



Helicopter emergency medical services report 2021

Alberta 

This publication is issued under the Open Government Licence – Alberta (<http://open.alberta.ca/licence>).



Helicopter emergency medical services report 2021 | Alberta Health

© 2021 Government of Alberta | June 22, 2021 | ISBN 978-1-4601-5036-8



Contents

Introduction	4
Purpose	4
Definitions	5
Current EMS state	7
About STARS.....	8
About HALO	9
About HERO	9
Search and rescue	11
Evidence and analysis	11
HEMS and air ambulance models of in other jurisdictions	12
Alberta quality matrix for health framework	13
Acceptability	13
Effectiveness.....	14
Accessibility.....	15
Efficiency.....	16
Safety	17
Appropriateness	18
Governance and reporting	18
HEMS model	19
Recommendations	20
Appendix 1: EMS call data	21
Appendix 2: Estimated annual labour costs for paramedics on HEMS calls .	25
Appendix 3: Government HEMS funding in Alberta	26
Appendix 4: Jurisdictional scan	27

Introduction

Air ambulance is an integral part of the overall provincial health and emergency medical services (EMS) system. This includes both rotary (helicopter) and fixed-wing aircraft, attending emergent and urgent scene events and providing urgent and scheduled care and transportation from health facilities when most appropriate in place of, or in addition to, a ground ambulance.

Air response and transport pathways are complex and based on patient need, access to higher care centres, and availability of appropriate modes of transport, which are in turn dependent on landing access, weather, and available ground ambulances. Air ambulance, and specifically helicopter emergency medical services (HEMS), is particularly vital in rural Alberta, where “Some people fear the distance between their home and the nearest emergency department places them at serious risk if they experience a life-threatening event such as a heart attack or car accident. In northern Alberta, air medevac is particularly important for transporting patients to emergency facilities.”¹

The HEMS system provides Albertans access to critical care when they are not able to safely and efficiently access emergent care through the use of ground ambulance services in a time appropriate manner. It is the most expensive and highest risk mode of ambulance service, costing more to acquire the helicopter and other equipment, and requiring a greater operational cost per event attended, than either ground or fixed-wing air ambulances.

Overall, HEMS covers 0.2 per cent of all EMS calls in the province, 0.4 per cent of interfacility transfers (IFTs) and 0.1 per cent of all scene calls. Raw data is available in Appendix 1.

While HEMS is a small piece of the EMS system, it is an integral and costly part. Which is why further analysis of the HEMS system in Alberta with regard to appropriate service levels, funding, integration with ground and fixed-wing ambulances and risk mitigation was necessary.

This report is intentional in discerning between HEMS and the rescue of Albertans who may subsequently require critical care and emergent transport to higher care centres by HEMS, ground ambulance or fixed-wing ambulance. Rescue, while an integral aspect of public safety, is not considered in this report as public safety is under the purview of other provincial and federal government departments such as Alberta Municipal Affairs rather than the Ministry of Health.

This report aims to:

- evaluate existing services and identify service gaps;
- provide recommendations that enhance patient care, overall safety, efficiency, reliability and equity for EMS response in remote and rural areas; and
- better identify patient need and response areas that would benefit from HEMS.

Purpose

This report proposes next steps in achieving a sustainable HEMS system, further integrated with the ground and fixed wing system, under a fixed budget. With proper planning and implementation of measures that are coherent and relevant to the provision of health care, Alberta can provide improved EMS with more stable and consistent funding.

¹ Richard Starke et al., “Rural Health Services Review Final Report,” p. 3.

The future state of HEMS is further critical care integration across the EMS system. This report recommends service levels, defines ALS and critical care, and includes funding considerations for the cost of implementing an optimized HEMS system within the framework of the Alberta Quality Matrix for Health. It does not describe the precise operational or policy steps that would need to take place to implement this system. Alberta Health will work with AHS EMS to develop and implement policy and standards changes aimed at producing this desired future state. This will begin the process of optimizing HEMS as part of the overall EMS system, comprising ground and air emergency health services.

This report consists of actions aligned with Outcome 1 of Alberta Health's 2020-23 Business Plan: "Albertans' health and well-being is supported throughout their lives by a sustainable, high quality patient-centred health system that listens and responds to Albertans' concerns about care, understands patients' needs and provides access to the most appropriate care in the most appropriate setting."² Further, as a 2015 government review of rural health services found, "all Albertans deserve and require equitable access to basic health care services regardless of where they reside."³ However, as that same review revealed, "accessing health care services largely depends on the patient travelling to the caregiver. In rural and remote areas, this depends in large measure on reliable access to transportation" emphasizing how "rural [EMS] is a vital service that becomes more crucial as distance from an emergency care facility increases."⁴ It is vital for all Albertans to have access to appropriate emergency and urgent health services, but many Albertans in rural and remote areas have difficulty doing so due to their proximity to these health services. Determining how best to use HEMS to improve access and care is therefore imperative to supporting Albertans' health.

Definitions

Advanced Care Paramedic (ACP) – ACPs provide enhanced levels of assessment and care when compared with Primary Care Paramedics (PCPs). Controlled or designated medical acts in the ACP competency profile include advanced techniques to manage life-threatening problems affecting patient airway, breathing and circulation. ACPs may implement treatment measures that are invasive and/or pharmacological in nature.

Advanced Life Support (ALS) Care – in Alberta, the Patient Assessment and Treatment Pathways in the provincial EMS Medical Control Protocols (MCPs) defines ALS care as the level of care provided by an ACP; an ALS intervention means a treatment or medication within ALS care that is not within Basic Life Support (BLS) care. An ACP is registered under this designation with the Alberta College of Paramedics (ACoP). The designation is established in the *Health Professions Act Paramedics Profession Regulation (HPA/PPR)* and referenced in the *Emergency Health Services Act Ground Ambulance Regulation*. The scope is defined by the competency set in the 2011 Paramedic Association of Canada National Occupational Competencies Profile for Paramedics (NOCP). ACP competencies include advanced techniques to manage life-threatening problems affecting patient airway, breathing and circulation. ACPs may implement treatment measures that are invasive and/or pharmacological in nature and support multidisciplinary teams.

Critical Care Multidisciplinary Team – a team made up of regulated health practitioners from different disciplines, with a skill mix appropriate to provide critical care. Currently, the Shock Trauma Air Rescue Service (STARS) dispatches such teams, which include an ACP, a registered nurse (RN), and a flight physician (or some combination thereof, depending on circumstance). While there is currently no established definition of this term in Alberta legislation, hospital intensive care units use multidisciplinary teams – made up of physicians, nurses, respiratory therapists, and pharmacists – to provide appropriate care to critically ill or injured patients.

² Government of Alberta, "Ministry Business Plan – Health" from Budget 2020, Ministry Business Plans, p. 86.

³ Richard Starke et al., "Rural Health Services Review Final Report," p. 4.

⁴ Ibid. p. 3.

Critical Care Paramedic – in Alberta, Critical Care Paramedic (CCP) is a designation of practitioner and protected title under HPA/PPR of emergent and urgent out-of-hospital level paramedic scope of practice in alignment with the CCP competency set in the 2011 NOCP. The ACP/CCP competency profile includes advanced techniques, including invasive hemodynamic monitoring devices to manage life-threatening problems affecting patient airway, breathing and circulation. CCPs may implement treatment measures that are invasive and/or pharmacological in nature. Current critical care EMS MCPs reflect the full ACP scope of practice. Although the Alberta College of Paramedics retains the protected title of Critical Care Paramedic, there is as yet no specific designation or alternate scope of practice to use the term CCP, and in Alberta, all ACPs are trained to perform the CCP scope of practice.

Helicopter EMS (HEMS) – ALS or critical care level paramedicine, depending on team configuration, provided via twin-engine, dual-pilot rotor-wing aircraft dispatched in response to a request for emergency health services. Delivery of critical care via HEMS is determined by the skill and crew mix, which includes ACPs, RNs, and physicians.

Interfacility Transfer (IFT) – the movement of a patient from an approved health facility (including a hospital) to any other approved health facility for the purpose of evaluation or treatment at a higher or more appropriate level of care. This includes:

- non-emergency IFTs, which are transport services arranged, coordinated or dispatched on behalf of the Minister, when a patient may require medical assistance or monitoring during the transport; and
- emergency IFTs, which are transport services arranged, coordinated, or dispatched on behalf of the Minister, when a patient is expected to require ALS or critical care during transport.

