then vetted independently by each of the four reviewers on the Expert Panel, in order to determine if the case met inclusion criteria. The vetting process was designed to err on the side of inclusion of cases. For example, if any one of the four reviewers felt the case met inclusion criteria, the case was flagged as potentially reviewable, or 'In'. With further clarification of facts related to the case or as additional documentation was obtained, the inclusion or exclusion of the case was often easily resolved. If any difference of opinion remained, the case was included for detailed review.

It must be noted that the decision to vet a case as not requiring review, or 'Out', was not necessarily based on the validity of a complaint or a concern, but rather, on the nature of the case as it related to the stated purposes of the Review.

Case Review Process

Most of the cases identified for review had already been the subject of a coroner's investigation given that the circumstances of the deaths met criteria set out in Section 10 of the *Coroners Act*. This would include deaths resulting from trauma, sudden and unexpected medical deaths, and deaths in which concerns about medical care had been raised by family members or health care providers. However, a small number of deaths identified for review were natural deaths for which a coroner had not been notified at the time, and therefore a coroner's investigation had not taken place. For these cases, an investigation was initiated for the purposes of this Review using the criterion set out in Section 10(1)(g) of the *Coroners Act*, "under such circumstances as may require investigation."

Case files typically contained a Coroner's Investigation Statement, a Report of Post Mortem Examination (if performed), police reports, and relevant medical records. For each case identified for review, a Coroner's Authority to Seize was issued to both the MOHLTC-EHS Branch and to Ornge, in order to obtain any internal investigation reports not already in the possession of the Office of the Chief Coroner. Additional materials necessary for the purposes of the Review were similarly obtained using the powers set out in Section 16 of the *Coroners Act*.

Each case file underwent independent primary and secondary reviews by Drs. Muir and Cass. These were performed using an audit tool designed for this Review, which captured details regarding the medical circumstances of the death, the time sequence of the air ambulance response, the operational issues identified, and other details relevant to the Review.

Drs. Tallon and Dreyer were then electronically provided with all relevant materials from the case file, as well as the completed audit tool from the primary and secondary reviews. Each of the four reviewers was asked to rate the degree of impact of the operational issues on the outcome (No Impact; Possible Impact; Probable Impact; Definite

Impact). In addition, each reviewer was asked to contribute to the identification of themes and recommendations arising from each case. These assessments were done independently by each of the reviewers over several months, as files became ready for review.

Throughout the course of the Review, teleconference meetings were held as required between the Expert Panel members in order to clarify issues and discrepancies, and in an effort to achieve consensus, where possible, in terms of conclusions regarding a given case. In some instances, Panel members identified the need to obtain additional information or documents in order to inform the case review and conclusions. These were subsequently obtained and provided to Panel members.

On April 29, 2013, a meeting of the Expert Panel took place in Toronto. Each of the included cases was reviewed, with a significant portion of time being devoted to cases in which complete consensus had not previously been achieved with respect to impact or issues identified. By the conclusion of the Expert Panel meeting, complete consensus had been achieved on all but two cases. Additional documents were required to clarify issues related to the two remaining cases. These materials were provided to the Expert Panel members following the meeting, and after further discussions, complete consensus by all four Expert Panel members was achieved in all cases.

Ultimately, the Expert Panel had to determine whether or not the operational issues in each case had an impact on the death of the patient. This was categorized using the following criteria:

No Impact	The operational issues that occurred surrounding or during the air ambulance transport had No Impact on the death of the patient.
Possible Impact	It is conceivable that the operational issues that occurred surrounding or during the air ambulance transport in the case caused or contributed to the death of the patient.
Probable Impact	It is likely that the operational issues that occurred surrounding or during the air ambulance transport caused or contributed to the death of the patient.
Definite Impact	The operational issues that occurred surrounding or during the air ambulance transporting the case directly caused or contributed to the death of the patient.

Results

Cases Identified for Consideration

The Office of the Chief Coroner conducted a search of all coroners' investigation files within the review period in which there may have been Ornge air ambulance involvement. This search yielded nearly 300 cases in addition to the 19 cases already known at the time this Review was announced. In the vast majority of cases, reference to air ambulance transport within the investigation report was made in connection with the sequence of events prior to the death, but did not identify any concerns or issues. These files were independently screened by the Chair of the Expert Panel and an executive support member from the Office of the Chief Coroner to determine if the inclusion criteria were met. Approximately 4% of these cases were included for vetting by the Expert Panel.

Ornge and the MOHLTC-EHS Branch were then asked to conduct a review of their respective case files within the time period of the Review to assist the Office of the Chief Coroner in identifying cases in which a patient died during or following transport and in which there were concerns identified with respect to the air ambulance transport itself. Such concerns may have pertained to the patient care provided, operational issues related to the air ambulance response or any other issues which may have been identified by either organization. These requests yielded an additional 52 cases for vetting by the Expert Panel.

It is worth noting that several cases were identified for consideration through more than one source. The source by which potential cases were identified for screening is shown in Figure 2 below.

Initial Case Identification

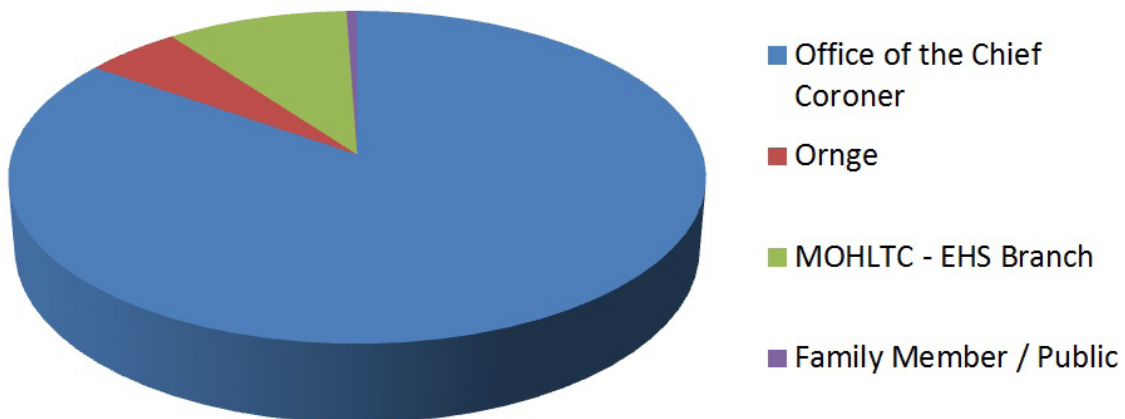


Figure 2. Demonstrates a breakdown of the ratio of cases identified for consideration by all sources.

Final Case Selection

The above process yielded nearly 400 cases identified for consideration. Criteria for formal vetting were met in 68 cases.

Cases were not included if:

- There was no identified delay or other operational concern related to air transport.
- The delays were determined to be unrelated to air ambulance transport. Examples of such delays were those occurring because of land transport delays, weather incompatible with air transport, delays related solely to sending or receiving facilities, and/or unrelated changes in a patient's condition.
- The transport was of a non-urgent nature and not related to death; or no air transport was involved, or indicated.

Of the 68 cases that underwent the formal vetting process, 40 were included in the Review and 28 cases were excluded. Figure 3, below, illustrates the source by which the 40 cases included in the Review were identified.

Case Identification (N=40)

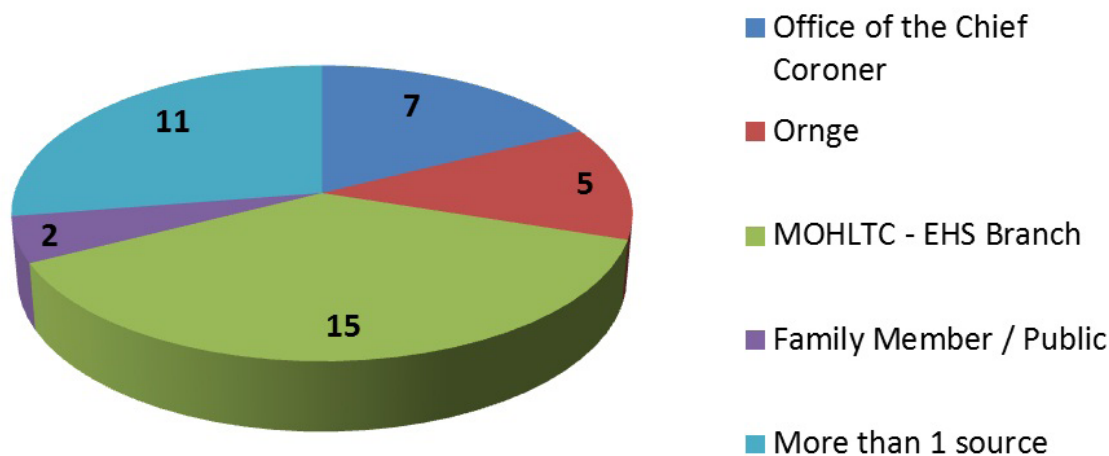


Figure 3. Depicts a breakdown of how the 40 cases included in the Review were identified to the Expert Panel.

