

# Assessment of U.S. Helicopter Emergency Medical Services' Planning and Preparedness for Disaster Response

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## Abstract

**Introduction:** Helicopter emergency medical services (HEMS) roles in disaster response vary significantly from routine operation, and as reported in the literature, such responses have not been without difficulty. We identified nine criteria (written policy, triage and incident command training, disaster drill participation, ground and air communications plan, critical incident stress management, annual review, policy sharing) that may significantly affect an air medical program's disaster preparedness, response, and recovery. Of these criteria, a written policy is considered of primary importance.

**Methods:** A written survey was developed and mailed in July 1995 to 187 U.S. rotor-wing members of the Association of Air Medical Services. The survey was designed to identify the programs that had a written policy and fulfilled the guideline criteria, had a written policy and partially fulfilled the criteria, or did not have a written policy.

**Results:** Surveys were returned from 104 (56%) programs. Of the 103 qualifying respondents, 16 (16%) meet the criteria, 55 (53%) partially met the criteria, and 32 (31%) did not have written policies.

**Conclusion:** Most U.S. HEMS programs have not fully addressed disaster preparedness, response, and recovery. HEMS disaster response guidelines should be established, and these criteria should be incorporated.

## Introduction

No region of the country is free from the threat of disaster, be it natural, technological, or a combination.<sup>1</sup> When a disaster strikes a region, helicopters are often one of the first assets called into action; historically, U.S. air ambulances, specifically helicopters, have assumed important adjunctive roles in disaster response. These roles are unique to disaster response, extending beyond normal daily operations of helicopter emergency medical services (HEMS). For example, Stohler et al.<sup>2</sup> outlined five basic functions that HEMS might fulfill when called to assist at a disaster site:

- Augmented medical response
- Triage
- Medical treatment
- Air surveillance
- Medical evacuation

In a separate discussion<sup>3</sup> of helicopter response in 18 disasters between 1978 and 1989, helicopters had been tasked to perform more than 30 functions. With the addition of these disaster roles and responsibilities, certain problems have surfaced. Some of these problems have been generated by the helicopter and its personnel; others must rest at the feet of disaster officials on the ground. Consistently identified problems include rotor wash interfering with ground communications and spreading debris, poor ground-to-air communication, poor air-to-air communication, scene control problems, improper landing zone preparation, increased risk-taking by helicopter crews, and assignment of roles

that helicopter crews were not prepared to perform.<sup>33</sup> Guidelines have been developed to help disaster planners incorporate helicopters into a comprehensive disaster response.<sup>34</sup> However, no guidelines as yet have been developed by the HEMS industry to assist in disaster preparation, response, and recovery despite the well-documented problems with these tasks.

Based on these facts, our hypothesis is the HEMS industry in general is not well prepared to respond efficiently to disasters. To evaluate that hypothesis, we developed and conducted a survey to evaluate the disaster preparedness of the U.S. helicopter medical industry. An additional purpose of our study was to propose a minimum set of guidelines that would improve overall HEMS disaster response.

## Methods

In July 1995, a written survey was developed in consultation with the Association of Air Medical Services (AAMS) survey committee. Surveys were mailed to 187 U.S. rotor-wing AAMS members. The questions specifically recognized HEMS' historical roles in disasters and the difficulties typically encountered during disaster responses. Additional questions were identified as significant for inclusion in a set of minimum guidelines, listed in Table 1, for HEMS disaster planning.

Programs were classified into three categories based on their responses:

- Existence of a written policy *and* fulfillment of all proposed guidelines
- Existence of a written policy with partial fulfillment of the proposed guidelines
- No written policy

## Results

One-hundred-four surveys were returned for an overall response rate of 56%; one survey was eliminated because of the flight program's specialization. Eighty-one percent of programs responding to the survey had been in operation for 6 years or more. Sixty (58%) programs said they have responded to an actual disaster. Surveys indicating the presence or absence of written policies were analyzed using chi-square test or Fisher's

**Table 1**

### Guidelines for Disaster Planning

- Annual policy review
- Triage training for medical crew members
- Incident command training for medical crew members
- Annual participation in disaster drills
- Policy incorporation into local EMA disaster plan
- Airborne communication plan
- Ground communication plan
- Automatic CISM for crew members

exact two-tailed tests for small expected cell counts. *P* values (0.05) were used to indicate a significant difference between groups.

