

Prehospital Helicopter Air Ambulances Part 2: Utilization Criteria and Training

Remle P. Crowe, BS, NREMT,¹ Roger Levine, PhD,² and Melissa A. Bentley, MS, NRP¹

Abstract

Objectives: The decision to request a helicopter air ambulance (HAA) is critical and complex. Emergency medical service (EMS) professionals must know how to appropriately and safely use HAA resources. We sought to describe important criteria for using HAA and the prevalence of HAA-related training among EMS professionals. Then, we identified characteristics associated with receiving training.

Methods: We sent an electronic questionnaire to all nationally certified EMS professionals. We performed descriptive analyses and multivariable logistic regression modeling.

Results: We received 15,366 responses. Nearly all respondents reported that time to nearest trauma center and mechanism of injury were important in their last decision to use a HAA. About two thirds received HAA safety training (66.7%), whereas 69.0% received HAA utilization training within the past 24 months. Nearly three fourths (74.2%) received training in at least 1 HAA-related topic. Providers working at advanced life support levels, fire-based services, agencies providing 911 response, or in rural communities had greater odds of having received HAA training, whereas women, members of minority ethnic/racial groups, and those with higher weekly call volumes had decreased odds.

Conclusion: Although their decision-making criteria appear to include the major factors recommended within current evidence-based guidelines, many nationally certified EMS professionals had not received recent HAA training.

Introduction

Helicopter air ambulances (HAAs) are increasingly used in the prehospital setting to bring advanced interventions and deliver critical patients to definitive care sooner. The

decision to request a medical helicopter is complex because safety considerations for both the flight and ground crews must be taken into account as well as the increased costs of HAA transport compared with ground ambulance.¹⁻³ Consequently, appropriate and safe use of air medical resources by EMS professionals is critical. EMS professionals must carefully evaluate the potential benefits and costs of an air medical transport within the context of an individual patient and situation while also taking into account regional and logistic considerations.⁴

Efforts to assist EMS professionals in this complex decision-making process exist in the form of guidelines, including a national evidence-based guideline for the transport of trauma patients published in January 2014.⁵ This guideline highlights specific criteria, including components related to triage and time savings, which should be taken into account by EMS professionals when determining whether or not to call on air medical resources. However, little is known regarding which factors EMS professionals consider important in their decisions to use HAA and how well these factors align with current evidence.

Because the evidence base for HAA is continuously evolving and guidelines are updated to reflect which patients are likely to benefit most from air medical transport, prehospital EMS professionals must remain up-to-date through continuing education. In addition to understanding when to use HAA, ensuring safety while working with these resources is essential. Interactions with helicopter operations may pose risks to the prehospital ground crew including impact with the rotor blades, flying debris, and increased noise levels interfering with the ability to hear warnings.⁶ Mitigation of these risks requires that EMS professionals be adequately trained in HAA safety. No previous studies have assessed the prevalence of HAA use and safety training among EMS professionals.

To gain a better understanding of factors that influence prehospital HAA use and training related to medical helicopters, we conducted a census survey of nationally certified EMS professionals. The first objective of this study was to describe the criteria that EMS professionals believe are important in the decision to call on HAAs. Next, we sought to describe the prevalence of HAA-related use and safety training among EMS professionals within the past 24 months. Finally, we looked to identify characteristics of EMS professionals associated with having received any HAA-related training within the past 24 months.

1. National Registry of EMTs, Columbus, OH

2. Consultant, Redwood City, CA

Address for correspondence:

Remle P. Crowe, BS, NREMT, National Registry of EMTs, 6610 Busch Boulevard, Columbus, OH 43229, rcrowe@nremt.org

1067-991X/\$36.00

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<http://dx.doi.org/10.1016/j.amj.2015.06.008>

Methods

Population and Study Design

We conducted a cross-sectional census analysis of all nationally certified EMS professionals. Because the questionnaire was administered electronically, only individuals with e-mail addresses in the National Registry of Emergency Medical Technicians database were included in the sampling frame (approximately 94%). The survey contained items related to participant demographics, work-life characteristics, the importance of select criteria the last time a medical helicopter was used to transport a trauma patient, and HAA-related safety or utilization training received within the past 24 months. Items underwent cognitive testing with 10 practicing EMS professionals and were revised as appropriate before finalizing the questionnaire.