Impact on Outcome

Of the 40 cases included in the Review, the Expert Panel concluded that in 32 cases, the identified issues related to air ambulance transport had No Impact on the outcome. In these cases, the patient's illness or injury was generally deemed so severe that the Panel concluded that the outcome of patient death would have been unchanged even if the air ambulance transport had been conducted in an ideal way. It is crucial to note, however, that even if the issues identified did not affect the outcome in a particular case, the issues were still felt to be instructive and relevant. In other words, even though the patient in a given case was felt to have non-survivable injuries or illness, it was still possible to learn from the identified operational issues in order to improve care for another instance in which a more effective response could result in a different outcome. These issues and themes were captured in all cases and collated to identify opportunities in the formulation of recommendations and are detailed below in the section, "Discussion and Themes."

In the remaining eight cases, the Panel members concluded that the operational issues related to air ambulance transport may have contributed to or caused the fatal outcome. Of these eight cases, the Panel felt that these issues had a Possible Impact in five, a Probable Impact in one, and a Definite Impact in two. Brief synopses of all cases in which there was felt to be an impact on the outcome are included below along with the identification of significant contributing systemic issues.

In order to put these numbers into context, it is important to consider the volume of air transports conducted by Ornge during the time period of the Review. While it is difficult to provide an exact applicable denominator, this may be estimated by considering the average number of urgent and emergent transports per year as described in the Introduction, above. Given an average of 6,662 urgent and 3,211 emergent transports per year, over a six and one-half year period, the total number of applicable transports is approximately 64,174. Thus, the 40 cases identified for review represent about 0.06% of all urgent or emergent transports or less than one out of every 1,600. Those in which operational issues were thought to have had some degree of impact on outcome represent an even smaller percentage: 0.012%, or less than one in every 8,000 urgent or emergent transports.

Cases with Potential Impact

Case # 1 – Possible Impact

This 55 year old man had a past medical history of heart disease. He presented to a community hospital in northern Ontario at 0620h with right-sided paralysis and severe weakness that he noted upon waking up that day. At 1500h he experienced a seizure lasting approximately 10 minutes. Medical imaging showed a blood clot in an artery in his brain. This was treated with appropriate medications and arrangements were made for him to be transferred to a definitive care hospital in south-central Ontario.

The air ambulance was requested at 1752h. Ornge requested that the patient's medication be changed prior to transport which was done and confirmed with Ornge by 1840h. The air ambulance arrived at the patient at 2245h and the patient arrived at the receiving hospital at 0315h. He died two days later.

Cause of Death: Basilar Artery Thrombosis

Contributions to delays in this case included: decision-making related to triaging this call appropriately; knowing the available/appropriate paramedic staffing; and promptly dispatching an aircraft when priority and staffing were clarified.

The well-defined roles of the TMP (medical) and Ornge Communications Centre (operational) were not appropriately followed.

There were communication issues internally with Ornge Communications Centre not being aware of changes to paramedic staffing levels and externally with sending/receiving physicians, and updating of patient status throughout the delay period.

Despite these observations, reviewers agreed that there was only a small possibility that there was a material impact on outcome, given the timeline of the disease process and the narrow window of opportunity for optimal intervention.

Systemic Issues: Decision-Making; Response Process; Communication

Case # 2 – Possible Impact

This 51 year old diabetic man with heart disease presented to the emergency department at Hospital A (a community hospital in northern Ontario) at 1000h the day before his death. He was diagnosed with an inferior wall myocardial infarction (heart attack). No bed was available at Hospital A and therefore, an Ornge air ambulance was requested for patient transfer to Hospital B (a regional hospital in northern Ontario) for definitive treatment, including cardiac catheterization and attempts to re-open the blocked blood vessel.

The air ambulance was requested at 1742h, however acceptance by Ornge was delayed due to a staffing issue and the case was not accepted until 1912h. The patient was successfully transported, arriving in the receiving facility at 2340h but died three hours later in hospital.

Cause of Death: Acute Coronary Syndrome

This case raises the issue of being able to establish and communicate to clinical decision makers the expected timelines for air transport versus land transport. Situational factors may influence such transport times and need to be communicated in order to inform appropriate choices. In this case, transport by land ambulance could have been achieved more quickly than occurred via air ambulance. Delay in transport, and therefore in receiving definitive care, clearly occurred, and reviewers agreed that there was a possible impact on outcome.

Systemic Issues: Decision-Making; Communication; Staffing

Case #3– Possible Impact

This 76 year old male presented to the emergency department of a community hospital in northern Ontario. Medical imaging showed an aortic dissection (a tearing of the wall of the large artery leading from the heart to the rest of the body). He was transferred by Ornge to a centre able to provide more definitive care but subsequently died in the operating room.

Cause of Death: Aortic Dissection

The air transport challenge was that of assigning an appropriately staffed aircraft when one was just completing a previous call, and when a shift change (pilots and medics) was imminent. This decision-making was not guided sufficiently by timely clinical input from the TMP. Weather was also a factor. There was further delay waiting for paramedics to arrive at the charter aircraft used for the call. The prognosis of the patient's underlying condition was recognized to be poor, but these delays possibly impacted the outcome.

Systemic Issue: Decision-Making; Communication; Staffing

Case #4– Possible Impact

This 60 year old female had an extensive past medical history of chronic lung disease, heart failure and diabetes. She was oxygen dependant at home and had many exacerbations of her lung disease requiring frequent hospitalizations.

The day prior to her death, she presented to a First Nations nursing station where it was felt that she would need to be transported via air ambulance to a regional hospital for care. However, because no beds were available at the time, a decision was made to treat her at the nursing station with intravenous antibiotics and fluids. The transfer would be arranged the following morning. The patient instead chose to return to her home overnight, with a plan to return in the morning for transport out of the community. However, her condition deteriorated and she returned to the nursing station at 0300h. She was much sicker, confused, hypoxic (low oxygen) and in severe respiratory distress. Arrangements were made for transfer to an Intensive Care Unit.

Air ambulance was requested and arrived at the nursing station at 0807h. The crew found her to be critically ill and attempted to intubate her with difficulty. The patient deteriorated and died before transport from the nursing station could be initiated.

Cause of Death: Pneumonia

This case involved a relatively rapid, unexpected change in the patient's clinical status, complicated by delays in departure (both avoidable and unavoidable) and also a lack of clarity regarding "Do Not Resuscitate" (DNR) status. This combination resulted in a time-sensitive scenario regarding intubation and respiratory support. Reviewers agreed that there was a possible impact on outcome.

Systemic Issues: Response Process; Communication

Case #5 – Possible Impact

This 70 year old male had a past medical history of diabetes, heart disease, and glaucoma. He attended a community hospital in central Ontario on the day of his death and reported feeling unwell and being unable to walk. He then had a seizure in the emergency room. Medical imaging demonstrated bleeding in the brain, fractures in his spine and pelvis, and a collapsed lung. This was felt to represent trauma that had not been identified from the initial history obtained from the patient. He was stabilized and transferred by air ambulance to a health science centre where he was pronounced dead.

Cause of Death: Epidural Hematoma

The combination of a series of delays was significant. These delays related to request for transfer, acceptance, departure (including unavoidable mechanical issues) and coordination of land transport at the receiving hospital. The reviewers agreed that there may have an impact on outcome, but also recognized the significant medical conditions which were present.