The respondents were divided into two groups: those with a written disaster policy (71) and those without (32). Their responses, outlined in Table 2, to the specific set of the proposed guidelines were compared. Triage training, incident command, and air/ground communication issues were addressed significantly more often by programs with established disaster policies. No significant differences were found with respect to drill participation, incorporation into Emergency Management Agency (EMA) plans, and critical incident stress management (CISM).

Only 16 (16%) programs had written policies for disaster response that addressed all the guidelines outlined earlier. Fifty-five (53%) had a written plan and partially met the guidelines: three

(5%) met up to four criteria, and 45 (82%) met up to eight criteria (seven of these 55 programs were missing data on at least one criteria). Thirty-two (31%) programs reported not having a written plan. One program did not answer the written plan question.

## Discussion

HEMS occupy an important niche in U.S. disaster management. In the 18 disaster case histories documented from 1978 to 1989, rotorcraft transported approximately 3357 people to safety. Of those transported, 187 lives were saved because of the specialized talents HEMS were able to bring to the scene.<sup>2</sup>

In filling that special niche, air medical services' responses during disaster historically have included roles that extend beyond daily operations. For example, during the 1989 Loma Prieta earthquake response, two HEMS programs acted as airborne radio repeaters to facilitate communication between communications centers, ground units, and counties.<sup>4</sup> At the mass shooting that occurred in San Ysidro, Calif., a flight surgeon who arrived with one of the air medical services took control of the medical command post.<sup>5</sup>

The expanded role expectations and inherent chaos associated with disasters invite difficulties not typically associated with normal air medical duties:

- Communication problems compound as agencies responding to the disaster multiply (eg, high-rise fire, Los Angeles, Calif., May 1988; Amtrak/Conrail crash, Chase, Md., January 1987).
- Risk-taking on the part of ground and air personnel becomes epi-

**Table 2**

### Comparison of Programs with and without Written Disaster Response Plans

	% with plan (n = 71)	% without plan (n = 32)	<i>P</i> value
Triage training	93	66	0.001
Incident command training	62	31	0.004
Annual drills	94	86	0.22
Incorporation into EMA plan	98	90	0.08
Air communication plan	68	39	0.01
Ground communication plan	84	63	0.02
CISM	81	69	0.21

demic (eg, MGM Grand Hotel fire, Las Vegas, N.V., 1980; DuPont Plaza Hotel Fire, San Juan, Puerto Rico, December 1986).

- Coordination problems develop as multiple helicopter services arrive on scene (eg, Hilton Hotel fire, Las Vegas, N.V., February 1981).
- Ground crews may be unfamiliar with the requirements for landing zone setup to accommodate multiple helicopters (eg, Amtrak/Conrail crash, Chase, Md., January 1987).
- Rotorwash and aircraft noise may interfere with disaster operations and ground communications (eg, United Airlines DC-10 Crash, Sioux City, Iowa, July 1989; molten sulfur spill, Benicia, Calif., January 1985).

A literature review on the 1989 Loma Prieta earthquake revealed that the six responding air medical helicopters faced several difficulties as a group, including improper and dangerous landing zone development; absent or inefficient ground control and command; and unfamiliar tasking, such as air surveillance. Interestingly enough, only one of the 6 HEMS at Loma Prieta provided any formal disaster training to its personnel before the earthquake.<sup>4</sup>

Despite these difficulties, helicopters and their crews continue to have a significant impact during disaster response when used properly. In our experience as members of the Toledo Area Disaster Medical Assistance Team, we believe the use of helicopters to transport south Dade County victims to Miami hospitals was crucial during the Hurricane Andrew recovery in 1992. We found this necessity to be greater after Hurricane Marilyn (1995), when severely ill patients on several Caribbean islands, including St. Thomas, had no other means of medical evacuation.