Currently, HEMS provides emergent IFTs in addition to scene calls and some rescue supports. A helicopter should only be used for an IFT when:

- the patient is a Priority Red with a time-critical need for transfer, and
- fixed-wing air ambulance or ground ambulance cannot reasonably be used because:
 - there is no landing strip, or accessing a landing strip in the local area of the facility poses an unacceptable time penalty, or
 - there is a clear advantage of helicopter over both fixed-wing and ground ambulance in terms of out of hospital “time at risk”, or
 - ground transport will be unreasonably rough for the patient and/or would be expected to cause excessive pain or other significant undesirable medical consequence, or
 - the medical team available cannot be reasonably expected to cope with the patient's condition.

Integration – refers to aligning approaches to service delivery across the province with the Health Service Planning Framework and Companion provided by the Health Standards, Quality and Planning Division. This ensures all partners are included in the development of service standards, goals, and governance and care models, with all parts of the health system aligned to optimize patient outcomes.

Rescue – in the context of HEMS, a helicopter used to perform local access to patients who are not accessible by ground EMS and not in practical range of a dedicated EMS resource. Alberta Municipal Affairs supports eligible search and rescue groups in a variety of ways. Search and Rescue teams find, stabilize and evacuate people who are in distress. However, these teams are not considered part of the health or EMS system.

Rescue Aircraft – as used herein, rescue aircraft means a helicopter whose usual function is not emergency IFT or pre-hospital transportation of patients, but which may be required to be used in this way in an emergency. This aircraft will not be required to have any medical attendants on board, although other rescue personnel may be on board.

Transport Physicians – as defined by STARS, physicians who provide online medical consultation oversight during all missions and participate as a flight crew member on approximately 5% of patient transports. While STARS regularly uses this term, and does provide some training to staff, this is not an officially recognized designation under the HPA in Alberta.

Current EMS state

A brief summary of the current state of EMS in the province is required to frame the recommendations provided later in this document for sustainable and integrated HEMS.

The largest component of EMS is the ground ambulance system. Ground ambulances are available throughout the province through a mix of direct delivery by AHS EMS (65 per cent) and contracted operators (35 per cent), and centrally dispatched by AHS EMS utilizing a borderless system. As articulated below, ground ambulances are the most cost-efficient mode of EMS transportation, but cannot provide all EMS due to time and geographical challenges present in Alberta. While it is generally preferable to use a ground or fixed wing ambulance to deliver care when possible, there are occasions when a ground or fixed wing ambulance is not appropriate for the patient's needs, often dependent on time frame appropriate to specific injuries or health issues.

AHS contracts 11 fixed-wing aircraft to provide 24-hour air ambulance service throughout the province, with bases in Calgary, Edmonton, Fort McMurray, Fort Vermilion, Grande Prairie, High Level, Lac La Biche, Medicine Hat, Peace River and Slave Lake. Fixed-wing air ambulances do not attend scene calls, but transport approximately 8,500 patients per year via IFTs. Fixed-wing air ambulances are dispatched by AHS EMS and are highly integrated with the ground ambulance dispatch system.

HEMS is currently provided by contracted operators. Providing the majority of HEMS are: STARS at a critical care level, from bases in Calgary, Edmonton and Grande Prairie; the Helicopter Emergency Response Organization (HERO) at an advanced life support level for northeastern Alberta from Fort McMurray; and the Helicopter Air Lift Operation (HALO) at an advanced life support or basic life support level, based in Medicine Hat and covering southeastern Alberta. A small number of additional HEMS flights are funded on a fee-for-service basis via ad hoc arrangements with charter helicopter operators.

HEMS attends both scene calls and also moves critically ill or injured patients to higher levels of care. However, only STARS, which can cover approximately 90 per cent of Alberta's rural and remote population,⁵ provides critical care-level service. On average, 1,350 patients per year are transported by helicopter for rescue, critical care and basic and advanced care purposes.⁶ AHS provides annual operational funding to STARS and HERO, and funds HALO on a fee-for-service basis.⁷

STARS currently dispatches all HEMS and some rescue in the province from its Emergency Link Centre (ELC) in Calgary. Supports in the ELC include online clinical consultation and available transport physicians, as defined above. AHS dispatches all other EMS resources across the province with the support of in-house medical consultation. There is not always the ability for real time access to locations of ground, fixed-wing and rotary ambulance resources between the AHS EMS and ELC centres, which means the system is not fully integrated. HEMS dispatch should be integrated with the AHS EMS dispatch system, which dispatches all ground and fixed wing ambulances as of January 2021 (see Recommendations below).

This report assumes that base locations and services provided by fixed-wing air ambulances will remain stable. Although it does not propose changes to the ground ambulance system, the report takes into account work currently underway (e.g. dispatch integration, clinical triage, etc.).

Centralized EMS dispatch allows for a consistent set of triage and clinical protocols to be followed to ensure that the most appropriate resource is dispatched to each and every event. For example, where EMS dispatch determines that a patient call is less urgent or time sensitive, they may choose to dispatch a paramedic response unit – a single-

⁵ Excludes urban/metro areas, as these are best served by ground ambulances.

⁶ AHS EMS, "HEMS Review Public Webinars – Questions," p. 6.

⁷ Ibid., p. 4.

paramedic vehicle such as an SUV – rather than a traditional ambulance. Similarly, when patient need is time sensitive, EMS can dispatch the closest available ambulance to provide appropriate care. This capability should be scaled up to include dispatching HEMS resources, allowing for dispatchers to make appropriate decisions for patient care and transport while being able to take the locations of all EMS resources (ground and air) into account. This is explained in more detail below in the “Efficiency” section.

The following sections contain additional information about the services provided by STARS, HALO and HERO. See Table 1 for a summary of this information.

About STARS

- STARS operates a fleet of H145 and BK117 helicopters located across the three Prairie Provinces, and has three Alberta bases in Calgary, Edmonton and Grande Prairie.
- STARS operates dedicated air ambulance helicopters and medical crew 24 hours per day. The air medical crews are employed and trained by STARS, and include specially trained ACPs, nurse paramedics and emergency physicians.
- AHS and STARS had a 10-year affiliation agreement that expired in 2020; this agreement was extended pending future negotiations. Under the agreement STARS provides critical care level medical care and helicopter transport in exchange for operational funding of \$6.7 million per year not including landing, and site fees in 2019-20.
- STARS’ operating expenditures in Alberta in 2019-20 amounted to \$37.5 million.
- STARS flew 1,255 missions to locations in Alberta in 2019-20, down from 1,386 missions in 2018-19.
- In March 2019, the Government of Alberta provided STARS \$13 million to cover the cost of one new H145 helicopter, and STARS received \$65 million from the Government of Canada for five new helicopters across western Canada.⁸
- According to STARS, its average mission cost of \$5,400 covers the medical and aviation crew, as well as the necessary medical supplies and helicopter fuel needed from the time a STARS helicopter and crew leaves the base, arrives on scene and provides care and medical transport for a critically ill or injured patient.
 - The average cost does not include the training and education, emergency communication, aircraft maintenance and the other support services required to operate a helicopter EMS program 24 hours a day, seven days a week.
 - The \$5,400 mission cost is based on the average mission flight time of 1.5 hours; the actual cost of each mission varies based on length of trip, weather and patient need.
- STARS’ mandate is to transport critically ill and injured patients. In practice, this means transporting patients who have or might have a life or limb-threatening condition that may be compromised by a delay in transport to appropriate medical care, either because of access issues or availability of resources.
- The top 5 categorizations of patients transported by STARS are:
 - Trauma (vehicle incident or other trauma)
 - Neurological
 - Cardiac
 - Pulmonary
 - “Other” medical (gastrointestinal bleed, sepsis, diabetic ketoacidosis, aneurysm, anaphylaxis, electrolyte imbalance, etc.).

⁸ <https://www.canada.ca/en/public-safety-canada/news/2019/03/government-of-canada-invests-65-million-in-five-new-emergency-medical-helicopters-for-stars-in-western-canada.html>.

