

Understanding When to Request a Helicopter for Your Patient

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"If you are in trouble anywhere in the world, an airplane can fly over and drop flowers, but a helicopter can land and save your life."
— Igor Sikorsky, 1947

Medical helicopters were first widely used for patient transport during the Korean War. Patients were secured to the outside of the Bell 47 helicopter on a basket stretcher and evacuated to the nearest field hospital. Despite no care being provided during transport, a significant number of lives were saved.¹ Survival rates increased during the Vietnam War, when larger aircraft allowed medics to begin patient resuscitation during evacuation.²

Because of the vastly improved mortality rate, these services were extended into the civilian sector of the United States in the late 1960s and early 1970s. From these humble beginnings, the helicopter EMS (HEMS) industry in the U.S. [has grown](#) to 970 helicopters in 2013, transporting over 400,000 patients annually.^{3,4} HEMS is annually a \$2.5-billion business in the U.S. and accounts for approximately 3% of all civilian emergent transports.³

Despite this rapid growth, HEMS has been the subject of scrutiny for a variety of reasons. Concerns regarding safety, inappropriate utilization and financial cost have been raised. Furthermore, conducting rigorous scientific research to definitively demonstrate the clinical effectiveness of HEMS has proved challenging. Although the majority of research investigating the effect of HEMS on mortality in trauma has shown that lives are indeed saved, the results haven't been entirely unanimous.⁵⁻¹²

Despite this debate, a 2013 joint position statement from the Air Medical Physician Association, the American College of Emergency Physicians, the National Association of EMS Physicians, and the American Academy of Emergency Medicine concludes that patients do benefit from the appropriate utilization of HEMS.³ (See Figure 1)

Figure 1: Clinical benefits HEMS can provide to patients

1. **Meaningfully shortening the time to delivery of definitive care to patients with time-sensitive medical conditions.**
2. **Providing necessary specialized medical expertise or equipment to patients before and/or during transport.**
3. **Providing transport to patients inaccessible by other means of transport.⁵**

As EMS professionals, we've taken an oath to "conserve life, alleviate suffering, promote health, do no harm, and encourage the quality of and equal availability of emergency medical care."¹³ Accordingly, this article aims to provide an overview of the patient care considerations that should help inform

the decision to activate a helicopter, examine new evidence-based guidelines for the air medical transport of trauma patients, and conclude with a brief discussion of the financial consequences of air medical transport.

Care Considerations

In making the decision to request a helicopter, it's critical to remember HEMS is a unique and complex medical process with its own inherent risks and benefits to both the patient and the provider. It's a medical decision made to specifically manipulate time in an attempt to "conserve life."⁸

Thus, just like performing any other critical EMS procedure, providers requesting a helicopter should have a working understanding of potential challenges to patient care encountered during flight to help inform decision-making so the most appropriate mode of transport—air or ground—can be promptly arranged. (See Table 1.) These unique challenges don't necessarily serve to limit HEMS, as they're often balanced by the advanced clinical capabilities of air medical transport.

Table 1: Challenges to patient care in a helicopter

Challenges will vary greatly depending on the specific aircraft being utilized.

Limited space

In comparison to an ambulance, the limited space in a helicopter can effect:

- >> Performing some in-flight procedures such as intubation;^{1,2}
- >> Access to parts of the patient's body such as the side of the patient placed against the aircraft wall;
- >> Delivering a baby in-flight;
- >> Ability to transport two critical patients simultaneously;
- >> Ability to transport a family member with the patient (important when caring for frightened pediatric patients); and
- >> Ability to transport additional providers to assist with a critically ill patient.

Positioning of medical crew

Where each member of the medical crew sits in relationship to the patient is important and not uniform among all helicopters.

- >> CPR is best performed when one provider is positioned to the side of the patient.³ (This obstacle can be overcome by utilization of an automated chest compression device.)
- >> Performing multiple interventions on the patient simultaneously is more easily achieved if both crewmembers have easy access to the patient.

Lighting

Dim or colored aircraft lighting, particularly at night, can affect:

- >> Accuracy of detailed procedures such as obtaining IV access;
- >> Reading of small text on medication vials; and
- >> Accurate assessment of the patient's skin pallor or cyanosis.

Noise

The sound of the rotor blades and wearing a helmet makes some aspects of patient assessment difficult, such as:

- >> Auscultation of lung sounds for pneumothorax;
- >> Detecting warning alarms from monitors or ventilators; and
- >> Hearing a patient speak in response to verbal reassessment.

