

NATIONAL TRANSPORTATION SAFETY BOARD

Public Meeting of January 25, 2005

(Information subject to editing)

Special Investigation Report Emergency Medical Services (EMS) Operations and Briefs of Seven EMS Accidents

This is a synopsis from the Safety Board's special investigation report and does not include the Board's rationale for the conclusions and safety recommendations. Safety Board staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing.

INTRODUCTION

Emergency medical services (EMS) aviation operations (conducted with either helicopters or fixed-wing aircraft) provide an important service to the public by transporting seriously ill patients or donor organs to emergency care facilities. The pressure to safely and quickly conduct these operations in various environmental conditions (for example, inclement weather, at night, and unfamiliar landing sites for helicopter operations) makes EMS operations inherently dangerous, and the hazards associated with EMS operations are resulting in an increasing number of accidents. This special investigation report of EMS operations and accidents is not intended to burden operators with undue requirements or to handicap this vital function in any way; rather the purpose of the report is to identify and recommend operational strategies and technologies that will help ensure that these vital EMS flights arrive safely and continue to provide a valuable service to the public.

Between January 2002 and January 2005, 55 EMS aircraft accidents occurred in the United States (this number of EMS accidents had not been seen since the 1980s); these accidents resulted in 55 fatalities and 18 serious injuries. Although the number of flight hours flown by EMS helicopter operations has increased from about 162,000 in 1991 to an estimated 300,000 in 2005, the accident rate from 1998 to 2002 has also increased and continues to do so.

As a result, the National Transportation Safety Board initiated a special investigation of these 55 accidents and identified the following recurring safety issues:

- less stringent requirements for EMS operations conducted without patients onboard;
- a lack of aviation flight risk evaluation programs for EMS operations;
- a lack of consistent, comprehensive flight dispatch procedures for EMS operations; and
- no requirements to use technologies such as terrain awareness and warning systems (TAWS) to enhance EMS flight safety.

Of the 55 accidents that occurred between January 2002 and January 2005, the following seven were considered to provide the best examples of the safety issues involved:

- **Salt Lake City, Utah (FTW03FA082).** On January 10, 2003, an EMS helicopter crashed into terrain while maneuvering in dense fog on an aborted mission to pick up a patient. The pilot and flight paramedic were killed, and the flight nurse was seriously injured.

http://www.nts.gov/nts/brief.asp?ev_id=20030117X00084&key=1

- **Redwood Valley, California (LAX04FA076).** On December 23, 2003, an EMS helicopter was en

route to pick up a patient when it collided with mountainous terrain while operating in high winds and heavy rain. The pilot and two flight nurses were killed.

http://www.nts.gov/nts/brief.asp?ev_id=20040108X00032&key=1

- **Dodge City, Kansas (CHI04FA066).** On February 17, 2004, an EMS airplane crashed about 5 miles beyond Dodge City Regional Airport while on a repositioning flight. The pilot, flight paramedic, and flight nurse, who were at the end of a 14-hour duty day, were killed.

http://www.nts.gov/nts/brief.asp?ev_id=20040220X00214&key=1

- **Pyote, Texas (FTW04FA097).** On March 21, 2004, an EMS helicopter crashed into terrain while maneuvering in reduced visibility conditions while transporting a patient. The pilot, flight paramedic, patient, and patient's mother were killed, and the flight nurse was seriously injured.

http://www.nts.gov/nts/brief.asp?ev_id=20040325X00375&key=1

- **Newberry, South Carolina (CHI04MA182).** On July 13, 2004, an EMS helicopter collided with trees shortly after picking up a passenger from an accident site on an interstate. The pilot, flight nurse, flight paramedic, and patient were killed.

http://www.nts.gov/nts/brief.asp?ev_id=20040720X01007&key=1

- **Battle Mountain, Nevada (SEA04MA167).** On August 21, 2004, an EMS helicopter crashed into mountainous terrain at night and in deteriorating weather conditions while transporting a patient along a direct route through mountainous terrain rather than taking an indirect route around the high terrain. The pilot, two medical crewmembers, patient, and patient's mother were killed.

http://www.nts.gov/nts/brief.asp?ev_id=20040831X01336&key=1

- **Rawlins, Wyoming (DEN05FA051).** On January 11, 2005, an EMS airplane that was operating in icing conditions, crashed when it impacted terrain while en route to pick up a patient. The pilot and two medical crewmembers were killed, and a third medical crewmember sustained serious injuries.

http://www.nts.gov/nts/brief.asp?ev_id=20050118X00064&key=1

These seven accidents have been specifically cited, where applicable, in this report's discussion of each safety issue.

The Safety Board examined similar safety issues after the occurrence of 59 EMS accidents between May 1978 and December 1986 and concluded in a 1988 safety study that many areas of EMS operations needed improvement, including weather forecasting, operations during instrument meteorological conditions (IMC), personnel training requirements, design standards, crashworthiness, and EMS operations management. As a result of its findings, the Board issued 19 safety recommendations to the Federal Aviation Administration (FAA) and others, which have since been closed. Most of the 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 (CRM), decision-making, flight-following procedures, weather minimums, and the development of safety programs for EMS helicopter flights operating under Part 135. Although the Safety Board expressed concern at the time that the FAA chose to issue an AC instead of regulations, the number of EMS accidents were decreasing, thus the recommendations were closed. Despite the guidance provided in AC 135-14A and AC 135-15, EMS aircraft accidents have continued to occur in significant numbers.