The HEMS industry collectively must acknowledge its potential role in disasters, as well as anticipate and plan for problems inherent in this type of response. Yet the results of this study reinforce the adage that those who do not study history are condemned to repeat it. Almost one-third of survey respondents indicated that their program had no written disaster policy. The development of this crucial policy is the initial step in disaster

preparation. The policy should be available for review by all relevant agencies, be readily accessible to the program's personnel, and be practiced and updated in a timely manner.

The importance of having such a written disaster plan is underscored by the HEMS in our study: programs with a written policy exhibited a significantly greater likelihood of providing incident command and triage training and had successfully addressed issues that historically plague helicopter response. They also were more likely to have CISM training available for their personnel than programs without a policy.

The second step in disaster preparation is training, specifically in disaster triage and the incident command system. We include these two aspects as part of the minimal guidelines for a proper HEMS disaster policy. This recommendation is not to suggest that air medical personnel take over the roles of the highly trained ground rescue and EMS personnel on arrival at disaster site. However, this training is necessary to facilitate efficient interaction with other agencies and personnel and becomes even more important if crew members are asked to assume extended ground roles. The type of training in triage techniques and incident command can be any of several standard methods but must be consistent with that used in the local community.

The third step is practice. A written disaster plan is an illusion of preparedness unless it is accompanied by training and practice. The roles likely to be assumed by HEMS personnel should be practiced whenever possible to discover and resolve problems before being involved in an actual response. Participation in a disaster drill at least annually is a step toward this goal and is another element of the proposed set of guidelines. Programs should bear in mind that disasters do not always happen in the daytime, so nighttime drills are encouraged.

Finally, policy review and revision should occur at least annually; timely dissemination of policies (with updates) to all cooperating agencies is advocated. Interestingly, HEMS programs without a written disaster plan had no statistical difference compared with those with

plans when queried about participation in annual drills (86% versus 94%) and incorporation in local disaster plans (90% versus 98%). These responses cause speculation that this subset of HEMS' involvement in regional drills may be superficial and cursory.

One pitfall that may be encountered is an EMA plan that includes an air med program response although that program does not have an internal policy. Such issues as which services the program is capable of performing, specific clothing, individual disaster training, extended response periods, mental health issues, etc., may not be addressed.

We acknowledge that a study of this kind has certain limitations. Although we were able to identify what percentage of respondents have a disaster plan and specific aspects of that plan, we were unable to assess the adequacy of each program's policy. What may appear exceptional on paper may be moot if the training and drilling are inadequate. A particular program's ability to prepare, train, and drill may be hindered by internal forces, such as finances, and external forces, such as apathy on the part of local disaster officials. Should such forces come into play, the HEMS program is obliged to initiate a thorough review of the local plan, which may result in more assertive action.

Based on these results, we propose that air medical programs develop a written policy that addresses these key topics:

- Clarification of communication/frequencies and call signs
- Annual participation in disaster drills (including nighttime drills) in which crew members assume extended roles and multiple helicopter agencies respond and practice inter-agency communications
- Logistics of extended response (ie, food, clothing, supplies, duty rotation, and rest issues for crews involved)

Additional points of consideration:

- Ground personnel training for landing zone preparation and staging multiple aircraft at a disaster site
- Crew training in incident command, triage, and austere medicine following approved protocols
- CISM

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We further propose that all programs develop a method to address the health and welfare of crew members' families during a regional incident with timely communication of that information to responding crews. This plan will relieve crew members' anxiety and allow them

to focus on their duties, not their concerns for family welfare.

### **Conclusion**

Most U.S. HEMS fail to meet all the proposed guidelines for disaster planning and preparedness, and establishing dis-

aster response guidelines could have a positive effect with regard to future HEMS disaster response.

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