

Helicopter Emergency Medical Services (HEMS): needs analysis and clientele identification

English summary

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SUMMARY

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Context

Helicopter Emergency Medical Services (HEMS) is often referred to as an important component of a pre-hospital transport system. It offers several advantages, both for the primary transport of patients from the accident scene and for the inter-facility transport of people presenting time-sensitive¹ clinical conditions to specialized facilities. In Quebec, the implementation of a medical helicopter transport system has been discussed for about two decades. In the spring of 2019, the Ministère de la Santé et des Services sociaux (MSSS) confirmed its interest to initiate a helicopter medical transport project, preceded by an in-depth analysis of the needs and conditions required to guide the implementation of such a service. The MSSS thus mandated the Institut national d'excellence en santé et en services sociaux (INESSS) to synthesize knowledge on the prioritization of clienteles for inter-facility HEMS, and to evaluate the potential number of patients involved by such a system throughout Quebec. The analysis of primary transportation needs (ex. from accident sites, homes, etc.) is excluded from the present report.

Methodology

The present work aimed to: 1- identify the time-sensitive clinical conditions and pathologies for which the deployment of inter-facility medical helicopter transport in Quebec would be optimal, and to 2- estimate the number of patients affected by these clinical conditions that are located within the HEMS service areas established by the MSSS.

The evaluation approach included a review of the scientific literature. A preliminary search revealed several relatively recent reviews covering various aspects of helicopter transportation. Therefore, we synthesized existing systematic and narrative reviews published between January 2010 and July 2021 to extract the main knowledge on these issues.

Search strategies were designed to pinpoint the clinical conditions for which helicopter transport has the greatest potential benefit. Websites from relevant professional associations, organizations, agencies, and institutions were searched for guidelines, practical guides, and other documents relevant to the mandate. Publications that met the inclusion criteria were assessed for quality, and relevant information was extracted regarding the attributes of the patients most likely to benefit from inter-facility medical helicopter transport.

¹ Conditions for which rapid symptom identification and timely emergency care can have a mortality or morbidity benefit.

The use of a geographic information system allowed the identification of service areas for helicopter transport, as defined by the MSSS (i.e. a flying distance area defined between 75 km and 275 km from the receiving tertiary centers). A retrospective analysis of inter-facility transfers recorded in medico-administrative databases (FIPA, BDCU, MED-ÉCHO, SIRTQ) was undertaken to estimate the volume of some of the target clientele located within these defined service areas.

For the present work, an experts committee comprising various medical specialties was formed to contextualize the findings to the particularities of Quebec's healthcare system. Another committee including several stakeholders also ensured that the various organizational issues were considered and that the results were relevant and acceptable.

Results

Forty-six documents (28 reviews and 18 guidelines) met the inclusion criteria from the literature review. Of these, 6 reviews of good or average quality contributed to the preliminary results, and were discussed with experts to ensure their applicability to Quebec's healthcare system.

The integration of scientific evidence and expert consultations suggest that the activation of medical helicopter transport for the transfer of patients to tertiary/specialized care centers would optimize the benefits for the following specialties and clinical conditions:

- Cardiology: acute STEMI, cardiac intensive care, complications (fibrinolysis, infarction), acute myocarditis with heart failure, arrhythmia crisis, ventricular tachycardias.
- Neurology / neurosurgery: ischemic strokes requiring thrombectomy, intracranial hemorrhages requiring urgent surgical intervention.
- Traumatology: time-sensitive, and well selected severe cases (Injury Severity Score - ISS > 15).
- Neonatology: primarily for transporting medical expertise to the bedside.
- Pediatrics: neurosurgical trauma cases, general polytrauma cases, pediatric cases requiring admission to intensive care or emergency surgical care.

On the other hand, this type of transport appears less relevant or contraindicated for the following medical specialties:

- Neonatology: less relevant for patient transport.
- Obstetrics: no benefit in the absence of significant maternal trauma or a need for urgent surgery (e.g. cardiac surgery).
- Pneumology: no benefit identified and some risk factors related to flight altitude.

The potential number of patients who could benefit from inter-facility HEMS was estimated based on a map established with geographic parameters determined by the MSSS. This map includes an area for transferring patients to tertiary/specialized care centers located in Quebec City (12 referring hospitals), an area for transferring patients to

tertiary/specialized care centers located in Montreal (8 referring hospitals), and a common service area where people can be transferred to either of the two cities (13 referring hospitals). An area outskirting Montreal that could potentially benefit from a helicopter medical transport system, due to frequent road traffic congestion at the various entrances of the island, was also identified. This area, identified as "fragile ground ambulance transport to Montreal", would include 11 referring hospitals.

Based on data from Quebec's medico-administrative databases (2014 to 2019) and the established transfer areas, the pool of potential candidates for inter-facility medical helicopter transport was identified as follows:

1) Acute ST-elevation myocardial infarction (STEMI):

- Annual average of 845 cases transferred within 24 hours of arrival at a referral center in the service area of a specialized care center.
- 26% of these transfers were completed within 2 hours, and 86% were completed within 6 hours of arrival at a referral center in the service areas.

2) Ischemic stroke:

- Annual average of 312 cases transferred within 24 hours of arrival at a referral center in the service area of a specialized care center.
- 19% of these transfers were completed within two hours and 74% within six hours of arrival at a referral center in the service areas.

3) Trauma in patients 16 years and older:

- Annual average of 151 moderate to severe traumatic brain injuries, 64 spinal cord injuries, and 62 burn victims transferred from a referral center in the service areas of a specialized care center, for a total of 277 patients.
- Considering the severity of trauma cases, an average of 395 patients with an ISS > 12 (regardless of diagnosis) were transferred annually.

Transfers from referral hospitals in the so-called fragile area for ground ambulance transport to the city of Montreal accounted for 36% to 50% of cases, depending on the clinical specialties.

Conclusions

This work made it possible to identify the clienteles for which the deployment of inter-facility helicopter medical transport would have a greater impact in terms of clinical benefits, and to estimate the potential number of patients concerned based on the service areas established by the MSSS.

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