Movement

Once in flight, if a patient deteriorates or becomes physically aggressive, providers aren't able to "pull over" as in an ambulance and rapidly address the change in patient condition.

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Just as different hospitals or ground EMS agencies have different patient care capabilities and protocols, so do helicopter programs. Therefore, it's important providers have knowledge of the level of critical care provided by a specific helicopter service before the request for air medical transport is made. This is especially important when there are multiple air medical services within the same geographic region. For example, not every HEMS service carries tranexamic acid (TXA) and even fewer HEMS services have the ability to initiate transfusion of blood products,^{14,15} even though we know that for critically injured, bleeding trauma patients, minimizing resuscitation with IV fluids, prehospital transfusion of blood products, and early administration of TXA improves patient outcomes.^{16–18} Differing care capabilities also exist for treatment of traumatic brain injury, difficult airways, hemorrhage control and sepsis.

Recent military data demonstrates the significant benefit of delivering more advanced, time-sensitive treatments to critical trauma patients during transport.¹⁹ It's reasonable to believe this same clinical benefit should be seen in other life-threatening conditions. An understanding of the different clinical capabilities between HEMS services should help providers choose accordingly when utilizing a helicopter. Some patients will benefit most by immediate transport to definitive care, while others will benefit most by having true critical care transported to them.

HEMS Trauma Guidelines

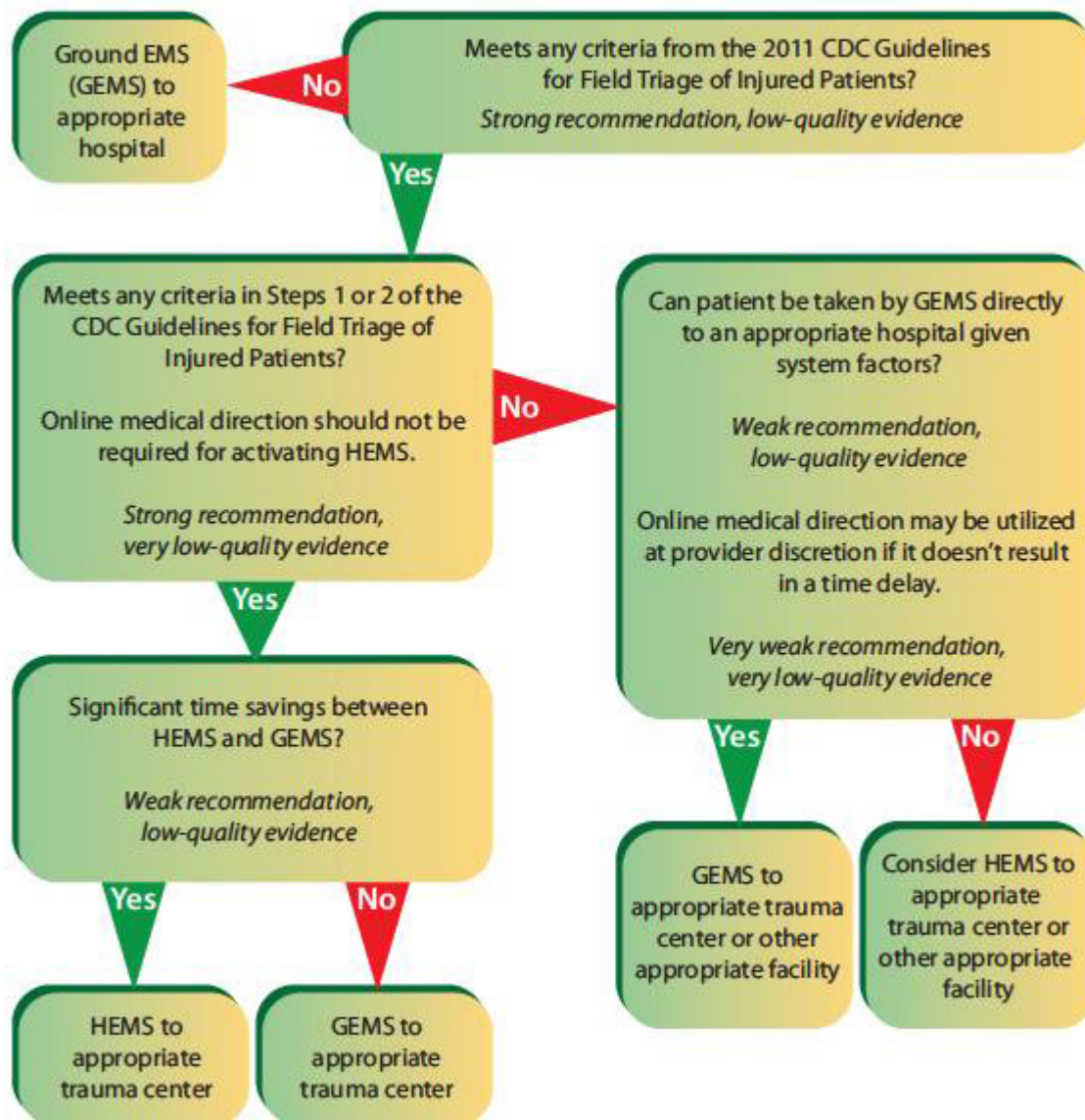
At the time of vehicle triage, it's not possible to know with complete clinical accuracy which patients will benefit from air medical transport. Furthermore, in many regions of the U.S., providers have no specific regional protocol for when to request air medical evacuation.⁵ Thus, situations arise where nonclinical factors such as convenience, economics and politics may begin to influence helicopter utilization. This is often to the detriment of the patient and the healthcare system.