Systemic Issues: Response Process; Communication

Case #6– Probable Impact

This 50 year old male had a past medical history of alcoholism and chronic back pain. Reportedly, he had been found at home disorientated and with a loss of consciousness. He was taken by ambulance to a remote community health centre where he was found to be critically ill with an infection, high blood pressure, high blood sugar and decreased level of consciousness. He was stabilized in the emergency department and CriteCall was engaged to facilitate air ambulance transfer to a major health science centre for further treatment.

Transport was by fixed-wing charter aircraft. There were difficulties on the transfer flight with compatibility between the aircraft and the paramedic equipment (namely the oxygen tubing for the transport ventilator) which required the patient to be manually ventilated. Additionally, there were communication and logistical issues in coordinating the land ambulance to meet the fixed-wing aircraft for transfer to hospital which added a delay of approximately 30 minutes. The patient was pronounced dead upon arrival at the definitive care hospital.

Cause of Death: Bilateral Lobar Pneumonia

This case illustrates the difficulties faced by the Expert Panel in ascribing impact based on air transport issues versus patient care issues in some cases. The air transport issues included challenges in assigning an appropriate aircraft when significant weather limitations existed, and then notifying land ambulance providers of the decisions and expectations for rendezvous with the air ambulance. Timely complementary land transport was an issue at both the sending and receiving facilities. The reviewers agreed that the most significant issue affecting the outcome was related to adequacy of ventilatory support given concerns about supplemental oxygen concentration and ventilation adequacy. These issues arose because the paramedics were not able to use the transport ventilator due to incompatibilities with onboard equipment in the charter aircraft.

Systemic Issues: Response Process; Communication; Aircraft/Equipment; Paramedic Training/Education

Case #7 –Definite Impact

This 17 year old male with a history of depression was found by his mother with a self-inflicted shotgun wound to his face. He was stabilized at Hospital A (a community hospital in northern Ontario) with a Glasgow Coma Score (GCS) of 15 (normal), and transported to Hospital B (a community hospital in another province) via air ambulance. Prior to transport, he was intubated with difficulty due to significant distortion of the airway anatomy due to the shotgun injuries to the face. During the transfer, the patient became agitated and extubated himself (removed his medical therapeutic airway). This self-extubation was followed by a failure to re-intubate, profound hypoxia (lack of oxygen) and a cardiac arrest which lasted 25 minutes with ongoing resuscitation efforts. While the paramedics had been provided with orders by the TMP for medications for sedation and chemical immobilization of the patient, these medications were not administered in a manner which prevented the self-extubation.

The patient was resuscitated with return of pulse, but he subsequently died. The autopsy showed cerebral edema (brain swelling) and herniation (compression of the swollen brain through openings in the skull).

Cause of Death: Gun Shot Wound to the Head

The transport delays associated with this case included decisions regarding the triaging of two challenging simultaneous cases, unavoidable mechanical delay in departure to the sending facility and lack of timely coordination with land ambulance on arrival at the receiving airport. These were considered significant by the reviewers, although in themselves would not likely have caused or contributed to the death.

In investigating these operational issues, however, the reviewers identified concerns with respect to the medical care provided by transport personnel. The fact that the patient was able to extubate himself, with subsequent hypoxic insult, generated significant debate amongst the reviewers with respect to the impact on outcome. There was controversy as to how to interpret the post mortem examination report and the relative contributions of the gunshot wound and the hypoxic brain insult to the cause of death. A neuropathologist was asked to independently review the available information and concluded that, based on the information available, the hypoxia indeed made a significant contribution to the death. Further discussion with the original forensic pathologist corroborated the conclusion that the observed cerebral edema resulted largely from the hypoxic episode, rather than the original injury. Although, in general, the reviewers sought to clearly separate transport issues from individual paramedic care issues, the relevance of the care issues in this case could not be disregarded in assessing the impact on outcome.

It was the opinion of the reviewers that the systemic issues (particularly the delay in coordinating the transfer to the land ambulance), coupled with the lack of effective sedation and chemical immobilization of the patient, led to a circumstance where the extubation could occur, which ultimately had a definite impact on the death.

Systemic Issues: Response Process; Communication; Paramedic Training/Education/Certification

Case # 8 – Definite Impact

This 22 year old male had a history of drug and alcohol misuse, diabetes, and acute alcoholic pancreatitis. After a two day drinking binge followed by bloody vomiting, he presented to the local First Nations nursing station. He was treated and sent home. He returned to the nursing station the next day with worsening symptoms. He was transported via air ambulance to a community hospital in northern Ontario.

The patient required more extensive care than could be provided there, and arrangements were subsequently made to transfer him by air to receive definitive care at a centre in eastern Ontario. Staffing configuration was non-standard because of the sudden illness of a critical care paramedic during the call (a nurse from the Intensive Care Unit of the sending hospital replaced the ill critical care paramedic for the transfer, working with the remaining advanced care paramedic).

During this transport, the oxygen flow rate was set at 25 litres per minute (L/min) instead of the typical 15L/min. This resulted in the medical oxygen supply running out before landing, at which time the patient became vital signs absent. Resuscitation, including cardiopulmonary resuscitation, was initiated, and oxygen from the land ambulance was provided again after landing. Resuscitation efforts continued, but the patient was pronounced dead shortly after arrival in hospital.

Cause of Death: Adult Respiratory Distress Syndrome

The rate of oxygen flow from the aircraft system to the patient was set higher than intended or required for a portion of this flight, which resulted in the medical oxygen supply running out just prior to landing.

Given the underlying medical condition and the reason for transport, there was an associated abrupt clinical deterioration and cardiac arrest which followed, and oxygen could not be supplied until meeting the land ambulance approximately nine minutes later. Reviewers agreed that there was a definite impact on the outcome related to air transport/caregiver issues. The non-standard staffing configuration, and a lack of familiarity of the accompanying registered nurse with the equipment and aircraft, may have contributed to the potential for the error in oxygen flow rate setting.

Systemic Issues: Aircraft/Equipment; Paramedic Training/Education; Staffing

Discussion and Themes

In each case reviewed, regardless of whether or not there was an impact on outcome, the Expert Panel was asked to identify any operational issues related to the air ambulance transport. The aim was to identify systemic issues which may have compromised the effectiveness or efficiency of the air ambulance response, with a view to informing recommendations aimed at improving future care. Issues of quality of care provided at the level of individual paramedics, while beyond the scope of the Review, were considered when identified in the cases reviewed in order to inform systemic recommendations around paramedic education and certification.

Many of the cases had extensive reviews conducted by MOHLTC-EHS Branch and/or Ornge shortly after the transport occurred, in keeping with their mandate for reporting and reviewing critical incidents. As a result, issues which required attention often had been identified and corrective actions implemented (e.g. policy or protocol changes) prior to this Review. The Panel acknowledges these efforts; however, it was determined that all issues identified during the Review needed to be captured and reported, without an attempt to analyze whether any corrective actions already taken were sufficient to remedy the problem. We felt strongly that the onus should be on Ornge and/or the MOHLTC to indicate whether corrective actions had already been taken, or if further actions are required in response to the Expert Panel's recommendations.

The Expert Panel identified seven themes, which are outlined below. Although they are described separately, there may be a significant overlap in a given case, as they all have the potential to impact timely and appropriate response.

Decision-Making

For any given patient transport, decisions must be made regarding both medical and operational issues. As these represent distinct areas of expertise within the process of air transport, it is expected that medical professionals need to make medical decisions and operational professionals need to make operational decisions. The Expert Panel found that there were issues with decision-making in 21 of 40 cases. In many of these cases, medical professionals were making operational decisions and vice versa.

Decision-making in the context of appropriate allocation of acute medical air transport assets rests with the staff of the Ornge Communication Centre, who have knowledge of available transport resources, and the TMP, who triages the priority of individual patient transport requests. Although critically linked to expeditious transport, they must be considered independent to a certain degree. The Review determined that many avoidable delays occurred when the responsibility for different aspects of the decision-making became blurred. The issue was noted with equal frequency concerning the Ornge Communications Officer and the TMP in just over one-third of the cases reviewed. Each role requires full and up-to-date information. When appropriate information was not sought or made known to the decision maker, efficient and effective transport was potentially compromised.