This special investigation report is not intended to represent a comprehensive statistical analysis of EMS accidents. Because 14 *Code of Federal Regulations* (CFR) Part 135 operators are not required to

maintain flight activity data, such an analysis is not possible. The purpose of this report is to discuss the safety issues identified during the Safety Board's investigation and suggest recommendations that, if implemented, could address these issues. The Safety Board also recognizes that the use of EMS aircraft operations involves aspects of public policy (for example, the decision to use EMS aircraft instead of ground transportation, the reimbursement structure of vital services, and the economic competition among EMS operators) that will not be the focus of this report.

The Safety Board notes that the FAA has recently taken positive steps to improve the safety of EMS operations. For example, in August 2004, the FAA convened a Helicopter Air Ambulance Accident Task Force to make recommendations to reduce helicopter EMS accidents; to date the task force has not issued any recommendations or rule changes. On January 28, 2005, the FAA released Notice N8000.293, "Helicopter Emergency Medical Services Operations," which contained information that FAA inspectors could provide to helicopter EMS operators "for a review of pilot and mechanic decision-making skills, procedural adherence, and crew resource management." On August 1, 2005, the FAA released Notice N8000.301, "Operational Risk Assessment Programs for Helicopter Emergency Medical Services," which identified possible risks and dangers to flight crews and patients and encouraged aircraft EMS operators to promote the use of risk assessment models. The FAA issued similar (although less detailed) guidance in AC 135-14A; however, the recommended practice of risk assessment and decision-making had not been incorporated in a formalized manner into the EMS operations that were investigated as part of this special investigation. Finally, on September 27, 2005, the FAA released Notice N8000.307, "Special Emphasis Inspection Program for Helicopter Emergency Medical Services," which provided guidance to aviation safety inspectors for the examination of operational factors that were identified as causal to EMS accidents from 1999 to 2004, such as operational control, safety culture development, and access to and use of weather information by flight crews, management, and in-flight communications specialists.

Despite these positive steps to improve EMS operation safety, the FAA has not yet imposed any requirements for all aircraft EMS operators regarding flights without patients on board, risk management, flight dispatch, or the use of technologies. The FAA's recently published notices are simply information for principal operations inspectors (POI) to convey to their operators and encourage them to incorporate into their operations. Because the guidance provided in ACs 135-14A and 135-15 was not widely adopted by EMS operators, the Safety Board does not anticipate that the guidance provided in the FAA's notices will be widely implemented. The Board is concerned that, without requirements, some EMS operators will continue to operate in an unsafe manner, which could lead to further accidents. Although the Board recognizes that the nature of EMS operations involves some risks, operators should be required to provide the best available tools to minimize those risks and help medical personnel, flight crews, and patients arrive at their destinations safely.

CONCLUSIONS

1. The safety of emergency medical services (EMS) operations would be improved if the entire EMS flight plan operated under Part 135 operations specifications; 35 of the 55 accidents in this special investigation occurred with crewmembers on board but no patients on board.
2. The minimal contribution of medical personnel to the safe operation of emergency medical services (EMS) flights is not sufficient to justify operating EMS positioning flights under the less stringent Part 91 requirements.
3. The implementation of flight risk evaluation before each mission would enhance the safety of emergency medical services operations.
4. Formalized dispatch and flight-following procedures, including a dedicated dispatcher with aviation-specific knowledge and experience, would enhance the safety of emergency medical services flight operations by providing the pilot with consistent and critical weather information, assisting in go/no go decisions, and monitoring the flight's position.

5. The use of terrain awareness and warning systems would enhance the safety of emergency medical services flight operations by helping to prevent controlled flight into terrain accidents that occur at night or during adverse weather conditions.
6. If used properly, night vision information systems could help emergency medical services pilots identify and avoid hazards during nighttime operations.

SAFETY RECOMMENDATIONS

As a result of this special investigation, the National Transportation Safety Board makes the following recommendations:

To the Federal Aviation Administration:

1. Require all emergency medical services (EMS) operators to comply with Part 135 operations specifications during the conduct of all flights with medical personnel onboard. (A-06-XX)
2. Require all EMS operators to develop and implement flight risk evaluation programs that include training all employees involved in the operation, procedures that support the systematic evaluation of flight risks, and consultation with others trained in EMS flight operations if the risks reach a predefined level. (A-06-XX)
3. Require EMS operators to use formalized dispatch and flight-following procedures that include up-to-date weather information and assistance in flight risk assessment decisions. (A-06-XX)
4. Require EMS operators to install terrain awareness and warning systems on their aircraft and to provide adequate training to ensure that flight crews are capable of using the systems to safely conduct EMS operations. (A-06-XX)