About HALO

- Based in Medicine Hat, HALO is a non-profit agency that provides charter rescue helicopter services in southeast Alberta. Rangeland Helicopters is the aviation provider.
- HALO is available to provide up to 14 hours of on-call, non-dedicated aircraft or crew medevac services per day, and does not have night flying capabilities.
- HALO does not have a dedicated paramedic crew, which means that availability is dependent on AHS EMS ground crews' availability to attend an event. When HALO flies, either a ground ambulance is taken out of service, or additional EMS staff is called in to provide care.
- AHS EMS paramedics, at both the PCP and ACP level, provide patient care on HALO aircrafts (as the medical crew) as required. AHS also provides all medical equipment and supplies.
- HALO operates on local donations to manage operational costs, and AHS provides funding to HALO on a fee-for-service basis. In 2019-20, HALO flew 38 missions, with AHS paying \$139,615 for these services.
- In 2018-19, HALO flew 36 missions.
 - In January 2019, AHS EMS agreed to a one-time grant of \$1 million to HALO following HALO's purchase of a BK117 helicopter. AHS EMS has no plans to continue funding HALO at this level, and returned to fee-for-service funding when the grant term expired in April 2020. As a result of the grant, AHS ended up paying \$1,369,688 to HALO in 2018/19.
- As of calendar year 2019, HALO's annual budget for HEMS and rescues was \$2.5 million using the BK117 twin-engine, twin-pilot helicopter, up from \$1.4 million in 2018 when it used a Bell 206L-1 LongRanger, a single-engine, single-pilot helicopter. HALO submitted a business case for provincial core funding on a contractual basis on June 22, 2020. It requested \$1 million in calendar year 2021, \$1.5 million in 2022 and \$2 million in 2023, while committing to enhancements to training and technology in proposed cooperation with AHS EMS.
- HALO announced in May 2020 that they would cease deployment of their BK117 in favour of the Bell 206L-1 effective June 1, pending the outcome of a public fundraising drive. This fundraising campaign was successful and HALO flew the BK117 through the end of 2020.
- In March 2021, HALO announced that it had once again purchased a BK117. As this was a recent development, no further information was available at the time of writing this report.

About HERO

- Based in Fort McMurray, the Local HERO Foundation (HERO) raises money to fund operating costs for helicopter EMS provided by Phoenix Heli-Flight. According to HERO, its annual expenses are \$3.5 million for HEMS and rescues.
- In 2017, AHS amended its agreement with the Regional Municipality of Wood Buffalo to include funding for HERO in partnership with the municipality and a consortium of oil sands stakeholders. AHS contributes \$1 million annually while Wood Buffalo contributed \$2.2 million in December 2020. HERO stated in November 2019 that the oil sands industry contributes \$700,000 per year, while other community donations amount to about \$650,000 annually.
- Phoenix Heli-Flight operates one EC135 T2e twin-engine helicopter on behalf of HERO. It has 24 hour per day capability, and has flown over 500 missions since 2013.⁹
- HERO stated in 2019 that it planned to acquire a new helicopter that would accommodate two crew and two patients, rather than one patient at present.
- Wood Buffalo Regional Emergency Services, the contracted ambulance operator in the region, provides ACPs to serve as Phoenix Heli-Flight's air medical crew.

⁹ <http://localherofoundation.com/history/>

TABLE 1: STARS, HALO AND HERO AT A GLANCE

	STARS	HERO	HALO
Full name	Shock Trauma Air Rescue Service	Helicopter Emergency Response Organization (Local HERO Foundation)	Helicopter Air Lift Operation
Who provides air medical crew?	STARS	Wood Buffalo Regional Emergency Services ¹⁰	AHS EMS
Level of service	Critical care paramedicine (CCP) with RN and/or physicians	Advanced life support (ACPs)	Advanced life support (PCP and ACP)
Helicopter service provider	STARS	Phoenix Heli-Flight	Rangeland Helicopters
Service area	90% of Alberta population, except northeast and section of southeast areas. Also serves areas of eastern British Columbia from Alberta bases	Northeast Alberta	Southeast Alberta
Base locations	Calgary, Edmonton, Grande Prairie	Fort McMurray	Medicine Hat
Who provides dispatch?	STARS Emergency Link Centre	STARS Emergency Link Centre	STARS Emergency Link Centre
Number and model of helicopters deployed	6 total – 2 H145, 4 BK117 (Alberta only)	1 - EC135 T2e	1 - BK117
Night flying capability?	Yes	Yes	No
Events per year (2019/2020)	1,255	62	38
Estimated additional labour costs* (2020) ¹¹	n/a	\$16,535.40	\$6,949.80
Annual operating expenses	\$37.5 million (2019-20, Alberta only)	\$3.5 million (2019)	\$2.5 million (2019)
Annual provincial government contribution (2019/20) ¹²	\$6,724,155	\$1.0 million via AHS EMS to Regional Municipality of Wood Buffalo (RMWB)	\$139,615 plus in-kind contribution via AHS EMS

¹⁰ AHS EMS contracts with Wood Buffalo Regional Emergency Medical Services to provide EMS in the Regional Municipality of Wood Buffalo. Paramedic crews used by HERO are therefore employees of Wood Buffalo Regional Emergency Medical Services, not AHS.

¹¹ HERO estimates assume two ACPs both at midpoint wage rate; HALO estimate assumes one PCP and one ACP, each at their respective midpoint wage rate. Benefits and overtime not included. STARS not included in this analysis as staffing costs are included in operational funding (these are additional costs for HALO/HERO) See Appendix 2 for additional assumptions.

¹² See Appendix 3 for details on government funding.

Funding sources	GOA via AHS EMS (20%); corporate and individual donations and fees (80%)	RMWB, oil sand industry and other donations; GOA via AHS EMS	Corporate and individual donations and fees; GOA via AHS EMS (fee for service)
-----------------	--	--	--

Sources: Alberta Health, AHS EMS, HALO, HERO, Regional Municipality of Wood Buffalo, STARS

Search and rescue

Several charter helicopter operators across Alberta provide search and rescue services in remote areas of the province. In addition to supporting EMS and the health system, these search and rescue services support other federal and provincial agencies such as the Alberta Emergency Management Agency (AEMA), which is under the purview of the Ministry of Municipal Affairs. While search and rescue services are not part of the EMS system, they support this system. Thus, the relationship between EMS and search and rescue must be clearly defined.

Where search and rescue operations are transporting patients requiring medical care, they should notify EMS immediately and receive direction on where to transport said patients from EMS dispatch. If practical, the search and rescue unit might only transport the patient as far as is needed to transfer them to a ground ambulance, assuming the patient's injuries are non-critical.

Evidence and analysis

In order to determine how and where to best employ HEMS, we must first establish what value HEMS provides within the EMS system. Table 2 below shows the characteristics of the three modes of ambulance in Alberta.

TABLE 2: CHARACTERISTICS OF GROUND AMBULANCE, FIXED-WING AIR AMBULANCE AND ROTARY-WING AIR AMBULANCE

	Ground	Fixed-wing	Rotary-wing
Expense (operations and maintenance, per event)	Lowest	Middle	Highest
Speed	Slow over long distances; quick over short distances	Quick over long distances; slow over short distances	Quick over long distances; slow over short distances
Delivery mode	Mixed direct delivery, and contracted providers	Primarily contracted providers	All contracted providers
Dispatch	AHS EMS – 3 communications centres, integrated with fixed-wing	AHS EMS Central Communications Centre (Edmonton); integrated with ground EMS dispatch	STARS Emergency Link Centre; not integrated with ground or fixed-wing dispatch
Frequency of use	Most frequent	Middle	Least frequent
Services provided	Scene calls and IFTs	IFTs only	Scene calls and IFT
Level of service	Basic Life Support or Advanced Life Support	Advanced Life Support	Critical Care (STARS); Advanced Life Support (HERO and HALO)
Annual government funding	\$467.6 million (80% of budget from GoA, 20% from user fees)	\$47 million (100% of budget from GoA)	\$8.4 million (23.6% of annual budget from GoA; remainder a mix of private donations and municipal contributions)

Safety	Collisions more frequent, but less severe than air ambulances; increased danger for road traffic when operating lights and sirens	Safer than rotary-wing, with a positive safety record, but still subject to catastrophic events	Safety concerns due to size of helicopter interior, movement, potential for patient harm, and risk of catastrophic events; unstable interior temperature and air pressure during flight
Accessibility	Cannot reach some parts of province due to absence or inaccessibility of roads	Requires an appropriate airfield with a landing strip	Provides access in situations in which a helicopter is the only viable option to reach a patient; requires helicopter base; can land in a variety of settings, but requires landing zone support or helipad for IFTs
Impact of weather	Least dependent on weather conditions	Moderately dependent on weather conditions	Most dependent on weather conditions
Impact of road traffic	Most dependent on traffic	Not dependent on traffic	Generally not dependent on traffic, except when landing near roadways
Range	Shortest range	Longest range	Medium range
Lifespan of physical resources	12 years	20 years	20 years
Maintenance	Can be performed by most licensed auto mechanics; monitored by Alberta Health	Aircraft maintenance heavily regulated by Transport Canada	Aircraft maintenance heavily regulated by Transport Canada
Number of resources	Highest	Few, but more than rotary-wing	Lowest

Sources: Alberta Health, AHS EMS, HALO, HERO, Regional Municipality of Wood Buffalo, STARS

HEMS and air ambulance models of in other jurisdictions

Comparisons of HEMS systems, including funding, are compiled and presented below (Appendix 4) in the jurisdictional scan which demonstrates that approaches to funding and operationalizing HEMS vary widely across jurisdictions.