The locus for this decision-making is, in part, internal to Ornge, but also involves information exchange with sending and receiving facilities, caregivers and associated land transportation providers. This is a very complex process, and the primacy of transport by the most expeditious and appropriate means is of paramount importance. Often the most appropriate form of transportation is not via air ambulance and this information and the rationale supporting this conclusion needs to be communicated and acted on promptly. Similarly, if the ability to meet expected timelines is impacted by unforeseen developments during the course of transport, revised decisions may be required and must be communicated. In one case, relative cost of modes of air transport (i.e. helicopter versus fixed-wing) was considered, and this ultimately contributed to the delay.

When many people become involved in the decision-making on a given case, the ability to maintain situational awareness may become compromised. For instance, when multiple call takers and flight planners take part in coordinating a flight, incomplete or inaccurate information hand-offs and lack of awareness of “the big picture” may result in incorrect decision-making. While such scenarios were noted to be a concern in only a relatively small number of cases included in the Review, the importance of this cannot be overstated.

Finally, a common misperception exists that air ambulance transport is the fastest, and therefore the most effective and efficient form of transport. This, however, is not always the case and needs to be considered in full when making decisions surrounding air versus land transport. The Expert Panel identified that appropriateness of transport was an issue in 15 of the 40 cases reviewed.

Recommendations: Decision-Making

To Ornge:

1. Decision-making around mode of transport (air versus land) for inter-facility transfers should be coordinated between the Ornge Transport Medicine Physician, Ornge operations staff, and, where possible, the sending and receiving physicians. This should include a consideration of the various options available, including the expected transfer times via each route.

Rationale: When a sending facility makes a request for air ambulance transport, there is no formal process to review the circumstances and determine if air is, in fact, the most appropriate option. In some situations, land transport may be quicker than air.

2. Decision-making by Transport Medicine Physicians should primarily focus on three areas: (i) the medical urgency of the call; (ii) the level of paramedic care required for the patient, and; (iii) the triaging of two or more calls of equal priority within a given response area. Transport Medicine Physicians should not make operational decisions, such as which aircraft is assigned to a call or when the aircraft is to launch.

Rationale: In some cases, the Transport Medicine Physicians strayed outside their area of expertise, and were making decisions of an operational nature. Such decisions should be made by staff in the Ornge Communications Centre who have the appropriate knowledge and expertise, and greater awareness of competing call priorities and pressures.

3. Decision-making with respect to assigning fixed-wing versus rotary-wing aircraft to a call should be based on patient-related factors (such as level of paramedic staffing and transport time), and not on relative cost of one mode versus the other at the expense of the timely provision of best possible care.

Rationale: In at least one case, the relative cost of transport between fixed and rotary-wing was factored into the decision-making process. This ultimately resulted in a delayed response and a possible impact on outcome.

4. If, in the course of a transport, it appears that an unanticipated delay will occur (due to weather or mechanical issues), the Transport Medicine Physician should be consulted so that a decision can be made whether or not to proceed with air versus land transport. Whenever possible, decision-making in such situations should involve input from the sending and receiving physicians.

Rationale: Significant delays sometimes occur after the call is triaged and the sending facility is provided with an estimated time of arrival of the air ambulance. In some cases, the Transport Medicine Physician and/or the sending physician and/or receiving physician were not made aware of the delay. This prevented informed decision-making and reconsideration as to the best option to ensure timely and appropriate transport of the patient.

5. Ornge should re-examine its staffing and communication procedures in the Ornge Communications Centre. Specifically, all reasonable efforts should be made to minimize hand-offs of a given call between call-takers and other Ornge Communications Centre staff, and to ensure that all Ornge Communications Centre staff maintain situational awareness of calls in progress, assets available, and other critical operational information.

Rationale: In several cases, it was apparent that decision-making was hampered by a lack of complete awareness on the part of the call-taker about both the call details and the options available for response. This problem was compounded when multiple calls were in progress simultaneously, and when multiple persons within the Ornge Communications Centre were managing the call.

Response Processes

Once a call is accepted, details obtained and the case triaged, it is critical that all steps required to launch an appropriate aircraft and crew for the situation commence without delay. In 60% (24 of 40) of the cases reviewed, the Expert Panel found that response times were delayed and therefore outside of industry guidelines. These delays were a mix of preventable and unpreventable delays.

Several cases were reviewed in which delays were incurred prior to the crew being fully alerted, or before the aircraft was prepared or authorized to depart, while further information was being sought to confirm the need for air transport (e.g. where a land ambulance was en route to a scene and air transport had also been requested). Such delays are additive and constitute preventable delays in these calls.

Scene responses are significantly different from inter-facility transports. Sending facilities have varying degrees of expertise, human resources and equipment available to diagnose and stabilize patients prior to transport. Resources available to nursing stations or very small facilities are often severely limited and it was not clear to reviewers that this was always considered in response decisions. In keeping with the overall intent for patient care, all unnecessary delays must be minimized in departing from the sending facility or scene for the destination hospital.

Although not specifically defined in the scope of this Review, it became clear to Panel members that some calls for provisions of Ornge air transport did not seem to be appropriate (15 cases). Serious consideration must be given to the most appropriate use of a precious resource. Simply put, if an air ambulance is tasked to transport a patient for whom air transport is not necessarily indicated or appropriate, the air ambulance becomes unavailable to transport a patient for whom air transport may make a difference. The expectations of caregivers (and the public) are significant and there is a responsibility to ensure appropriate, as well as timely, provision of this resource.

Examples of jurisdictions which provide published guidelines for air transport include Emergency Health Services Lifeflight in Nova Scotia³ and the Air Medical Physician Association⁴ based in the United States. These guidelines specify in significant detail appropriate indications for air transport for trauma and non-trauma cases in adult, paediatric and obstetrical populations.

³ Emergency Health Services –LifeFlight. Indications for Transport. Available from: <http://www.ehslifeflight.ca/indicationsfortransport/Pages/default.aspx> Accessed 15 May 2013

⁴ The Air Medical Physicians Association. Position Papers. Available from: <https://ampa.org/position-papers> Accessed 15 May 2013

Panel members also noted the particular challenges of responding to transport requests from northern Ontario. Nearly two thirds of the requests for air ambulance transfer are from northern Ontario, and 47% of the cases the Panel reviewed were from the north. This highlights the challenges faced in trying to establish an appropriate balance of distribution of human and equipment resources with population demographics and distances to institutions which can provide definitive care.

Recommendations - Response Processes

To Ornge:

6. Responses to remote nursing stations should be treated as scene calls, and not inter-facility transfers, in terms of their prioritization and level of paramedic care assigned.

Rationale: Nursing stations in remote northern communities are not staffed or equipped like community hospitals, and therefore the response needs to proceed as quickly as possible using the most immediately available paramedics, irrespective of whether they have Advanced or Critical Care certifications. This will avoid unnecessary delays in response.

7. When a request for a potential scene response is received, the nearest available rotary-wing aircraft should be pre-alerted. The pilots and paramedics should immediately perform any necessary preparation, and the helicopter should be readied and "rotored up" while awaiting confirmation.

Rationale: In several cases in which a potential air ambulance scene response was contemplated, a significant delay in departure occurred. Preparation of the aircraft for departure did not begin until several minutes after a land paramedic crew had arrived at the scene and the need for an air ambulance scene response was confirmed.

8. Once a request for a scene response is received, the helicopter should be airborne within ten minutes of the request unless this is precluded by extenuating circumstances. In such cases, the launch should proceed as soon as possible after the ten minute target.

Rationale: The Panel's understanding of the current protocol is that, when a request for a scene response is received, the crew is to prepare for launch. If a land paramedic crew is expected to be on scene within ten minutes, the launch is deferred until confirmation is received from the land crew. However, in some of the cases reviewed, when the land paramedics arrived on scene, their priority was (appropriately) the care of those injured, and there was an additional delay before confirmation was received from the land paramedics and the launch was authorized. In order to avoid this delay, once a scene response is requested, the launch should occur within ten minutes whenever possible, unless specific information is received from the scene to indicate that the air ambulance response is not required.

9. In modified scene responses, transfer of care to the air paramedic crew and departure of the air ambulance from the hospital should occur without delay.

