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Reporting Helicopter Emergency Medical Services in Major Incidents: A Delphi Study



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A B S T R A C T

Objective: Research on helicopter emergency medical services (HEMS) in major incidents is predominately based on case descriptions reported in a heterogeneous fashion. Uniform data reported with a consensus-based template could facilitate the collection, analysis, and exchange of experiences. This type of database presently exists for major incident reporting at www.majorincidentreporting.net. This study aimed to develop a HEMS-specific major incident template.

Methods: This Delphi study included 17 prehospital critical care physicians with current or previous HEMS experience. All participants interacted through e-mail. We asked these experts to define data variables and rank which were most important to report during an immediate prehospital medical response to a major incident. Five rounds were conducted.

Results: In the first round, the experts suggested 98 variables. After 5 rounds, 21 variables were determined by consensus. These variables were formatted in a template with 4 main categories: HEMS background information, the major incident characteristics relevant to HEMS, the HEMS response to the major incident, and the key lessons learned.

Conclusion: Based on opinions from European experts, we established a consensus-based template for reporting on HEMS responses to major incidents. This template will facilitate uniformity in the collection, analysis, and exchange of experience.

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By nature, major incidents do not readily lend themselves to a prospective interventional study design. Predominately, research on major incidents is based on case reports. Although these studies can depict the challenges involved in major incident management, they are notoriously heterogeneous in format. Data reports for major incidents should be standardized to allow researchers to compare data sets and generate transportable recommendations.^{1,2}

A previous systematic literature review identified 10 templates that currently existed for reporting prehospital major incident medical management.³ However, those templates were heterogeneous and limited by incomplete implementation and a lack of feasibility testing. Subsequently, a template was created with a particular focus on the immediate prehospital phase of major incident medical management.⁴ This template specified information on preincident data, background on emergency medical services (EMS), incident characteristics, EMS response data, patient characteristics, and key lessons. The template was deployed through an open-access webpage⁵ that allowed peer-reviewed reporting and access to previously published reports.⁶ It allows researchers and planners to collect data systematically, with the aim of improving preparedness for major incidents. However, no data set is currently available that is dedicated to the use of helicopter EMS (HEMS).

A recent systematic literature review on the use of HEMS in major incidents found that reporting was scarce and nonsystematic.⁷ The review identified case reports that mainly described the use of HEMS to transport personnel and equipment, provide patient treatment, and transport patients to medical facilities.⁷ HEMS is a limited, costly resource that demands highly trained, skilled personnel. Therefore, it is imperative to conduct a thorough scientific evaluation of HEMS use and potential benefit in major incident management. Reporting prospective uniform data with a consensus-based template could facilitate the collection, analysis, and exchange of experiences. We conducted a Delphi study with physicians who had HEMS experience. This study aimed to develop a consensus-based template for reporting on HEMS use in major incidents to provide uniform data for evaluations.

Methods

We used a Delphi approach with experts who interacted by e-mail.⁸ The Delphi technique is a method for systematically collecting opinions from a group of respondents on a specific issue. Questionnaires are administered in repeated rounds, with adjustments in

each round, until a consensus is reached.⁸⁻¹⁰ The consensus requires general agreement or “a consensus of opinion among judges.”¹¹

We recruited prehospital critical care physicians with current or previous HEMS experience to participate in the consensus group. This group was drawn from the European prehospital research alliance (EUPHOREA),¹² defined as an informal European research network, which is composed of clinicians and researchers who aim to promote research in prehospital critical care. The recruited experts were from the Nordic countries and Eastern and Central Europe. They were asked to identify which data variables were most important to report during an immediate HEMS response to a major incident. A major incident was defined as an incident that required the mobilization of extraordinary EMS resources and was identified as a major incident in that system.⁴

The objectives for each round of the Delphi process are listed in [Table 1](#). The primary aims were to provide systematic collection of standardized data and a means for freely disseminating these data to other practitioners and managers. Gradually, with each individual assessment and reassessment of synthesized responses, a consensus was reached. As a feedback control, in each round, we provided a summary of the previous rounds and offered the participants an opportunity to add thoughts and clarifications.⁸ All data were summarized and presented anonymously in Excel spreadsheets (Microsoft Corp, Redmond, WA).