For example, funding through charitable contributions to HEMS range from zero in several jurisdictions to 80 per cent of operational budgets. These discrepancies can be attributed to significant differences in geography; population (and population density); historical practices with respect to HEMS; the relationship between HEMS, EMS and the health system in general; and political factors. These factors make it imperative to design a made in Alberta approach to HEMS.

Some common themes emerge: first, most Canadian provinces employ a single operator model. Manitoba and Saskatchewan exclusively use STARS, Ontario and Nova Scotia use a single operator, and BC contracts a single organization for clinical staffing. The single operator model increases oversight and system stability, as government has a single point of contact and funding relationship for all HEMS. As a result, this report recommends moving to a single operator model to deliver all critical care HEMS in the province. More will be said about this model under the “HEMS and Advanced Critical Care” section of the document.

Second, regarding the length of the contract between government and the helicopter operator, the most common term was 10 years. While the department does not have copies of other jurisdictions’ contracts, it is reasonable to assume that said

contracts include performance agreements and clauses for government to terminate contracts early should services provided be deemed inadequate. As with the single operator model, such terms ensure stability in the system while providing regular opportunity for government to analyze and update its HEMS delivery model.

Alberta quality matrix for health framework

This report uses the Alberta Quality Matrix for Health (AQM) as its framework for analysis and planning. This approach allows the system to move toward service optimization, based around the common commitments of Alberta's overall health system.

Developed by the Health Quality Council of Alberta (HQCA), part of the Ministry of Health, the AQM provides a way of organizing information and thinking about the complexity of the health system. The matrix has two components: dimensions of quality, which focus on aspects of the patient/client experience; and areas of need, which divides the range of services provided by the health system into four distinct, but related categories. The AQM is useful for strategic and service planning, and in particular for this plan, because it allows stakeholders to establish a common understanding of quality and provide a framework for strategic planning and policy development, and can be used to identify or verify all the dimensions of quality have been addressed in service planning and appropriate measurement tools are in place to continuously monitor the quality of the service delivered.¹³

The six dimensions of quality, which form the basis of the analysis in the remainder of this plan, are:

1. **Acceptability:** health services are respectful and responsive to user needs, preferences and expectations.
2. **Accessibility:** health services are obtained in the most suitable setting in a reasonable time and distance.
3. **Appropriateness:** health services are relevant to user needs and are based on accepted or evidence-based practice.
4. **Effectiveness:** health services are based on scientific knowledge to achieve desired outcomes.
5. **Efficiency:** resources are optimally used in achieving desired outcomes.
6. **Safety:** mitigate risks to avoid unintended or harmful results.

The four areas of need are:

1. **Being healthy:** achieving health and preventing occurrence of injuries, illness, chronic conditions, and resulting disabilities.
2. **Getting better:** care related to acute illness or injury.
3. **Living with illness or disability:** care and support related to chronic or recurrent illness or disability.
4. **End of life:** care and support that aims to relieve suffering and improve the quality of living with or dying from advanced illness or bereavement.

While HEMS has direct and indirect impacts on all four areas of need, because its main use is to treat and transport critically ill or injured patients, this plan will focus on the "getting better" area. The next portion of this document is organized around the six dimensions of quality and their impact on this area of need.

Acceptability

The HEMS system has significant public support from Albertans, particularly in rural areas. Correspondence received by Alberta Health also signals this support. Alberta Health has received messages from across rural Alberta – both from citizens and elected officials at the municipal level – that affirm the value of HEMS and call for additional, stable government support of these services. Correspondence has supported all three of the current HEMS providers (STARS, HERO and HALO). In addition, the Rural Municipalities of Alberta has advocated to Alberta Health, through formal resolutions and writing campaigns, for equitable funding for all HEMS providers and for maintaining current service levels across the province.

In addition to identifying significant public support for HEMS, AHS recently undertook public consultations regarding HEMS, engaging with the public, aviation experts, stakeholders and government and provided a summary of the results of this consultation to Alberta Health. Respondents noted that HEMS should be used when a patient's injuries or illness are time sensitive and require access to higher level services, the patient is in an area that would make ground transport impossible or impracticable, and/or the patient requires access to critical care. Respondents also noted that HEMS should not be used in non-emergency/non-time sensitive situations, when other ground or fixed-wing ambulances are available, and/or when unsafe

¹³ https://www.hqca.ca/wp-content/uploads/2018/05/HQCA_User_Guide_Web.pdf

conditions for operating the helicopter exist that would put the patient or crew at risk. Four out of five respondents thought AHS should have greater control over HEMS, which should “make sense economically” and be funded by government and donations. The aviation experts recommended a clear definition of rescue compared to HEMS, a quality assurance audit program, and use of a single helicopter type for the HEMS fleet. Most of the recommendations contained in this report align with these responses, suggesting that they are likely to be acceptable to patients.

Effectiveness

While, according to the HQCA “there is no consensus [...] regarding the effect of [HEMS] transport on patient mortality,”¹⁴ a preponderance of the evidence available suggests that HEMS resources should *only* be dispatched when the patient requesting EMS requires time-sensitive critical care. The same report by HQCA articulates the following benefits for HEMS, although it should be noted that due to difficulties in ethically conducting studies, these conclusions fall short of proof:

- significant improvement in patient mortality for trauma patients;
- increased opportunity for the transport of trauma-trained personnel to the scene;
- improved outcomes when trauma physicians are present^{15 16}; and
- ability to transport the patient to a facility where trauma-specific care will be delivered.

Standardized dispatch protocols for HEMS vary, but generally attempt to evaluate severity of injury and access to appropriate care and risk associated with utilization of other resources. Precise, evidence-based protocols for dispatching time-sensitive critical care HEMS that are followed consistently would ensure integrated and effective deployment of all EMS resources.

Alberta’s EMS dispatch criteria is contained in the Trauma Destination Decision Tool, an MCP under the *Emergency Health Services Act (EHSA)*. In this protocol, Level I trauma centres comprise four tertiary care hospitals in Calgary and Edmonton, the one Level II trauma centre is an Edmonton hospital, and the five Level III trauma centres are regional hospitals in Fort McMurray, Grande Prairie, Lethbridge, Medicine Hat and Red Deer.

Under this protocol, paramedics are required to:

- provide patient care and initiate resuscitation in accordance with the appropriate MCP;
- whenever possible, reduce on scene time ; interventions are best performed enroute to the hospital versus remaining on scene (exceptions to this are described below);
- bypass the non-trauma centre as a primary destination with the trauma patient with physiological, anatomical or additional criteria; and
- evaluate transport mode options and travel time to a Level I, II or III trauma centre. If a rotary or fixed wing resource is available and transport time to the trauma centre can be decreased by 20 minutes or more over ground transport, request an aircraft response through EMS dispatch.

Online medical consultation (OLMC) by EMS medical directors is often part of this decision making pathway.

With regard to the use of helicopters:

- A rendezvous may occur at the scene, at a designated location, or at a non-trauma centre hospital/facility to which the patient will initially be transported for stabilization not possible on scene or during transport.

¹⁴ Health Quality Council of Alberta, “Review of Operations of Ground Emergency Medical Services in Alberta,” p 131.

¹⁵ Pakkanen et al., “Physician-Staffed helicopter emergency medical service has a beneficial impact on the incidence of prehospital hypoxia and secured airways on patients with severe traumatic brain injury”, <https://sjtrem.biomedcentral.com/articles/10.1186/s13049-017-0438-1>

¹⁶ Garner, Lee and Weatherall, “Physician staffed helicopter emergency medical service dispatch via centralised (sic) control or directly by crew – case identification rates and effect on the Sydney paediatric trauma system”, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3571886/>.

- When rendezvous between ground and rotary is at a hospital, the paramedic should be prepared to move the patient directly from the ambulance to the aircraft to avoid transport delays. If delay is anticipated, the paramedic must contact OLMC to determine if the patient should be further stabilized in the emergency department.

Regarding fixed-wing aircraft:

- If appropriate, the paramedic can request a fixed-wing response in collaboration with OLMC/transport physician and EMS dispatch.
- When transport time is greater than 60 minutes and the paramedics believe the patient may benefit from services available at a local hospital instead of, or as an interim staging point for specialty transport to a Level I, II or III trauma centre, they must contact OLMC for clinical management advice and to facilitate the mobilization of transport resources and teams.
- The protocol articulates the key role of OLMC and – in the case of HEMS – the transport physician in determining how rotary or fixed wing transport is used. It should be noted that medical first responders, registered nurses, physicians (among other health care providers) are able to trigger a HEMS response if they assess or diagnose a patient as having a traumatic or other serious injury and relate that information to the Referral, Access, Advice, Placement, Information and Destination (RAAPID) or EMS dispatcher who then links the paramedic to STARS ELC.
- STARS ELC will link the transport physician (employed by STARS) with ground paramedic and/or EMS medical director and dispatch.