Rationale: Modified scene responses occur when a land paramedic crew transports an ill or injured patient from the scene of the incident to the nearest hospital where they are met by the air ambulance paramedics. In some of these cases, a lack of understanding of how care should proceed resulted in delays in departure from the local hospital while additional medical investigations and interventions were performed. This runs contrary to the intent of the modified scene response, that being to ensure timely transport to a definitive care centre such as a Trauma Lead Hospital. Paramedics and Transport Medicine Physicians are sometimes inconsistent in their approach to such situations. This has led to delays in transport to definitive care.

10. Ornge should review their current policy and procedures with respect to responding to calls for patients who are vital signs absent at the scene with ongoing cardiopulmonary resuscitation. Such patients rarely, if ever, benefit from air ambulance transport, and such responses divert air ambulance and paramedic resources away from other patients with potentially survivable illness or injuries.

Rationale: The Panel reviewed cases in which an air ambulance response was initiated and/or continued when the patient was vital signs absent with ongoing cardiopulmonary resuscitation. When there is no response to initial resuscitation efforts by land paramedics, the survival rate for such patients is unfortunately essentially zero. Despite this, in some cases air ambulances were dispatched, and air paramedics were advised to continue cardiopulmonary resuscitation until arrival at the receiving hospital. This resulted in the air ambulance and paramedic crew being unavailable to respond to other calls where they may have had a positive impact on outcome.

International Transports

Occasionally, an appropriate response may involve cross-border transport to a receiving facility in the United States because of weather or distance/time issues, or lack of availability of an appropriate receiving hospital in Ontario. In some instances, delays have occurred due to the lack of availability of travel documents (i.e. passport) for the patient being transported. This has become a logistical challenge which should be addressed to eliminate additional sources of delay in patient access to emergency care.

Recommendation - International Transports

To Ornge and Ministry of Health and Long-Term Care:

11. Ornge and the Ministry of Health and Long-Term Care should work with the Canada Border Services Agency and United States Customs and Border Protection to ensure that delays do not occur when patients are transported across the border for emergency medical care.

Rationale: In at least one case, a transport was delayed in order to obtain the necessary travel documents for a patient who required emergency transport to a facility in the United States. There needs to be clear and universally understood and accepted processes to allow such transports to proceed without delay, even in the absence of the usual documents.

Communication

Efficient and effective communication is necessary to ensure the success of any aspect of medical care. This is especially true for an organization such as Ornge that operates in a fluid environment across a large, geographically diverse province. The Expert Panel found that in 60% (24 of 40) of the cases reviewed there were communication issues that affected the response to a call. These cases had a mixture of internal and/or external communication issues.

Timely and accurate communication is critical to both coordination of transport and patient care. Even for relatively straightforward transports, multiple people and agencies are necessarily involved and delays can be introduced by these multiple potential areas for miscommunication or lack of communication. Efforts to streamline and simplify procedures could have significant value in supporting transport efficiency.

In addition to the communication required to support decision-making, the actual ability for paramedic crews to communicate with the TMP was in some cases compromised by technological problems. Intermittent lack of cellular and even satellite telephone coverage hampered communication efforts with resultant delays or the inability to provide situational updates. It would appear to the Panel that these challenges continue to exist, particularly in remote areas.

Clarity with respect to the documentation of the applicable time zone created some difficulties for the Panel's assessment of potential delays in the extreme western part of the province (Central time zone) and the potential for confusion in communicated times should be recognized and addressed.

Recommendations - Communication

To Ornge:

12. Ornge should review and upgrade its communication technology with a view to preventing loss of communication between paramedics and the Transport Medicine Physician.

Rationale: In a number of cases, there was a loss of communication between paramedics and the Transport Medicine Physician because of a failure of the satellite telephone technology. This resulted in paramedics being unable to obtain direction from the Transport Medicine Physician in a timely fashion.

13. For calls involving more than one time zone, times referenced in communication and documentation should clearly identify the time zone in which the event is taking place.

Rationale: While most of Ontario falls within the Eastern time zone, north-western Ontario and Manitoba are in the Central time zone. During the Review, it was noted that with calls which involve transport from one time zone to another, the documentation is often confusing and difficult to analyze. Reference to the time zone in question, or alternatively, documenting all times with reference to the Eastern time zone, would resolve this issue.

To the Ministry of Health and Long-Term Care:

14. Greater integration and linkages are required between CritiCall and the Ornge Communication Centre in order to provide sending facilities/physicians with simpler and more seamless access to both critical care resources and air transport.

Rationale: The Patient Safety Review Committee noted that the current system is confusing, fragmented and siloed, and requires the sending facility/physician to first access a receiving hospital via CritiCall, and then separately access air ambulance transport for the patient, all the while attempting to provide care to the patient. It should be possible to have one point of contact to access all necessary resources to facilitate the transfer of a critically-ill or injured patient.

15. The Ministry of Health and Long-Term Care should develop an education program and materials to support a simplified process for sending facilities/physicians to access critical care resources and air ambulance transport. Both the process and the materials should be easy to understand, even by an inexperienced care provider in a remote location.

Rationale: The Patient Safety Review Committee expressed concern that the current system has a steep "learning curve" for care providers in order to understand the various processes for accessing critical care resources and air ambulance transportation. As a simplified, integrated process is developed, educational materials to support sending facilities/physicians in accessing these resources more easily should be developed.

Aircraft / Equipment

As with any type of complex equipment, mechanical issues can arise with aircraft. In 9 of the 40 cases reviewed the Expert Panel found that there were mechanical issues that likely affected response timelines.

It is important to note that mechanical issues can be both avoidable and unavoidable. Unavoidable mechanical issues are ones that cannot be mitigated in advance and must be dealt with once known. An example of an unavoidable mechanical problem is when a warning system indicates the development of a mechanical problem en route to a transport which needs to be further investigated by a mechanic before the flight can continue. Eight of the nine cases with mechanical issues had unavoidable delays. There was one case in which the delay was felt to have been completely avoidable.

The inability of paramedics to perform cardiopulmonary resuscitation during taxiing, take-off and landing in the newer AgustaWestland AW139 helicopters was publically known prior to the commencement of this Review. In addition, there were restrictions on the ability to transport the patient in the semi-sitting position during these same phases of flight in these aircraft. Reviewers noted several written and recorded concerns expressed by paramedics. The Expert Panel examined this issue closely and found that the issue of inability to perform cardiopulmonary resuscitation arose in three of the 40 cases reviewed. It is important to note however, that in these three cases, the inability to perform cardiopulmonary resuscitation did not contribute to the patient's death. The lack of a specific incident where this was of impact, however, does not make this concern any less valid. The Expert Panel felt that any aircraft used for air ambulance transport should allow for CPR and head-up positioning to be provided in all phases of flight.

In one case reviewed, a stretcher became jammed during removal from the AW139 aircraft, resulting in a delay of several minutes. This was of obvious concern to the Panel. This issue needs to be better defined and corrected.

From time to time, if Ornge resources are unavailable, charter aircraft are used by Ornge and staffed by Ornge paramedics. The compatibility of medical equipment with aircraft equipment must be seamless, regardless of the aircraft used. Cases were identified where this was not the case. Efforts are required to ensure that all medical equipment is compatible with all aircraft used for air ambulance transport.

The Expert Panel members were surprised to learn that, at present, regulations do not exist in Ontario governing medical equipment used in fixed-wing aircraft. This includes a lack of regulation of the amount of oxygen required for medical transport in fixed-wing aircraft. This gap needs to be rectified so that fixed-wing aircraft are subject to similar requirements as currently exist for rotary-wing aircraft used for air ambulance transport.

The focus of this Review was on systemic issues, rather than the medical care provided by individual paramedics. Three cases raised concerns that blurred the distinction between systemic and individual issues, and the Panel agreed that in these cases the air transport and medical care issues must be considered together. These cases related to oxygen and ventilation equipment and management of oxygen reserves. It should be noted that, in all cases where professional practice issues were identified by Ministry of Health and Long-Term Care and/or Ornge, they were subject to appropriate remedial action at the time they were identified.

Recommendations - Aircraft/Equipment

To Ornge:

16. All air ambulance cabins must permit paramedics to perform critical resuscitation activities (including cardiopulmonary resuscitation, and care delivery with the patient in the head-up position) without interruption in all phases of flight.