An e-mail explaining an individual's rights as a study participant and containing a link to the survey was sent to all nationally certified EMS professionals. Following the modified Dillman survey methodology, 2 follow-up messages were sent requesting that individuals complete the questionnaire 1 week and 3 weeks after the original e-mail.⁷ A nonresponder survey was administered to assess differences between responders and nonresponders. This abbreviated questionnaire contained 15 items from the main survey including demographics, work-life characteristics, and whether the individual had been on a call in which a medical helicopter was used in the past 12 months. A total of 2,857 nonresponders were randomly selected to receive the survey electronically, and 500 nonresponders were randomly selected for phone interviews. The American Institutes for Research's Institutional Review Board approved this project.

Description of the Variables

Survey demographic items included sex and race/ethnicity (collapsed into white non-Hispanic or minority categories for analysis). Work-life characteristics included current EMS certification level (emergency medical responder, emergency medical technician [EMT], EMT intermediate, advanced EMT, or paramedic), EMS service type (fire based, hospital, private, government, military, or tribal), primary EMS service provided (911 response with transport capability, 911 response without transport capability, hazmat, medical transport, specialty care transport, rescue, paramedic intercept, air medical, or other), weekly call volume (treated as a continuous variable using categoric midpoints), and community served (dichotomized to "rural, < 25,000 residents" or "urban, ≥ 25,000 residents").

For HAA utilization criteria, a 4-point Likert scale (very important, moderately important, slightly important, or not important) was used to assess the importance of different factors in the decision to transport a trauma patient by medical helicopter the last time these resources were used. Factors assessed included the following: mechanism of injury, Glasgow Coma Scale score, number of patients injured, pro-

longed extraction, travel time to nearest trauma center, protocol, anatomic site of injury, higher level of care available through HAA, and possible risk to the helicopter crew. The scale was collapsed to either important (very important and moderately important) or not important (slightly important and not important) for analytic purposes. Regarding HAA training, individuals were asked to indicate whether they received training related to when to use EMS helicopters (yes or no) and on EMS helicopter safety (yes or no) within the past 24 months. A variable was created for EMS professionals who received at least 1 of these types of HAA training in the past 24 months.

Data Analysis

Data were obtained through web-based Snap 10 survey software (Snap Surveys Ltd, Portsmouth, NH), and results were exported into Microsoft Excel (Microsoft Corp, Redmond, WA). All questionnaires were deidentified during the upload and data export process; no personal identifying information was collected by the software. All analyses were performed using Stata/IC 12 (StataCorp LP, College Station, TX).

Only EMS professionals who were currently practicing were included in these analyses. Individuals were excluded if they worked for a hospital-based, military, or air medical service because HAA usage among individuals at these types of agencies likely differs greatly from that of most other EMS professionals. Descriptive statistics were calculated, and chi-square and *t*-tests were performed to identify significant associations between having received HAA training and demographic and work-life characteristics ($\alpha = 0.05$). Finally, a multivariable logistic regression model was constructed to test associations between receiving HAA training in the past 24 months and demographic and work-life characteristics.

For the multivariable logistic regression analysis, the following variables were collapsed to create a more parsimonious model: certification level was collapsed to basic life support (emergency medical responder and EMT) and advanced life support (intermediate, advanced EMT, and paramedic), service type was dichotomized into fire-based and other services (private, government, and tribal), and primary service provided was separated into 911 response (with and without transport capability) and other (hazmat, medical transport, specialty care transport, rescue, paramedic intercept, and other). Purposeful backwards selection was used to determine which demographic and work-life characteristics to include in the model. Only variables with a Wald *P* value < .05 remained in the model. Plausible interactions were assessed. Regression diagnostics were performed, and the Hosmer-Lemeshow goodness-of-fit test was used to assess model fit.⁸

Results

The electronic survey was sent to 107,858 nationally certified EMS professionals, and 15,366 responded (14.2%). A total

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