In order to optimize effectiveness and ensure consistent use of dispatch criteria, all flights must be dispatched centrally through AHS, in conjunction with the Minister's policies. Aircraft must be used at the sole discretion of the Minister, as directed by AHS. Use of independent dispatch systems should not be remunerated.

According to the Institute for Health Economics (IHE) report on "Air Ambulance with Advanced Life Support" cited previously, "outcomes in patients with time-sensitive illnesses such as trauma or severe medical conditions, including acute myocardial infarction and stroke depend on rapid access to definitive care" (p. 10). On the other hand, "for less severely injured or critically ill patients where time sensitive care is not as crucial, these issues become less significant, as the patients will tolerate some delay in reaching definitive care" (p. 10). While more precise protocols will need to be developed for emergency communications officers to determine when to dispatch HEMS, these considerations provide a basic foundation.

With respect to IFTs, the IHE concludes that HEMS only results in quicker transfer times for trauma and injury patients when a helipad is available at the destination centre, and should be avoided for patients with extremely severe injuries due to safety concerns (p. iv). They also provide some evidence that IFTs can be completed more quickly by helicopter for medical patients when the transfer is between 32 and 113 kilometers (one way). However, they conclude that both trauma and medical patients for whom the only issue is time to critical procedure may be transported by ground ambulance rather than air if ground is immediately available. That is, if the ground ambulance and a HEMS resource can both provide effective care and monitoring enroute and transport the patient in the same time frame, or if the ground ambulance is faster, deploying the ground ambulance is preferable. Patients with reduced levels of consciousness, airway obstruction, respiratory distress, shock, or significant head or facial injury maybe initially managed at the scene, as clinical interventions for these issues cannot as effectively be provided in a helicopter.¹⁷ Given these factors, the standard practice in Alberta should be to use HEMS only for scene calls in which a patient requires critical care, with other scene calls covered by ground ambulances unless there are extreme extenuating circumstances.¹⁸

It is also worth noting, however, that critical care need not always be provided by HEMS crews. The HPA/PPR allows ACPs to act as CCPs, and therefore perform the CCP scope of practice "if the Registrar [of ACoP] is satisfied that the member has the additional competencies required by the council" (s. 15(f)). Although ACPs are not permitted to perform this level of care currently, they are trained for the critical care skills and the HPA/PPR allows for these skills.

Accessibility

¹⁷ Black, Ward, and Lockey, "Appropriate use of helicopters to transport patients from incident scene to hospital in the United Kingdom: an algorithm," pp. 356-7.

¹⁸ For example, current AHS dispatch criteria allow for dispatching HEMS if the patient is trapped or the extrication time would be inordinately long if a ground ambulance was used, even if the patient's injuries or medical condition are not necessarily time sensitive. This consideration could be maintained in the final dispatch criteria.

The proven value of HEMS to health systems is that it improves ground ambulance availability, enables access to patients in rural, remote and urban areas, provides a means for fast critical care transport to higher level of care, and provides system response for major incidents. Up to 90 per cent of Albertans in rural and remote areas currently have access to STARS from bases in Calgary, Edmonton and Grande Prairie.

The remainder of the rural and remote population that STARS cannot easily access consists of a small portion of the southeastern corner of the province and portions of the north. While HALO and HERO indicate they cover the southeastern corner and a portion of the northeast of the province (totaling approximately an additional 4.3 per cent of the province), neither organization currently provide dedicated advanced care and/or critical care EMS crews or equipment.

Coverage of the remaining areas of the province is possible with further integration of all resources and consideration of base position in the south and the north. Further work will be required over the transition period to explore how to increase HEMS services in the southeast and north east of the province.

Efficiency

The average cost for a critical care-level HEMS resource to respond to an EMS event (based on a total flight time of 90 minutes) is \$5,400,¹⁹ excluding the training and education, emergency communication, aircraft maintenance and other support services required to operate a helicopter EMS program 24 hours per day, seven days per week. For comparison, AHS' total cost for EMS in 2019-20 was \$531 million to respond to 589,498 events, a per-event cost of approximately \$900.²⁰ The cost of a new helicopter to provide EMS – which will last approximately 20 years if not resold²¹ – is approximately \$13 million,²² and the approximate annual cost to operate a helicopter EMS base is \$10 million.²³

Further, while some studies have concluded that the extra expense of HEMS provides effective value for money (using a metric of dollars spent per life year saved),²⁴ authors of these studies consistently conclude that it has not been possible to adequately assess the cost-effectiveness of HEMS due to difficulties in study design and the studies' inability to take local factors into account.

Determining the most efficient use of HEMS should be guided by Alberta Health's overall commitment to delivering patients the most appropriate care in the most appropriate setting. Thus, ensuring efficiency means making sure that HEMS resources are available for patients when necessary, using specific and evidence-based criteria, but not deploying them when a less expensive resource can be used without compromising patient safety or care.

Another way to ensure efficiency in the EMS system is to integrate HEMS more fully into the ground ambulance system. Currently, STARS delivers its own training programs and employs physicians to provide OLMC, and dispatches HEMS resources separately from AHS. Integrating HEMS into the ground ambulance system allows for greater efficiency insofar as it brings training, quality control and OLMC into one system, creating greater consistency in practice and more efficient use of the EMS system as a whole. Further, upskilling ACPs such that they can provide critical care while employed on a ground ambulance would increase the overall efficiency of the EMS system, leaving HEMS resources available for deployment when and where they are most needed.

¹⁹ <https://stars.ca/ways-to-donate/fund-a-flight/ab/>.

²⁰ Alberta Health Services, "Annual Report 2019-20," p. 10 (number of events) and p. 45 (budget).

²¹ <https://webcache.googleusercontent.com/search?q=cache:wJnX11AhcnIJ:https://www.columbiavalley.pioneer.com/>

<https://www.columbiavalley.pioneer.com/news/new-workhorse-police-helicopter-named-for-pilot-who-died-in-fraser-valley-crash/amp/+&cd=7&hl=en&ct=clnk&gl=ca>.

²² <https://calgaryherald.com/news/local-news/alberta-funding-new-13-million-stars-helicopter-as-part-of-fleet-replacement#:~:text=The%20Alberta%20government%20is%20covering,were%20acquired%20in%20the%201980s>.

²³ <https://stars.ca/how-we-are-funded/>.

²⁴ IHE, pp. iv-v.

Deployment decisions about appropriate resource usage are made from a system perspective, not in isolation. Further, enabling emergency communications officers within the system to use the same criteria for determining which vehicle is most appropriate to dispatch ensures optimal patient care. This could be accomplished in one of two ways:

1. Integrating HEMS dispatch with the AHS EMS dispatch system for ground and air ambulances, or
2. Determining precise criteria for dispatching HEMS and working with STARS ELC to ensure consistent application of these criteria.

The first option is preferable, as only STARS ELC has real-time access to where HEMS resources are located, more optimal decisions about when to use HEMS e versus fixed-wing or ground resources are made when all resource locations are available. Integrating HEMS with the AHS EMS dispatch system would allow for consistent criteria to be applied in all cases and more effective oversight of the EMS system as a whole. Given the cost and safety issues noted in this document, this is imperative to ensure patient safety and the sustainability of the EMS system.

Further, integrating all dispatch operations ensures effective regulation and oversight of this system. In an integrated dispatch system, all dispatchers and OLMC would fall under the purview of the *EHS*A, which is currently not the case with STARS dispatching HEMS resources.

Safety

While HEMS crashes are relatively rare, they tend to be much more catastrophic than ground ambulance crashes. Between 1983 and 2005, there were 182 HEMS crashes in the United States, with 39 per cent of the crashes in that period being fatal, mainly due to post-crash fires, darkness, or bad weather conditions.²⁵ According to the Transportation Safety Board, all recent HEMS crashes in Canada occurred at night.²⁶ Furthermore, a study analyzing 99 HEMS accidents in Germany found that 44.4 per cent of all accidents occurred during the landing phase.²⁷

In contrast, only approximately 10.6 per cent of emergency ground vehicle collisions result in injuries to emergency vehicle occupants and approximately 0.2 per cent result in fatalities.²⁸ Similar to HEMS, ground ambulance collisions were more likely to occur at night, more likely to result in injuries when they occurred at night, and more likely to occur and more severe during adverse weather conditions.²⁹ None of the available studies provide data on “near miss” events for either air or ground ambulance.