In January, "An evidence-based guideline for the air medical transportation of prehospital trauma patients" was published in *Prehospital Emergency Care*. This guideline, written by Thomas SH, Brown KM, Oliver ZJ, et al., is the work of a multidisciplinary panel consisting of experts in prehospital medicine,

trauma, EMS research and evidence-based medicine. The objective of this guideline is to recommend a practical strategy for deciding which prehospital trauma patients will benefit most from [air medical transport](#).

Using a well-accepted, systematic methodology, this guideline makes several recommendations for the transport of prehospital trauma patients. Recommendations are then incorporated into a suggested algorithm for real-time use by EMS providers. (See Figure 2.) The first and most important recommendation is that the 2011 Centers for Disease Control (CDC) Guidelines for the Field Triage of Injured Patients be used as the basis for risk-stratifying injury severity, and thus guide decisions as to transport destination and modality.²⁰ The CDC guidelines use the best available evidence to derive the safest possible triage guidelines focused on the anatomic, physiologic and situational criteria associated with risk of major injury and poor patient outcomes.²¹

Figure 2: Will your patient benefit from air medical transport?



The guideline goes on to recommend that consulting online medical direction prior to HEMS activation shouldn't be required for patients meeting the CDC criteria for serious injury. Recommendations suggest HEMS be used to transport patients meeting criteria for serious injury only if there will be significant time savings over ground EMS. All other trauma patients are to be transported by ground EMS unless system variables or road conditions prohibit safe and timely transport.²⁰ The guidelines don't define "time savings," but previous publications suggest HEMS may become the faster mode of travel when ground transport to a trauma center exceeds 30 minutes. Of note, if a patient was entrapped, HEMS may be faster at transporting much shorter distances.

When examining this new guideline, it's important to acknowledge all recommendations were made based on the best available evidence, which is typically of low scientific quality. This reflects the difficult nature of performing HEMS research and of making ground versus air ambulance comparisons.

Despite these challenges, this guideline has the potential to affect new EMS standards and have a meaningful impact on patient care. In making these recommendations, emphasis was placed on plausible patient preferences regarding risk of death or severe disability. Thus, the highest priority was placed on avoiding patient harm through under-triage rather than misuse of HEMS by overtriage.²⁰

As EMS administrators consider application of this new guideline, it's important to emphasize that it should be adapted based on regional capabilities and the needs of the local healthcare system. For example, 27% of U.S. residents are dependent on helicopter transport to access Level 1 or 2 trauma centers within the "golden hour."²² For the benefit of the patient, HEMS utilization in these areas should reflect this significant geographic barrier.

Financial Consequences

As healthcare providers, we often give little consideration to the financial aspects of patient care. However, every treatment we provide and every patient care decision we make comes with a price tag for our patients long after their injury or illness.

There's no national requirement for air medical services to publicly report their fee structure. However, for a single flight mission, a patient (and their insurance company) is commonly charged anywhere from \$12,000 to \$25,000 or more depending on the service and distance transported.²³ The degree of the patient's economic burden is extremely variable depending on their insurance coverage. Insurance companies fluctuate widely in what they deem an allowable charge for air medical transport. Only about 60% of insurers pay the full charge of HEMS transport with some companies paying only a few hundred dollars.²³

If a patient is unable to afford the remaining balance of their air medical transport bill, the extent to which they're pursued is also highly variable depending on the business practices of the particular HEMS service.