Rationale: In several cases, concerns were identified by paramedic crews about their inability to perform cardiopulmonary resuscitation in the new AW139 helicopters during taxiing, take-off and landing. Due to the design of the cabin, the stretcher must be turned 90 degrees (from a position parallel to the long axis of the helicopter, to a perpendicular position) in order to lower the stretcher for cardiopulmonary resuscitation or to fully elevate the head of the stretcher. Transport Canada requires that the stretcher be secured in the long axis position for taxiing, take-off and landing. This means that these activities would have to cease for several minutes during these phases of flight.

17. The current mechanism for securing the stretcher in the AW139 aircraft should be reviewed to ensure that incidents of the stretcher becoming “jammed” are avoided.

Rationale: In one case, a delay of several minutes occurred when the stretcher became jammed while the patient was being removed from the helicopter.

18. A review of oxygen equipment should be conducted on all aircraft used as air ambulances in Ontario. This should be done to ensure that excessive oxygen flow rates cannot inadvertently be selected, resulting in premature depletion of the oxygen supply onboard the aircraft. If high flow rates (i.e., 25 L/min) are not medically necessary, they should be disabled. If they are required, processes should be implemented (such as engineering designs, checklists, warning labels, etc.) to decrease the likelihood that such rates will be selected in error. Notwithstanding these preventative measures, the possibility of a warning system should be explored in order to alert care providers before the patient oxygen supply reaches a critical level.

Rationale: In one case, the oxygen supply onboard the aircraft was depleted due to the inadvertent setting of the oxygen flow rate at 25 L/min instead of the intended 15 L/min. This resulted in the patient becoming hypoxic and suffering a fatal cardiac arrest.

19. Ornge should ensure that all equipment used by air paramedics is compatible with all aircraft used for air ambulance transports (both aircraft operated by Ornge and charter aircraft).

Rationale: In two cases, there was incompatibility between paramedic equipment (such as transport ventilators) and equipment on charter aircraft that are used on an occasional basis by Ornge. In one such case, this required the paramedics to manually ventilate an intubated patient throughout a long transport, potentially compromising the effective ventilation of the patient and hindering their ability to perform other patient care activities.

To the Ministry of Health and Long-Term Care:

20. The Ministry of Health and Long-Term Care should amend provincial ambulance equipment standards to mandate the minimum standards for equipment available on fixed-wing aircraft used for patient transport. This should include standards regarding the minimum supply of oxygen available for use in patient care.

Rationale: The reviewers learned that provincial ambulance equipment standards currently exist for rotary-wing, but not for fixed-wing aircraft.

Staffing

The ability to ensure timely availability of appropriate staff for assignment to specific cases was not met in 24 of the cases included in this Review. This resulted in delays or the need to consider suboptimal options. Although some of these situations were unexpected (e.g., sudden paramedic illness), some were clearly anticipated, but not mitigated through appropriate contingency planning. An example of this occurred whenever paramedics exceeded the planned duration of their shifts due to completion of a late transport. Paramedics are required to have a certain minimum number of hours of rest time between shifts, and therefore the start of their next shift was pushed back to accommodate this off-duty time requirement. However, in many such cases, no attempt was made to back-fill the paramedics for the first few hours of the next day's scheduled shift, resulting in the aircraft being unavailable to respond during this period of time.

Recommendation - Staffing

To Ornge:

21. Ornge should review its policies, procedures and practices with respect to paramedic staffing, with a particular focus on preventing down-staffing of air ambulance units when paramedics exceed their hours of work ("duty day") on the previous shift.

Rationale: The current collective agreement with Ornge paramedics delineates maximum duty hours, and the minimum number of hours between shifts when paramedics exceed their usual shift duration. In a number of cases, air ambulances were either unstaffed or partially staffed for the first hours of the next scheduled shift, in order to allow for the minimum number of hours off between shifts. In other cases, paramedics who called in sick or who requested bereavement leave were not replaced. This resulted in air ambulances being unavailable to respond until full staffing was achieved. Greater efforts need to be made to ensure that, whenever possible, every shift is fully staffed for its entire duration with two paramedics.

Paramedic Education/Training/Certification

While, as previously noted, this Review was not intended to address possible concerns in these areas, cases were identified in which care concerns at the level of the individual paramedic(s) became an important consideration. In most such instances, these concerns related to management of the difficult airway and/or the intubated patient. As airway management is an integral component of the complex process of air transport, reviewers have included a recommendation that reinforces the need to review paramedic education, certification and ongoing training requirements.

Recommendation - Paramedic Education/Training/Certification

To Ornge:

22. Ornge should undertake a comprehensive review of the education, certification, and ongoing training of paramedics in advanced airway management, including management of the paediatric airway, with a view to ensuring that the highest standards are met and maintained.

Rationale: In a number of cases reviewed, issues or concerns were identified with respect to advanced airway management by paramedics (such as management of the difficult airway, and use of paralytic and sedative medications to facilitate intubation and/or safe transport). The way in which air paramedics are trained and certified, and the maintenance of their skills and knowledge, should be reviewed with the aim of ensuring the highest quality of airway management.

Investigation/Quality Assurance

All quality assurance programmes require tracking and reporting of key performance indicators. The ability to identify cases for inclusion in this Review was hampered by the fact that deaths within 24 hours of transport are not routinely captured by Ornge. There did not appear to be consistency in the way that cases were identified and reviewed by both Ministry of Health and Long-Term Care and Ornge. Recommendations 24 and 25 are suggested to help establish a more robust incident identification plan to support future quality improvement efforts and allow Ornge to more easily benchmark its performance against its peers.

Ornge has a performance agreement in place with Ministry of Health and Long-Term Care which outlines the expectations and standards by which Ornge is expected to abide. Section 9 of this performance agreement discusses the expectations surrounding policies and procedures. Specifically, the performance agreement states that “Ornge shall maintain, regularly review and update as necessary, comprehensive policies and procedures manuals with respect to the Services.”⁵ Additionally, the agreement states, “Ornge shall adhere to the policies and procedures in such manuals.”⁶ In this Review, the Office of the Chief Coroner found that in 73% (29 of 40) of cases reviewed, existing Ornge policies were not followed.

Finally, the Expert Panel members noted that in some Ministry of Health and Long-Term Care and/or Ornge investigations, key conversations and decision-making were not audio recorded. This presented significant challenges to the investigators (and Expert Panel) in accurately examining the root causes of issues in such cases.

⁵ Ornge. Performance Agreement. Available from http://www.ornge.ca/SiteCollectionDocuments/Amended_Performance_Agreement_MOHLTC_Ornge_March_2012.pdf Accessed 08 June 2013.

⁶ Ibid

Recommendations - Investigation/Quality Assurance

To Ornge:

23. All discussions and conversations related to air ambulance response should be audiotaped for the purposes of quality assurance, improvement and case review.

Rationale: In some cases, the ability for Ornge, the Ministry of Health and Long-Term Care, and/or the Expert Review Panel to understand the root causes of incidents was hampered by the lack of recorded communication. This required the reviewers to rely upon statements given after-the-fact by those involved. Such statements are subject to recollection bias.

To The Ministry of Health and Long-Term Care:

24. The Ministry of Health and Long-Term Care should review, and where necessary revise its policies with respect to which cases need to be reported by Ornge to the Ministry of Health and Long-Term Care for potential review. The aim would be to ensure that all cases involving a death, in which operational issues have been identified, are reported to the Ministry of Health and Long-Term Care Emergency Health Services Branch to facilitate independent review in a timely fashion.

Rationale: In the course of the Review, it became apparent to the Expert Panel that some cases involving significant operational issues (such as preventable delays to launch) were not brought to the attention of the Ministry of Health and Long-Term Care by Ornge. There needs to be enhanced clarity brought to these reporting requirements.

To Ornge and the Ministry of Health and Long-Term Care:

25. Ornge and the Ministry of Health and Long-Term Care should institute a process to track and identify all deaths that occur within 24 hours of air ambulance transport. This would permit comprehensive and timely investigation of cases in which operational concerns are identified, and allow Ornge to benchmark its performance against other jurisdictions.

Rationale: Throughout the course of this Review, the Expert Panel was aware that there is currently no process to flag deaths which occur within 24 hours of air ambulance transport. It is recognized that the majority of these deaths are the result of the severity of the patient's illness or injuries, and are not the result of operational issues. However, the ability to track such deaths would facilitate more timely review by Ornge and the Ministry of Health and Long-Term Care in cases in which such concerns are identified.