Due to the data noted above about HEMS accidents occurring during the landing phase of a flight, steps should be taken to minimize the number of times a HEMS resource has to land. The most important step that can be taken on this front is to ensure that HEMS resources are only being used where they provide a clear benefit over other, safer methods of transportation. Emergency communication officers should also avoid sending HEMS resources on trips that will require a refueling stop unless there is no other reasonable option available. If a helicopter has to refuel on the way to and/or from the scene, this increases the number of times it has to land during a scene call by up to 100 per cent (from two to four), thus substantially increasing safety risk.

Finally, due to the inherent risks of HEMS delivery, any service delivery model must prioritize patient safety. While the precise approach to patient safety will be determined collaboratively by AHS, Alberta Health, and the HEMS operator(s), the Canadian

²⁵ Institute for Health Economics (IHE), “Air Ambulance with Advanced Life Support” report produced by the Institute for Health Economics (2008), p. 3.

²⁶ Alberta Health Services, “Helicopter Emergency Medical Services Review Final Report,” p. 86.

²⁷ Health Quality Council of Alberta, “Review of Operations of Ground Emergency Medical Services in Alberta,” p 132.

²⁸ Yasmin, Anowar and Tay, “Injury Risk of Traffic Accidents Involving Emergency Vehicles in Alberta,” p. 4.

²⁹ *Ibid*, 9.

Patient Safety Institute's Safety Competencies Framework provides a useful foundation. This Framework includes six domains, which "support moving patient safety evidence into action,"³⁰ and are as follows:

1. Patient Safety Culture: which involves recognizing the importance of ongoing collaboration and the commitment to advocate for change.
2. Teamwork: high-performing inter-professional teams demonstrate capabilities and competencies that are essential to efficiency, effective, and safe collaborative practice.
3. Communication: which benefits patients and healthcare providers, builds trust, and is a precondition of obtaining patient consent.
4. Safety, Risk, and Quality Improvement: healthcare providers collect and monitor performance data to assess risk and improve outcomes.
5. Optimize Human and System Factors: optimizing the human and environmental factors that support the achievement of best human performance is an essential safety competency for all healthcare providers.
6. Recognize, Respond to and Disclose Patient Safety Incidents: open, honest, and empathetic disclosure and appropriate apologies benefit patients and families, health providers, and their organizations.

In order for HEMS to be safe and effective, safety must be an ongoing part of the culture, in which all stakeholders openly participate. Performance measurement, consistent improvement, and a sustainable and stable funding agreement will all contribute to this vision.

Appropriateness

Given the analysis provided thus far, several key principles to ensure the appropriate use of HEMS resources emerge:

1. HEMS safety and expense, as well as the availability of ground and fixed-wing resources, influence how HEMS should be integrated into EMS and when it should be used, which includes times when critical care is required.
2. If a scene call is requested on behalf of a patient who requires time-sensitive critical care, and a ground ambulance can reach the patient, provide appropriate treatment at the scene and/or enroute, and transfer them to an appropriate health facility more quickly than HEMS, a ground ambulance should *always* be dispatched instead of HEMS.
3. If a scene call is requested on behalf of a patient who requires time-sensitive critical care, and HEMS can reach the patient and transfer them to an appropriate health facility more quickly than a ground ambulance without compromising patient safety, HEMS should be used. Patients should be transported to a Level I trauma centre if possible. According to the IHE, primary transfer by helicopter to a Level I trauma centre statistically significantly improved patients' survival rates as compared with transfer to a regional hospital by ground.³¹
4. When determining the appropriate team to include on a HEMS resource dispatched to a scene call, patient needs must be taken into account. Including flight physicians when not needed is not an appropriate or efficient use of resources. For example, when responding to a patient experiencing trauma, a flight physician is beneficial when skills outside the scope of flight paramedics and nurses may be needed on scene.
5. Helicopters used for EMS should be "dedicated access" resources. That is, they should be used only to provide HEMS, and their paramedic and health practitioner crews should be dedicated to these resources rather than pulled from the ground system. Currently, situations where paramedic crews have to be moved from ground ambulances to helicopters usually leave a local ambulance out of service, as operators usually do not have additional paramedics or equipment readily available to staff it, and reduce the ability for time sensitive response.

Across Alberta, EMS provides multiple levels and types of care to ensure access for those requiring emergent, urgent and community care, utilizing triage, appropriate response (referral, virtual or in person) and transportation of the patient based on their need and time to access required care. The provision of critical care to Albertans is appropriate in reducing further injury to patients and decreasing costs across the system. Trauma, stroke and cardiac arrest are among the conditions that require specific and immediate care across all communities. On occasion HEMS is the best and only method to ensure timely, safe access for those experiencing critical illness and injury in rural and remote locations. In practice, this means using HEMS to provide critical care to patients requiring treatment for trauma, stroke, or cardiac events when and where a ground ambulance cannot do so in a timely manner.

Governance and reporting

³⁰ <https://www.patientsafetyinstitute.ca/en/toolsResources/safetyCompetencies/Pages/default.aspx>.

³¹ IHE, p. 35 and 37. It is worth noting that IHE suggests that this is probably due to more appropriate care available at a Level I trauma centre, not due to the mode of transportation.

Alberta Health provides oversight of EMS through the *EHSA*, which includes all publicly funded emergency health services provided to Albertans by air or ground ambulance. AHS is accountable for the delivery of clinical care and efficient transport for patients accessing the EMS system. However, there is currently no regulation covering air ambulance – either HEMS or fixed-wing – in the province. In order to ensure consistently applied deployment, operational, clinical and aviation standards, it is recommended that Alberta Health establish an air ambulance regulation under the *EHSA* that includes standards on HEMS and fixed-wing air ambulance.

As is the case with the existing *Ground Ambulance Regulation* under the *EHSA*, the air ambulance regulation would require all publicly funded aviation and air medical crew service providers contracting with AHS to be licensed by Alberta Health. The regulation would apply to all fixed-wing and rotary-wing service providers, but not to rescue services provided by charter helicopter companies on an ad hoc basis.

With respect to HEMS, the air ambulance regulation would include the following minimum standards:

- compliance with federal aviation regulations and accreditation from a recognized air ambulance standards authority (for example, the Commission on Accreditation of Medical Transport Systems), and, as applicable, with the AHS accreditation process via Accreditation Canada;
- twin-pilot, twin-engine helicopters with the capacity to hold a minimum of two health care practitioners and two patients;
- night-flying and poor-weather capability (use of night-vision goggles);
- minimum altitude capability to operate safely in high-elevation areas;
- dedicated medical interior with a transport ventilator, portable lab equipment, ultrasound machine, suction, heart monitor/defibrillator and aeromedical stretcher;
- equipped to meet the provincial critical care medical protocols;
- reporting requirements with respect to missions by number, type, pickup point and destination, and care provided;
- minimum of critical care level of service provided by interdisciplinary teams;
- onboard communications system connected to EMS dispatch and aviation air traffic control, and participation in the provincial ground and air EMS dispatch system, as agreed upon with the Ministry; and
- submission of a service plan that is aligned with service planning by AHS with respect to ground EMS and fixed-wing air ambulance, subject to approval by the Minister.

With legislation in place, the Ministry could enter into more robust contractual arrangements with HEMS providers. These contractual arrangements would contain reporting and other requirements as above, but also include:

- description of critical care to be provided by critical care ACPs and flight nurses and physicians as appropriate;
- performance measures agreed upon between the Ministry and the provider;
- commitment to follow response criteria, including the use of rescue helicopters, as agreed upon between the Ministry and the provider;
- regular financial and patient care reporting to the Ministry of Health;
- audit capability for the Ministry; and
- provisions dealing with education and training of ground or air EMS practitioners in critical care or HEMS response criteria, as agreed upon by the Ministry and provider.

HEMS model

HEMS providers have demonstrated a proven ability to raise funds to support operations. However; more stable and sustainable funding of HEMS will support quality assurance and ongoing improvement, ensuring HEMS remains viable, safe and effective in alignment with a coherent provincial strategy for air and ground ambulance.

The contractual relationship between AHS EMS' provincial air ambulance program and STARS is based on a 10-year affiliation agreement that has been extended through September 2021. This agreement contains no reference to performance standards, and AHS may only inspect STARS' financial records at its own cost. A performance based contract that specifically references standards, reporting and audit requirements can/may be implemented without a request for proposals, as STARS has demonstrated its existing key role as a critical care HEMS provider in Alberta. AHS is allowed under interprovincial trade agreements to sole-source contract with a not-for-profit entity such as STARS.

