National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: SEP 24 2009

In reply refer to: A-09-102 and -103

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The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendations in this letter. The NTSB is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

This recommendation letter addresses the helicopter emergency medical services (HEMS) industry and is derived from testimony provided at the NTSB's public hearing concerning this industry, as well as investigations of recent HEMS accidents. As a result, the NTSB is issuing two safety recommendations to the Department of Homeland Security's Federal Interagency Committee on Emergency Medical Services (FICEMS). Information supporting these recommendations is discussed below. The NTSB would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations. Additional recommendations have been addressed to the Federal Aviation Administration (FAA), the Department of Health and Human Services' Centers for Medicare & Medicaid Services (CMS), and 40 public HEMS operators.

Calendar year 2008 was the deadliest year on record for the HEMS industry with 12 accidents[1] (8 fatal accidents) and 29 fatalities. As a result of this increase in fatal accidents involving HEMS operations, the NTSB placed the issue of HEMS safety on its *Most Wanted List of Transportation Safety Improvements* on October 28, 2008,[2] and also conducted a 4-day public

[1] The NTSB classifies a HEMS accident as one in which the accident flight involved an aircraft dedicated to or configured for air medical operations and piloted by an EMS crew.

[2] See <http://www.ntsb.gov/Recs/mostwanted/aviation_improvesafety_ems_flights.html> for a discussion of these recommendations: A-06-12, A-06-13, A-06-14, A-06-15.

hearing to critically examine safety issues concerning this industry.[3] Based on testimony given at this public hearing, in addition to findings from recent HEMS accidents,[4] the NTSB believes that FICEMS needs to take action to aid in reducing exposure to accident risk in HEMS operations. This action is twofold and includes the development of national guidelines for the following:

- coordinating and integrating helicopter emergency medical transport into local and regional emergency medical systems and

- selecting the most appropriate emergency transportation mode for victims of trauma.

HEMS operations provide an important service to the public by transporting seriously ill patients and donor organs to emergency care facilities, often from remote areas not served by adequate facilities. These operations, which comprise an estimated 750 helicopters, 70 commercial operators, and 60 hospital-based programs, are unique and complex, mixing highly advanced medical care with the technical challenge of safely operating helicopters 24 hours a day.[5] Each year, approximately 400,000 patients and transplant organs are safely transported by helicopter. However, the pressure to conduct these operations safely and quickly in various environmental conditions (for example, in inclement weather, at night, and at unfamiliar landing sites for helicopter operations) increases the risk of accidents when compared to other types of patient transport methods, including ground ambulances or airplanes.

Previous NTSB Actions: Safety Study, Special Investigation, and Public Hearing

The NTSB has a long-standing interest in the safety of emergency medical services (EMS) aviation operations. In 1988, the NTSB conducted a safety study of commercial HEMS operations. That study evaluated 59 HEMS accidents and resulted in the NTSB issuing 19 safety recommendations to the FAA and to the air medical transportation industry.[6] However, the late 1990s and early 2000s saw a rapid growth of HEMS operations and the number of accidents began to rise. Prompted by this rise, the NTSB completed a special investigation in January 2006 that analyzed 41 HEMS accidents and 14 airplane EMS accidents that had occurred during the previous 3 years, claiming 54 lives; of these fatalities, 39 occurred during HEMS operations.[7] In this

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[3] The NTSB's public hearing took place February 3–6, 2009. For details, see the NTSB website at <http://www.ntsb.gov/events/Hearing-HEMS/default.htm>.

[4] Accident investigation reports are available at <http://www.ntsb.gov/Publictn/A_Acc1.htm>. The public may view and download docket contents at <http://www.ntsb.gov/info/foia_fri-dockets.htm>. Details of the recent HEMS accidents that are used to support the recommendations contained in this letter are cited later in the section of this letter titled "Recent EMS Accidents."

[5] Estimates provided by the Association of Air Medical Services.