Limitations of this Review

As with any retrospective review of this complexity, there are limitations. In the case of this Review, the limitations are related to the identification of cases.

As previously mentioned, there are inconsistencies in the reporting of case issues between Ornge and the MOHLTC-EHS Branch. Additionally, Ornge underwent a software upgrade in 2008-09. Prior to that, their data collection was complicated and relied upon manual processes. This presented significant challenges in efforts to identify cases prior to this software upgrade. Moreover, it was determined that Ornge may be unaware of deaths which occurred in the hours or days following air transport, once paramedics had completed their involvement and handed over care of the patient to the receiving facility.

It must be stated that while determined efforts were made to identify all cases of deaths in which operational issues related to air transport may have existed, there is a possibility that not all applicable cases were captured in this Review. However, the Expert Panel members are confident that every reasonable effort was made to identify all relevant cases, and that the themes and recommendations arising from this Review reflect the best possible understanding of these issues.

Review Participants

Biographies from Expert Panel Members and Executive Support Team

Craig Muir, BSc (Hons), MD, FRCSC, FACS
Regional Supervising Coroner
Office of the Chief Coroner

Dr. Muir is currently the Regional Supervising Coroner for the North Region, Sudbury office. He has been an investigating coroner in Ontario since 2002.

Dr. Muir is a graduate of McMaster University School of Medicine, where he subsequently completed his surgical training. He has fellowships in General Surgery from the Royal College of Physicians and Surgeons of Canada and the American College of Surgeons. Prior to joining the Office of the Chief Coroner, Dr. Muir practiced general surgery in Niagara Falls where he served as Chief of Surgery. During and after the formation of the Niagara Health System he held various leadership roles including positions with Medical Staff, Chief of Surgery and the Regional Chair of the Utilization Committee. He also held a faculty position in the DeGroot School of Medicine, Surgery Programme at McMaster University. In addition to his surgical practice, Dr. Muir was a physician lead with the Ministry of Health and Long Term Care's Surgical Coaching programme, where he was involved in teams working with multiple surgical programs throughout Ontario. He is also a surveyor with Accreditation Canada.

Dan Cass, BSc, MD, FRCPC
Interim Chief Coroner
Chair, Patient Safety Review Committee
Office of the Chief Coroner

Dr. Cass was appointed as Interim Chief Coroner for Ontario in January, 2013. Dr. Cass has been a coroner since 2007 and was appointed Regional Supervising Coroner for Central Region - Toronto West in 2009 and then Deputy Chief Coroner of Investigations in May, 2012. He is a graduate of the University of Toronto Medical School, and has a Fellowship in Emergency Medicine from the Royal College of Physicians and Surgeons of Canada. Prior to joining the Office of the Chief Coroner, Dr. Cass was an emergency physician at a major trauma centre for 16 years. He is an Associate Professor in the Department of Medicine, Division of Emergency Medicine at the University of Toronto, and is a core member of the Centre for Patient Safety at the University of Toronto.

Dr. Cass has held membership on various national, provincial, university and hospital committees. He has published a number of papers in peer-reviewed academic journals and has given over 200 lectures and seminars as an invited presenter in venues ranging from local to international.

John M Tallon MD MSc FRCPC
Vice President, Medical Programs
Emergency and Health Services Commission

Dr. Tallon is currently Vice President of Medical Programs for British Columbia Emergency Health Services which includes the British Columbia Ambulance Service, Trauma Services BC and the BC Patient Transfer Network. He

also continues to work clinically in emergency medicine at Vancouver General Hospital. Having recently relocated from Nova Scotia to British Columbia, he is a professor in the Department of Emergency Medicine at Dalhousie University with cross appointments in the Departments of Anesthesia and Surgery as well as adjunct professor in the Department of Community Health and Epidemiology. He is the immediate past president of the Trauma Association of Canada. He is a surveyor for Accreditation Canada as well as a member of the Accreditation Canada Physician Advisory Committee. He completed his medical school at the University of Toronto where he graduated with honours and completed his Royal College emergency medicine training at the University of Calgary. In the past he has been Medical Director of the Lifeflight EHS, the Nova Scotia air medical program as well as provincial trauma director for Nova Scotia. His research interests include trauma systems, head injury and resuscitative airway management.

**Jonathan F. Dreyer, MD, CM, FRCPC,
Research Director, Professor,
Division of Emergency Medicine
Schulich School of Medicine and Dentistry Western University**

A graduate of McGill University and a residency in emergency medicine at the Johns Hopkins Hospital in Baltimore, Maryland, Dr. Dreyer has been in continuous practice of emergency medicine at Western University affiliated teaching hospitals since 1984. He is a past Chair of the OMA Section on Emergency Medicine, former Medical Director of the London Base Hospital for Prehospital Care and former Chief of Emergency Medicine at the London Health Sciences Centre. He is actively involved in Emergency Medical Systems and Health Services research. He holds an appointment at the level of Professor at the Schulich School of Medicine and Dentistry at Western University. He is presently the Emergency Department Lead for the South West Local Health Integration Network, Research Director of the Western University Division of Emergency Medicine, and Chief of Staff at Four Counties Hospital in Newbury.

**Dorothy Zwolakowski
Strategic Advisor, Office of the Chief Coroner**

Dorothy Zwolakowski is the Strategic Advisor to the Chief Coroner for Ontario. In her role she provides strategic advice on a variety of policy, operational and administrative matters within the Office of the Chief Coroner (OCC). Dorothy has been with the OCC since 2002, and is a graduate of the University of Toronto with a degree in Sociology and also holds a Certificate in Quality Management from the University of Manitoba. Dorothy has been a member of several death review teams within the OCC, including the Drowning Review, Cycling Death Review and Pedestrian Death Review.

**Emily Coleman
Executive Officer – Investigations, Office of the Chief Coroner**

Emily Coleman joined the Office of the Chief Coroner in 2004 and has held several different administrative and technical roles within the office since then. In her current role, Emily is responsible for providing executive support as well as planning and executing a wide variety of special projects for the OCC. Over recent years, Emily has been a member of several death review teams resulting in public safety recommendations within the OCC including the Drowning Review, Cycling Death Review and Pedestrian Death Review. Emily is a graduate of the University of Toronto with a specialist degree in Political Science.

Consolidated List of Recommendations

Recommendations - Decision-Making

To Ornge:

1. Decision-making around mode of transport (air versus land) for inter-facility transfers should be coordinated between the Ornge Transport Medicine Physician, Ornge operations staff, and, where possible, the sending and receiving physicians. This should include a consideration of the various options available, including the expected transfer times via each route.
2. Decision-making by Transport Medicine Physicians should primarily focus on three areas: (i) the medical urgency of the call; (ii) the level of paramedic care required for the patient, and; (iii) the triaging of two or more calls of equal priority within a given response area. Transport Medicine Physicians should not make operational decisions, such as which aircraft is assigned to a call or when the aircraft is to launch.
3. Decision-making with respect to assigning fixed-wing versus rotary-wing aircraft to a call should be based on patient-related factors (such as level of paramedic staffing and transport time), and not on relative cost of one mode versus the other at the expense of the timely provision of best possible care.
4. If, in the course of a transport, it appears that an unanticipated delay will occur (due to weather or mechanical issues), the Transport Medicine Physician should be consulted so that a decision can be made whether or not to proceed with air versus land transport. Whenever possible, decision-making in such situations should involve input from the sending and receiving physicians.
5. Ornge should re-examine its staffing and communication procedures in the Ornge Communications Centre. Specifically, all reasonable efforts should be made to minimize hand-offs of a given call between call-takers and other Ornge Communications Centre staff, and to ensure that all Ornge Communications Centre staff maintain situational awareness of calls in progress, assets available, and other critical operational information.

Recommendations - Response Processes

To Ornge:

6. Responses to remote nursing stations should be treated as scene calls, and not inter-facility transfers, in terms of their prioritization and level of paramedic care assigned.
7. When a request for a potential scene response is received, the nearest available rotary-wing aircraft should be pre-alerted. The pilots and paramedics should immediately perform any necessary preparation, and the helicopter should be readied and "rotored up" while awaiting confirmation.