Similar to the funding arrangement between the Saskatchewan government and STARS (see Appendix 2), the Ministry of Health supports a provincial government contribution of about 50 per cent of STARS' annual operating costs in Alberta. This would help maintain STARS' viability and its primary mission of providing critical care rotary-wing air ambulance to Albertans in a more difficult environment for fundraising.

The Ministry will approve a transitional timeline and implementation plan during which STARS and HALO and HERO will be required to work in their respective service areas. In order to continue to provide HEMS, all three operators would have to meet requirements related to patient care and aviation safety established by the Minister, such as minimum ALS service level and the use of twin-engine, two-pilot helicopters with dedicated medical interiors as part of the transition phase.

As part of a new contract with STARS, HEMS dispatch via STARS' Emergency Link Centre would be integrated with EMS dispatch for ground ambulance and fixed-wing air ambulance. Similarly, STARS' online medical consultation and medical direction would also be fully integrated with other clinician online consultation resources and EMS dispatch.

While this approach will improve access and increase stability, it does not account for the 4.3 per cent of estimated demand for critical care that HEMS currently does not cover.

The precise cost of improving critical care access will be determined via the contracting process. However, at this juncture STARS' total annual costs may be estimated at **\$41.5 million**, broken down as follows:

- \$30 million per year to operate three bases.³²
- \$7.56 million per year in mission costs, assuming 1,400 missions per year at an average cost of \$5,400.
- \$1 million per year in landing fees.
- \$1 million per year for fuel.
- \$1.95 million per year, set aside for helicopter replacement costs, assuming STARS replaces each of their three helicopters once every 20 years,³³ at \$13 million per aircraft.³⁴

Of this \$41.5 million annual cost, this report estimates the contribution of the Government of Alberta at \$20.8 million, up from \$8.4 million at present.³⁵

Recommendations

Based on Alberta Health's analysis, it is recommended that:

- AHS negotiate a service performance based contract with STARS to provide HEMS throughout Alberta, with government providing 50 per cent of STARS' annual operating costs in Alberta. Minister establish an air ambulance regulation under the *Emergency Health Services Act* that includes standards on HEMS and fixed-wing air ambulance.
- Integrate HEMS dispatch with EMS dispatch for ground ambulance and fixed-wing air ambulance, and integrate other clinician online consultation resources with EMS dispatch. Implementing this recommendation would be part of a larger policy shift that may involve re-imagining the 911, 811, and Referral, Access, Advice, Placement, Information and Destination (RAAPID) systems in order to integrate EMS care.
- Develop qualifications for ground and air EMS emergency communication officers.
- Determine the provision of ALS and Critical Care based on patient and community need, not mode of transport.
- Multidisciplinary teams must be developed to support patient needs, call type and location. The composition of these teams would be determined in the context of available supports in a given community.
- Integrate rural and remote ground ambulance with ALS and Critical Care Paramedics – using full scope of practice for paramedics.
- Establish a provincial EMS advisory committee that includes all ground and air ambulance.
- Ensure that accreditation standards for HEMS air ambulance align with Accreditation Canada standards for EMS and IFTs.
- HEMS education, evaluation and metrics should be similar across all air/ground ambulance environments for the scene and emergent/urgent access and transport and care of critically ill patients to higher levels of care.
- Identify best practice in educational programming and continuing competency across the EMS system.
- Work with municipalities to integrate rescue as appropriate for zone needs.

³² <https://stars.ca/how-we-are-funded/>.

³³ <https://www.theprogress.com/news/new-workhorse-police-helicopter-named-for-pilot-who-died-in-fraser-valley-crash/>.

³⁴ <https://calgaryherald.com/news/local-news/alberta-funding-new-13-million-stars-helicopter-as-part-of-fleet-replacement>.

³⁵ Unknowns in this estimate are the cost of neonatal/pediatric intensive care unit (NICU/PICU) equipment, transition to AHS EMS, and education.

Appendix 1: EMS call data

2017 STARS DATA

Missions type		Calgary	Edmonton	Grande Prairie	Total	% of Requests turned into missions ³⁶
Requests	IFT	1198	2042	505	3745	
	Search and rescue	8	7	14	29	
	Scene	1415	1818	508	3741	
	Total	2621	3867	1027	7515	
Missions	IFT	375	374	84	833	22.2%
	Search and rescue	4	2	7	13	44.8%
	Scene	211	187	164	562	15%
	Total	590	563	255	1408	18.7%
Cancelled Missions	Alt. transport	50	36	48	134	
	No transport required	15	16	18	49	
	Total	65	52	66	183	

2018 STARS DATA

Missions type		Calgary	Edmonton	Grande Prairie	Total	% of Requests turned into missions
Requests	IFT	1188	1922	491	3601	
	Search and rescue	6	3	9	18	
	Scene	1754	2041	612	4407	
	Total	2948	3966	1112	8026	
Missions	IFT	366	349	74	789	21.9%
	Search and rescue	2	0	6	8	44.4%
	Scene	228	226	182	636	14.4%
	Total	596	575	262	1433	17.9%
Cancelled Missions	Alt. transport	70	53	71	194	
	No transport required	19	24	12	55	

³⁶ STARS' data counts any time a helicopter takes off as a mission. However, this does not account for missions that are initiated and aborted due to weather conditions or other factors.

Total	89	77	83	249
--------------	-----------	-----------	-----------	------------

2019 STARS DATA

Missions type	Calgary	Edmonton	Grande Prairie	Total	% of Requests turned into missions	
Requests	IFT	1172	1791	504	3467	
	Search and rescue	3	1	8	12	
	Scene	1806	2233	604	4643	
	Total	2981	4025	1116	8122	
Missions	IFT	357	324	76	757	21.8%
	Search and rescue	2	0	4	6	50%
	Scene	194	215	163	572	12.3%
	Total	553	539	243	1335	16.4%
Cancelled missions	IFT	48	36	53	137	
	Search and rescue	16	15	12	43	
	Total	64	51	65	180	

2020 STARS DATA

Missions type	Calgary	Edmonton	Grande Prairie	Total	% of Requests turned into Missions	
Requests	IFT	1301	1867	544	3712	
	Search and rescue	5	5	6	16	
	Scene	1981	2362	609	4952	
	Total	3287	4234	1159	8680	
Missions	IFT	342	361	79	782	21.1%
	Search and Rescue	2	2	2	6	37.5%
	Scene	227	250	142	619	12.5%
	Total	571	613	223	1407	16.2%
Cancelled missions	IFT	40	41	38	119	
	Search and rescue	16	17	11	44	
	Total	56	58	49	163	

ALL HEMS MISSIONS³⁷

	2018-19	2019-20
STARS	1421	1322
HERO	59	62
HALO	36	38
Total	1516	1422

NON-STARS EMS DATA

Zone	Year	Population	IFT (Fixed-wing + ground)	Events (ground)	ED visits
Alberta	2017-18	4,334,025	174,036	544,744	2,101,629
	2018-19	4,362,503	179,189	560,434	2,056,631
	2019-20	4,421,876	179,390	587,898	2,058,370
North	2017-18 ³⁸	480,002 (48,126>65yrs)			532,069
	2018-19	482,179 (50,045>65yrs)	28,361	65,615	509,903
	2019-20	484,981 (52,197>65yrs)	28,709	69,180	500,014
Edmonton	2017-18	1,383,025 (172,297>65yrs)			552,858
	2018-19	1,404,498 (179,787>65yrs)	63,121	193,091	552,341
	2019-20	1,424,837 (188,087>65yrs)	62,445	199,435	553,175
Central	2017-18	476,519 (73,503>65yrs)			347,222
	2018-19	479,435 (74,503>65yrs)	23,700	60,345	328,256
	2019-20	482,349 (77,408>65yrs)	24,463	65,221	325,148
Calgary	2017-18	1,614,318 (190,551>65yrs)			476,013
	2018-19	1,669,272 (200,478>65yrs)	49,772	188,786	476,267

37AHS' data counts any time a helicopter takes off as a mission. However, this does not account for missions that are initiated and aborted due to weather conditions or other factors.