[6] Most of these recommendations to the FAA were closed as a result of the June 20, 1991, issuance of Advisory Circular (AC) 135-14A, "Emergency Medical Services/Helicopter (EMS/H)," which addressed equipment, training, crew resource management, decision-making, flight-following procedures, weather minimums, and the development of safety programs for EMS helicopter flights operating under 14 *Code of Federal Regulations* Part 135. Although the NTSB expressed concern at the time that the FAA chose to issue an AC instead of regulations, the number of EMS accidents was decreasing; thus, the recommendations were classified "Closed—Acceptable Action."

[7] Accident rates would have been a better metric for evaluation, but HEMS operators are not required to report exposure data. Consequently, only raw counts were available.

Special Investigation Report on Emergency Medical Services Operations,[8] the NTSB identified the following recurring safety issues: less stringent requirements for EMS operations conducted without patients on board; the absence of aviation flight risk evaluation programs for EMS operations; a lack of consistent, comprehensive flight dispatch procedures for EMS operations; and a lack of requirements to use technologies such as terrain awareness and warning systems (TAWS) and night vision imaging systems (NVIS) to enhance EMS flight safety. As a result, the NTSB adopted four safety recommendations specifically addressing the need to improve the safety of EMS flights. These recommendations are currently included on the NTSB's Most Wanted List.

As noted above, 2008 was the deadliest year on record, with 8 fatal accidents and 29 fatalities, up from 2 fatal accidents and 7 fatalities in 2007. During its February 2009 public hearing, the NTSB heard testimony[9] describing the perspectives of nearly every facet of the HEMS industry, including large and small companies, companies that conduct visual flight rules and instrument flight rules operations, hospital programs, and those who oversee HEMS operators. The hearing called upon 41 expert witnesses representing 8 HEMS operators, 12 associations, 6 manufacturers, and 4 hospitals. The witnesses participated as part of 12 panels[10] that addressed particular safety issues.[11]

By taking a comprehensive look at the HEMS industry, the hearing sought to obtain a more complete understanding of why this industry has grown rapidly in recent years and explored its increasingly competitive environment. Topics examined during the hearing were flight operations procedures including flight planning, weather minimums, and preflight risk assessment, as well as safety-enhancing technology such as TAWS and NVIS. Flight recorders and associated flight operations quality assurance programs were also discussed. Training, including use of flight simulators, was discussed at length, as well as corporate and government oversight of HEMS operations.

Incorporation of Helicopter Emergency Medical Transport Resources into Local and Regional EMS Systems

According to testimony provided during the NTSB's public hearing, patient transport using helicopters has increased by 88 percent over the past 10 years.[12] Factors that may be associated with this increase include a continuing reorganization of the health care system with

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[8] *Special Investigation Report on Emergency Medical Services Operations,* NTSB/SIR-06/01 (Washington, DC: National Transportation Safety Board, 2006). The full report can be accessed at the NTSB website at <http://www.ntsb.gov/publictn/2006/SIR0601.pdf>.

[9] For a summary of the testimony, see the NTSB website at <http://www.ntsb.gov/events/Hearing-HEMS/HEMS_Summary.pdf>.

[10] The 12 sessions included Current EMS Models and Reimbursement Structures; State Oversight and Competition; Patient Transport Request Process; Flight Dispatch Procedures; Safety Equipment and Flight Recorders; Flight Operations Procedures and Training; Corporate Oversight; Safety Management Systems; and FAA Oversight.

[11] Additionally, several organizations designated as parties to the public hearing had an opportunity to question the witnesses directly. The parties, who were designated for their technical expertise in their respective fields, were the FAA, Association of Air Medical Services, Helicopter Association International, National EMS Pilots Association, Professional Helicopter Pilots Association, Air Methods (representing a relatively large operator), and CareFlite (representing a relatively small operator).