Regardless, air transport is significantly more expensive than the average ground transport cost, which currently sits at \$800 to \$2,000.²³ Thus, in today's healthcare financial climate, the critical question becomes: Is this additional cost worth it? In other words, is HEMS transport cost-effective?

In 2013, a group of researchers (mostly from Stanford University) published the most sophisticated cost-effectiveness analysis to date of U.S. HEMS scene trauma response. Using complex modeling, they determined that HEMS must provide a 15% relative risk reduction in mortality (equivalent to 1.3 more lives saved per 100 patients transported) over ground EMS in order to offset the higher costs, transport risks and inevitable overtriage.²⁴ Most, but not all, previous outcomes studies of helicopter trauma scene transport demonstrate achievement of this efficacy threshold.^{6,24}

A full discussion of this cost-effectiveness analysis is beyond the scope of this article; however, two important concepts are worth highlighting. The first is that any improvement in our patient's long-term disability will make HEMS more cost-effective even if no additional lives are saved relative to ground transport.²⁴ We know very little about HEMS' capacity to prevent disability, and this should be an area of future research. The second is that reducing over-triage of minor trauma to HEMS is absolutely the most important way to increase the cost-effectiveness of HEMS for our patients and the healthcare system.²⁴

Preparing Your Patient for Flight

A quick Internet search yields countless news articles featuring patients upset by or unaware of the significant personal expense they would incur as a result of helicopter transport.²⁵ Some even openly questioned the need for air medical services prior to flight.

These stories raise an important question. In EMS we routinely make rapid decisions for critically ill, incapacitated patients under the doctrine of implied consent, including requesting a helicopter. However, for potentially critical patients still capable of making decisions, how often and to what extent do we explain to them or their families why we believe it's in their best interest to be transported by HEMS?

The time-sensitive and task-saturated nature of the prehospital environment is certainly not conducive to a lengthy informed consent process. However, a patient has the right to understand the risks and benefits of any treatment, including no treatment at all. With decision-making capacity, they have the right to refuse a particular mode of transport, even if it means a bad health outcome may occur. These news stories should remind us to make a focused effort to keep our patients involved in decision-making and informed about the critical necessity of the quality care we provide.

Beyond the clinical, financial and [safety](#) (not discussed in this article) aspects of air medical transport, all providers must be mindful of psychological considerations surrounding HEMS transport. First, the fear of flying is well-reported in the literature and yet rarely acknowledged in patients before flight. In one study, approximately 1 in 7 air medical patients had no previous flight experience.²⁶ This fear is real and its effects can be challenging to manage. It can contribute significantly to unexpected agitation before or during flight. In addition, the air medical environment can often be a claustrophobic and anxiety-provoking experience for some patients.

Furthermore, flight can be a rapidly isolating event whereby a patient is suddenly removed from the comfort of family networks and local community support. For the injured patient, it's often unclear how and when they'll be reunited with loved ones, since many HEMS services lack the capability to transport a family member with the patient. The psychological effects of this separation during a time of crisis, particularly in the very young and elderly, must not be underestimated.

Lastly, patients may have an increased fear of death from the injury or illness that was felt to necessitate a helicopter instead of a ground ambulance. These psychological stressors shouldn't limit HEMS utilization, but it's critical for all providers to be aware of their potential effects. Unaddressed, these fears can significantly increase a patient's resistance to HEMS transport and compound the physiologic stress of injury and illness. Clear communication that includes reassurance, explanation of decisions and active listening is the cornerstone of addressing these fears and in preparing a patient for air medical transport.

Final Thoughts

The decision to activate air medical transport for trauma patients is a complex one requiring consideration of a variety of clinical, logistical and psychological factors. The more we know about our local HEMS services' capabilities, challenges to the provision of patient care in flight, and fears our patients may be harboring, the more consistently we'll make good decisions.

Ultimately, the decision to request HEMS activation should be guided by the need to manipulate time for the clinical benefit of the patient either by transporting the patient to definitive care, by transporting critical care to the patient, or both. We know HEMS is unlikely to improve patient outcomes if utilized for situations that aren't time-sensitive.¹² Thus, the true effectiveness of air medical transport hinges upon the appropriate selection of injured patients for HEMS. Under-triage has negative implications for patient outcomes, while over-triage affects system resources and places an unnecessary financial burden on the patient and healthcare system. Establishing and adhering to local, evidence-based guidelines for HEMS utilization is mission critical in our efforts to "conserve life, promote health, and do no harm."

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