38 Complete data by zone is not available for 2017-18.

	2019-20	1,696,765 (211,374>65yrs)	49,050	199,616	485,695
	2017-18	305,134 (46,988>65yrs)			193,467
South	2018-19	307,033 (48,662>65yrs)	14,235	47,115	189,864
	2019-20	308,924 (50,362>65yrs)	AHS: 14,723	54,446	194,338

Appendix 2: Estimated annual labour costs for paramedics on HEMS calls

ESTIMATED LABOUR COSTS

Variables	Totals	Sources/Assumptions
Missions per year	1,350	
PCP hourly wage (low end)	\$27.25	https://www.albertahealthservices.ca/careers/Page11715.aspx
PCP hourly wage (high end)	\$34.40	https://www.albertahealthservices.ca/careers/Page11715.aspx
ACP hourly wage (low end)	\$33.99	https://www.albertahealthservices.ca/careers/Page11716.aspx
ACP hourly wage (high end)	\$44.75	https://www.albertahealthservices.ca/careers/Page11716.aspx
Average mission time (hours)	3	
Annual cost – lower bound	\$220,725	2 PCPs, low end of wage range
Annual cost – midpoint	\$291,600	
Annual cost – upper bound	\$362,475	2 ACPs, top end of wage range
Annual cost – lower bound with 1 ACP + 1 PCP	\$248,022	PCP + ACP, both low end of wage range
Annual cost – midpoint	\$305,248	
Annual cost – upper bound	\$362,475	2 ACPs, top end of wage range

Note: does not include benefits, overtime or additional labour costs due to possible replacement of paramedic by flight nurse, physician or other health professional.

Appendix 3: Government HEMS funding in Alberta

GOVERNMENT FUNDING

	2018/19	2019/20
STARS contract	\$6,230,735	\$6,048,665
STARS fuel	\$701,855	\$675,490
STARS grant	\$2,000,000	\$0
STARS total	\$8,932,590	\$6,724,155
HERO	\$1,000,000	\$1,000,000
HALO fee for service	\$369,688	\$139,615
HALO grant	\$500,000*	\$500,000*
HALO total	\$869,688	\$639,615
HEMS total	\$10,802,278	\$8,363,770

*\$1 million grant provided in 2018/19, but covered costs across two fiscal years. This is divided evenly across 2018/19 and 2019/20 to more accurately reflect the intention of the grant.

Appendix 4: Jurisdictional scan

Some cells have been left blank due to a lack of available information. Note that dollar amounts are in Canadian dollars (CAD) for Canadian jurisdictions, but Australian dollars (AUD) for Australian jurisdictions. Currently 1 AUD = 0.97 CAD.

DOMESTIC JURISDICTIONS

	Alberta	British Columbia	Manitoba	Nova Scotia	Ontario	Saskatchewan
Operator (helicopter provider)	<ul style="list-style-type: none"> STARS HALO (Rangeland Helicopters) HERO (Phoenix Heli-Flight) 	<ul style="list-style-type: none"> Helijet Summit Helicopters 	STARS	Canadian Helicopters (EHS LifeFlight)	Ornge	STARS
Government funder	AHS	BC Emergency Health Services	Shared Health (MB Health)	NS Health (Emergency Health Services)	Ministry of Health and Long-Term Care	Saskatchewan Health
Government HEMS funding (annual)	\$8,363,770 (2019/20)	Approx. \$17m (4-year, \$60m contract with Helijet runs through April 1, 2023)	\$9m	\$3.6m	\$70m (estimate)	\$11m
Contract follows RFP?	No	Yes	No	Yes	No	
Charity funded?	Yes (80% of operating budget)	No	Yes (15% of operating budget)	No	No	Yes (50% of operating budget)
Helicopters	<ul style="list-style-type: none"> STARS: 2 H145 and 3 BK117s HALO: BK117 HERO: EC135 T2e 	<ul style="list-style-type: none"> Helijet: 4 Sikorsky S76C Summit Helicopters: 1 Bell 412 EPI (twin-pilot) 	1 BK117	1 Sikorsky S76	12 AW139s	1 H145, 1 BK117
Bases	<ul style="list-style-type: none"> Calgary Edmonton Grande Prairie 	<ul style="list-style-type: none"> Helijet: Vancouver International Airport (2 plus 1 backup) Seal Cove (Prince Rupert, 1) Summit Helicopters: 	Winnipeg	Halifax	<ul style="list-style-type: none"> Kenora (1), London (1) Moosonee (1) Ottawa (1) Sudbury (1) Thunder Bay (1) Toronto (2) 	Regina, Saskatoon

Kamloops (1) Bell 412 EPI						
Total annual government air ambulance funding	\$60m	\$33m	\$23m (most recent data from 2012-13)	Approx. \$9m (most recent data from 2011-12)	\$179.2m	\$24.5m
Population	4.1m	4.6m	1.3m	0.94m	13.6m	1.2m
Notes	<ul style="list-style-type: none"> STARS deploys ACPs and critical care flight nurses and flight physicians (non-unionized) HALO air medical crew is AHS EMS (ALS, unionized); HERO air medical crew is RMWB Emergency Services (ALS, unionized) 	<ul style="list-style-type: none"> All Helijet aircraft are night vision imaging system (NVIS) or night vision goggle (NVG) capable Air medical crew are critical care paramedics (unionized) 	GOM analysis showed Lifeflight could have completed around 600 missions at a cost of \$3 million	Total provincial EMS funding: \$139.1m	<ul style="list-style-type: none"> Request for information regarding helicopter fleet in 2015-16 Canadian Helicopters was rotary wing provider before Ornge took over delivery in 2008 for a \$33m fee (ON Legislative Committee Report) 	

INTERNATIONAL JURISDICTIONS

	Scotland, UK	New South Wales (NSW), Australia	Queensland, Australia	Victoria, Australia
Operator (helicopter provider)	Babcock Mission Critical Services Onshore Ltd	Helicopter Retrieval Network = Northern NSW Helicopter Rescue Service + Toll Group; CareFlight	RACQ LifeFlight Rescue	Babcock Mission Critical Services Australasia
Government funder	Scottish Ambulance Service (NHS Scotland)	NSW Health (NSW Ambulance)	Queensland Health (Queensland Ambulance Service)	Ambulance Victoria (Victoria Health & Human Services)
Government HEMS funding (annual)	£5m (estimate)	<ul style="list-style-type: none"> \$15.1m to Helicopter Retrieval Network \$53.8m to CareFlight (some from Northern Territory government) 	\$20m	\$55m

Contract follows RFP?	Yes	Yes	No	Yes
Charity funded?	No	Partly (Westpac, CareFlight)	Yes	Yes
Helicopters	2 Airbus H145	<ul style="list-style-type: none"> Toll Group: 8 AW139 Westpac Life Saver Rescue Helicopter Service (Northern): 8 CareFlight: 1 AW139 in Darwin 	RACQ LifeFlight Rescue: 8 (2 each AW139, Bell 412, BK117, AS350 Squirrel)	4 AW139, 1 other
Bases	Glasgow, Inverness	<ul style="list-style-type: none"> Toll Group: Bankstown, Orange and Canberra Northern: Lismore, Newcastle, Tamworth CareFlight: Westmead 	RACQ LifeFlight Rescue: Mount Isa, Bundaberg, Sunshine Coast, Toowoomba, Brisbane	Essendon, Latrobe Valley, Bendigo, Warrnambool
Total annual government air ambulance funding	£16.1m			
Population	5.3m	7.5m	4.7m	5.8m
Notes	<ul style="list-style-type: none"> All other helicopter ambulance in UK is fully charity funded Also Charity Air Ambulance helicopter based at Perth, Scotland; Scottish Ambulance Service budget £218.5m; London's Air Ambulance gets 32% of its income (£2.2m) from government (total income £6.9m) 	<ul style="list-style-type: none"> \$151.2m to Helicopter Retrieval Network over 10 year contracts for doctor-based HEMS; operations coordinated by Ambulance Service Aeromedical Operations Centre in Sydney >3,000 missions per year Westpac:340 air ambulance missions in 2013-14 CareFlight received \$53.8m in revenue from NSW & Northern Territory governments (2015-16) CareFlight neonatal and pediatric care helicopters flew 359 missions Northern Operations fixed wing and helicopter crews 	<ul style="list-style-type: none"> Queensland government has 10-year agreement with LifeFlight for \$200m 1,864 missions in 2015-16 Queensland Ambulance Service 2014-15 spending: \$525.3m (3.5% of health budget) 	<ul style="list-style-type: none"> Ambulance Victoria spent \$720.7m in 2014-15 (road and air) Ambulance Victoria has 10-year, estimated \$550m agreement with Babcock for 6 AW139s (2016-26) Membership fees: \$71.6m (2014-15) 1,496 helicopter transports in 2014-15 (1,841 helicopter incidents) Private health insurance does not cover air ambulance or subsequent transfers. Helicopter transfer costs >\$10,000 for non-members Road ambulance trip from Victorian snowfields costs >\$1,700 w/o

launched 2,940
missions

Ambulance Victoria
membership. Annual
membership cost:
\$44.90 (singles)
\$89.80 (families)