[12] Exhibit 3A can be accessed at <http://www.ntsb.gov/Dockets/Aviation/DCA09SH001/411077.pdf>.

the loss of some emergency departments and trauma centers, decreasing numbers of clinical specialists and subspecialists at community hospitals, the absence of rural ground-based critical care transport, and Medicare reimbursement practices for HEMS transport resulting from the establishment of a national fee schedule.[13]

Testimony indicated that, historically, HEMS services were provided under contract from a sponsoring hospital or a public agency such as a police department. Such HEMS services were usually integrated into the local EMS transport system. Most newer HEMS services, however, are supplied by providers unaffiliated with a hospital or public transport.[14] In these types of operations, the EMS helicopter, medical crew, pilots, and supporting infrastructure are instead provided by an aircraft operator. Ordinarily, a physician on the operator's staff serves as the medical director for patient transport services.[15] Transport requests are typically initiated by physicians or 911-type services.

Testimony indicated that the recent growth of HEMS providers appears to have been primarily market driven. That is, HEMS providers have been added in geographic regions where the potential patient populations are adequate and reimbursement rates are favorable for ensuring that the HEMS provider has the level of income required to stay in business. Often no integrated local or regional plan exists to provide guidance on where HEMS services are needed or how they should be integrated into other forms of emergency response and patient transport. Consequently, multiple HEMS providers may provide coverage in some geographic regions, while other regions may not have adequate patient populations to support any HEMS providers. The following accident provides an example.

On January 6, 2008, a motorcoach ran off the road and rolled over near Mexican Hat, Utah.[16] Of the 53 passengers aboard the bus, 50 were ejected. Nine passengers were fatally injured and 43 others received various levels of injury. The NTSB found that poor weather conditions prevented the use of HEMS to transport the seriously injured. The nearest trauma center was approximately 230 miles from the accident site. The NTSB concluded that the regionalization of emergency medical care had resulted in a reliance on air medical transport for timely long distance patient transport and that contingency plans did not address the possibility that air medical resources might be unavailable. Findings from this accident investigation, along with testimony delivered during the HEMS hearing, indicated that improvements could be made to ensure HEMS services are better integrated into local and regional EMS response system plans.[17] In its June 2006 report, *Emergency Medical Services at the Crossroads,* the National

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[13] See exhibit 5-G at <http://www.ntsb.gov/Dockets/Aviation/DCA09SH001/409994.pdf>.

[14] Hospital-sponsored HEMS services are known as "hospital-based" or "traditional" HEMS services. HEMS services provided by governmental entities are typically called "public" HEMS services. HEMS services provided by stand-alone organizations with no hospital affiliation are typically called "community-based" services. Community based services can be for-profit or not-for-profit.

[15] The CMS, a government health insurance program, provides reimbursement for community-based HEMS services if they meet the CMS requirements to be an "enrolled supplier." These requirements specify what qualifies as an air ambulance for purposes of insurance reimbursement.

[16] *Motorcoach Run-Off-the-Road and Rollover, U.S. Route 163, Mexican Hat, Utah, January 6, 2008,* Highway Accident Report NTSB/HAR-09/01 (Washington, DC: National Transportation Safety Board, 2009).

[17] The NTSB issued Safety Recommendation H-09-5 to FICEMS on May 29, 2009: "Evaluate the system of emergency care response to large-scale transportation-related rural accidents and, once that evaluation is completed, develop guidelines for emergency medical service response and provide those guidelines to the States."

Institute of Medicine highlighted this concern stating, "EMS care is highly fragmented, and often there is poor coordination among providers. Multiple EMS agencies…frequently service within a single population center and do not act cohesively."[18] To be effective, EMS response must be an integrated part of the continuum of health services needed to reduce deaths and the severity of injuries sustained in transportation accidents. Therefore, the NTSB recommends that FICEMS develop national guidelines for the use and availability of helicopter emergency medical transport by regional, state, and local authorities during emergency medical response system planning.