8. Once a request for a scene response is received, the helicopter should be airborne within ten minutes of the request unless this is precluded by extenuating circumstances. In such cases, the launch should proceed as soon as possible after the ten minute target.
9. In modified scene responses, transfer of care to the air paramedic crew and departure of the air ambulance from the hospital should occur without delay.
10. Ornge should review their current policy and procedures with respect to responding to calls for patients who are vital signs absent at the scene with ongoing cardiopulmonary resuscitation. Such patients rarely, if ever, benefit from air ambulance transport, and such responses divert air ambulance and paramedic resources away from other patients with potentially survivable illness or injuries.

Recommendation - International Transports

To Ornge and Ministry of Health and Long-Term Care:

11. Ornge and the Ministry of Health and Long-Term Care should work with the Canada Border Services Agency and United States Customs and Border Protection to ensure that delays do not occur when patients are transported across the border for emergency medical care.

Recommendations - Communication

To Ornge:

12. Ornge should review and upgrade its communication technology with a view to preventing loss of communication between paramedics and the Transport Medicine Physician.
13. For calls involving more than one time zone, times referenced in communication and documentation should clearly identify the time zone in which the event is taking place.

To the Ministry of Health and Long-Term Care:

14. Greater integration and linkages are required between CritiCall and the Ornge Communication Centre in order to provide sending facilities/physicians with simpler and more seamless access to both critical care resources and air transport.
15. The Ministry of Health and Long-Term Care should develop an education program and materials to support a simplified process for sending facilities/physicians to access critical care resources and air ambulance transport. Both the process and the materials should be easy to understand, even by an inexperienced care provider in a remote location.

Recommendations - Aircraft/Equipment

To Ornge:

16. All air ambulance cabins must permit paramedics to perform critical resuscitation activities (including cardiopulmonary resuscitation, and care delivery with the patient in the head-up position) without interruption in all phases of flight.
17. The current mechanism for securing the stretcher in the AW139 aircraft should be reviewed to ensure that incidents of the stretcher becoming “jammed” are avoided.
18. A review of oxygen equipment should be conducted on all aircraft used as air ambulances in Ontario. This should be done to ensure that excessive oxygen flow rates cannot inadvertently be selected, resulting in premature depletion of the oxygen supply onboard the aircraft. If high flow rates (i.e., 25 L/min) are not medically necessary, they should be disabled. If they are required, processes should be implemented (such as engineering designs, checklists, warning labels, etc.) to decrease the likelihood that such rates will be selected in error. Notwithstanding these preventative measures, the possibility of a warning system should be explored in order to alert care providers before the patient oxygen supply reaches a critical level.
19. Ornge should ensure that all equipment used by air paramedics is compatible with all aircraft used for air ambulance transports (both aircraft operated by Ornge and charter aircraft).

To the Ministry of Health and Long-Term Care:

20. The Ministry of Health and Long-Term Care should amend provincial ambulance equipment standards to mandate the minimum standards for equipment available on fixed-wing aircraft used for patient transport. This should include standards regarding the minimum supply of oxygen available for use in patient care.

Recommendation - Staffing

To Ornge:

21. Ornge should review its policies, procedures and practices with respect to paramedic staffing, with a particular focus on preventing down-staffing of air ambulance units when paramedics exceed their hours of work (“duty day”) on the previous shift.

Recommendation - Paramedic Education/Training/Certification

To Ornge:

22. Ornge should undertake a comprehensive review of the education, certification, and ongoing training of paramedics in advanced airway management, including management of the paediatric airway, with a view to ensuring that the highest standards are met and maintained.

Recommendations - Investigation/Quality Assurance

To Ornge:

23. All discussions and conversations related to air ambulance response should be audiotaped for the purposes of quality assurance, improvement and case review.

To The Ministry of Health and Long-Term Care:

24. The Ministry of Health and Long-Term Care should review, and where necessary revise its policies with respect to which cases need to be reported by Ornge to the Ministry of Health and Long-Term Care for potential review. The aim would be to ensure that all cases involving a death, in which operational issues have been identified, are reported to the Ministry of Health and Long-Term Care Emergency Health Services Branch to facilitate independent review in a timely fashion.

To Ornge and the Ministry of Health and Long-Term Care:

25. Ornge and the Ministry of Health and Long-Term Care should institute a process to track and identify all deaths that occur within 24 hours of air ambulance transport. This would permit comprehensive and timely investigation of cases in which operational concerns are identified, and allow Ornge to benchmark its performance against other jurisdictions.

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Ministry of Health and Long-Term Care – Emergency Health Services Branch. Dispatch Priority Code Index System (DPCI II). Version 1.3. February 2009.

Ornge. Performance Agreement. Available from: http://www.ornge.ca/SiteCollectionDocuments/Amended_Performance_Agreement_MOHLTC_Ornge_March_2012.pdf Accessed 08 June 2013.

The Air Medical Physicians Association. Position Papers. Available from: <https://ampa.org/position-papers> Accessed 15 May 2013

Appendix

Ornge Air Ambulance Expert Panel – Patient Safety Review Committee - Terms of Reference

Purpose

The Patient Safety Review Committee (PSRC) of the Office of the Chief Coroner for Ontario has established an Expert Panel to examine deaths in which issues pertaining to air ambulance transport by Ornge may potentially have affected the outcome.

The Expert Panel will review individual cases and:

1. will provide an opinion as to whether issues regarding air ambulance transport had an impact on the outcome; and,
2. may make recommendations arising from these cases aimed at preventing similar deaths in the future.

Membership

1. Dr. Craig Muir, Regional Supervising Coroner – Northeast Region (Sudbury) will Chair the Expert Panel
2. In addition to the Chair, Panel members will include:
 - Dr. Dan Cass, Deputy Chief Coroner - Investigations and Chair, Patient Safety Review Committee
 - Dr. Jon Dreyer, Emergency Physician and Research Director, Division of Emergency Medicine, Western University
 - Dr. John Tallon, Emergency Physician and Vice President Medical Programs, Emergency and Health Services Commission, British Columbia
 - Ms. Dorothy Zwolakowski, Executive Officer – Investigations, Office of the Chief Coroner
3. The appointment and tenure of Expert Panel membership is at the sole discretion of the Chief Coroner and/or Deputy Chief Coroner, pursuant to Section 15(4) of the Coroners Act.
4. Other individuals with specific expertise and/or case knowledge may be invited to attend the expert panel meeting(s) on an ad-hoc basis as the need arises at the discretion of the Chair, and with advice from members of the expert panel. Every invited person must execute a confidentiality agreement.

Reporting Relationship and Term of Expert Panel

The Expert Panel will report to the Patient Safety Review Committee of the Office of the Chief Coroner. Following completion of this case review, the Expert Panel will be disbanded.

The Terms of Reference may be modified by the Chair of the Patient Safety Review Committee and/or the Chief Coroner.

Inclusion Criteria for Expert Panel Review

The Expert Panel will review cases of deaths that occurred between January 1, 2006 June 30, 2012, in which concerns regarding air ambulance transport have been identified to the Office of the Chief Coroner by one or more of:

- An Investigating coroner and/or Regional Supervising Coroner
- Family member(s) of a decedent
- Ministry of Health and Long-Term Care Emergency Health Services Branch
- Ornge Air Ambulance
- Member(s) of the public

Procedures

A case definition and audit tool will be developed with input from panel members. Using the audit tool, a preliminary review of identified cases will be conducted by Drs. Muir and Cass.

The results of the preliminary review, as well as any relevant supporting material, will be forwarded to all Panel members and a meeting of the Expert Panel will be held at the Office of the Chief Coroner. The aims of the Expert Panel meeting will be to:

1. review and discuss the cases;
2. classify each case, using the categories below, regarding what, if any, impact the issues pertaining to air ambulance transport may have had on the outcome;
3. identify themes arising from the cases; and,
4. if appropriate, make recommendations aimed at preventing similar deaths in the future.

Category	Impact of Transport Issue on Outcome
1	No impact
2	Possible impact
3	Probable impact
4	Definite impact

The findings and recommendations of the Expert Panel will be presented to the members of PSRC for their input and endorsement, after which the conclusions will be submitted to the Chief Coroner.

Report

The Chief Coroner will issue a public report on the conclusions of the Expert Panel and on any recommendations made as a result of the Expert Panel review. It is expected that the final report will be released in the fall of 2012.

NOTES



**Office of the Chief Coroner
Province of Ontario**

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