Patient Transport Decisions

Public hearing testimony indicated that the criteria used for determining the appropriateness of helicopter transport vary markedly among different air medical operators and regional EMS systems. In many cases, HEMS transportation is the only available means of timely EMS response, making it the first choice for emergency patient transport. In other cases, though it may be slower than ground transport, air medical transport may actually be better for the patient due to the higher level of clinical care provided by the HEMS crew.[19] The consensus among witnesses at the hearing, however, was that EMS helicopters are sometimes used for transport where cheaper and safer alternatives exist.

The costs associated with establishing a HEMS service are high. These costs include, at a minimum, acquiring a helicopter and modifying it for medical transport, employing pilots to fly the helicopter, employing clinical crewmembers to take care of the patients, providing continuing training for the pilots and crew, employing mechanics to maintain the helicopter, and funding the large variety of associated support costs. These costs can easily reach into millions of dollars per year. Additional safety-related equipment and training would raise these costs even more.

Most HEMS providers receive no reimbursement from health insurance companies, Medicare, or state Medicaid programs unless a patient is transported.[20] The use of HEMS for patient transfers may therefore raise the possibility that, in some cases, financial pressure to undertake HEMS flights might compromise safety—influencing the decision to accept a mission in marginal weather conditions, for example. This possibility is of particular concern when multiple HEMS organizations provide service to the same geographic region. Testimony at the hearing indicated that air medical services in close proximity do experience competitive pressures.

The decision to request HEMS transport is typically made by physicians when the patient is already in a hospital, or by emergency first responders wishing to address trauma or serious

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[18] *Emergency Medical Services at the Crossroads,* National Institute of Medicine (Washington DC: National Institute of Medicine: 2006), p. 3.

[19] HEMS medical crews are composed of highly skilled paramedics, critical care nurses, and in some cases physicians. Advanced medical equipment on the helicopter, and the training of these clinicians, allow them to provide a more comprehensive level of medical care than that provided by most ground ambulance services.

[20] In contrast, some public-use HEMS services do not charge for patient transport. For example, the State of Maryland's HEMS service is funded by a surcharge of $11 for each motor vehicle registered in the state. Some community-based HEMS providers also offer "subscription" programs where participants pay a yearly fee and are provided free HEMS transportation if transported by that HEMS provider. This is essentially a form of supplemental HEMS transport insurance.

illness in a prehospital setting. Guidelines for determining when an EMS helicopter should be used are usually established by the involved organizations, such as the HEMS operator, affiliated hospitals, first responder EMS services, and local police. However, public hearing testimony indicated that a variety of standards are used by various providers and organizations. There are no nationwide standards or recommended guidelines.

In its 2006 report, the National Institute of Medicine described a need to develop better criteria to determine when patients should be transported and by what type of vehicle.[21] The Institute observed that currently few criteria exist upon which to base transport guidelines. This is an important consideration since first responders decide when prehospital patients should be transported, often with little specific knowledge of the patient's actual physical condition other than what they can observe at the accident scene. Absent such criteria, the decision to undertake a HEMS flight may be made whether the medical situation merits the HEMS flight and its associated risks (compared to ground transportation) or not. This view was reflected in testimony provided at the hearing. The NTSB therefore recommends that FICEMS develop national guidelines for the selection of appropriate emergency transportation modes for urgent care.

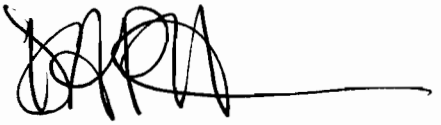
Recommendations

The National Transportation Safety Board therefore recommends that the Federal Interagency Committee on Emergency Medical Services:

> Develop national guidelines for the use and availability of helicopter emergency medical transport by regional, state, and local authorities during emergency medical response system planning. (A-09-102)
>
> Develop national guidelines for the selection of appropriate emergency transportation modes for urgent care. (A-09-103)

In response to the recommendations in this letter, please refer to Safety Recommendations A-09-102 and -103. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our secure mailbox. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman HERSMAN, Vice Chairman HART, and Member SUMWALT concurred in these recommendations.



By: Deborah A.P. Hersman
Chairman

[21] National Institute of Medicine, 2006, p. 81.