Ethics

Norwegian law dictated that this project did not fall within the mandate of the Health Research Act, and it did not require approval by the Regional Committee for Medical and Health Research because it did not involve research on humans, biological material, or confidential information.¹³ Furthermore, this study was exempt from the Data Protection for Research restrictions because we did not collect personal or sensitive data.¹⁴

Results

The Consensus Process

Of the 28 individuals invited to participate in the consensus process, 19 accepted (67.9%). Fifteen participated throughout the entire process, and 2 responded to 4 out of 5 rounds. The remaining two participants did not respond after round 1 and were excluded from the research process, leaving a total of 17 participating experts. In the first round, we received a total of 98 suggested variables from the experts. Based on the comments and the average

Table 1
Objectives for Each Round of the Delphi Process

Round 1	In an open-ended question, participants in the expert group were asked to suggest the 10 variables that they thought were most important to report during a HEMS response to a major incident.
Round 2	The results from the first round were structured in a spreadsheet, and duplicate suggestions were removed before they were returned to the experts. They were asked to review and rate all variables from 1 (totally disagree) to 5 (totally agree) based on how relevant they found each item.
Round 3	Variables with an average score of 4 or more continued to the third round. In this round, the experts received a number of questions to answer regarding wording of questions, consent to delete some questions because of overlap, relevance of alternatives under a main question, and if there should be a free-text field for addressing key lessons. Furthermore, they were instructed to provide comments and grade the variables as either compulsory or optional.
Round 4	After summarizing the feedback from round 3, the list of variables that received a consensus, the accompanying comments, and further questions were distributed to the experts. This round provided an opportunity for participants to revise their judgments and combine similar variables.
Round 5	The feedback from round 4 was summarized into a final version of the template and sent to the experts to elicit any objections and/or to give final approval of the HEMS major incident-reporting template.

HEMS = helicopter emergency medical service.

variable scores in round 2, 29 variables were selected for round 3. In round 3, the experts had to agree on the wording of questions, and they rated the questions as compulsory or optional. In round 4, the participants clarified uncertainties and merged similar variables to obtain 21 variables. In round 5, all 17 members of the group gave their final approval of the HEMS major incident reporting template. These 5 rounds resulted in a template that covered 4 main categories ([Supplementary Material](#)): HEMS background information, major incident characteristics relevant to HEMS, the HEMS response to major incident, and key lessons.

HEMS Background

The variables in this category (questions 1-4, [Supplementary Material](#)) provided information regarding HEMS deployment details. It specified the number of HEMS sent to the affected area, whether HEMS was staffed by a doctor, and the preplanned role of HEMS in a major incident.

Major Incident Characteristics Relevant to HEMS

These variables (questions 5-7, [Supplementary Material](#)) described how accessible the scene was to HEMS and hazards that specifically affected HEMS in the incident.

HEMS Response to the Major Incident

The variables in this category (questions 8-19, [Supplementary Material](#)) were divided into 2 subcategories: dispatch and tasks. Data collected in the dispatch subcategory (questions 8-13) described the time line for dispatch, the number of HEMS requested, and how many actually responded. Furthermore, this category recorded the reasons for the request and the reasons for not responding (when applicable). The tasks subcategory (questions 14-19) recorded the tasks performed by the HEMS crew, the individual members transported to respond to the scene, and patient descriptors.

Key Lessons

This category contained 2 questions (questions 20 and 21). The first listed several safety challenges (question 20), and the second (question 21) allowed free-text descriptions of key lessons learned.

Implementation

This template for reporting data on the use of HEMS in immediate prehospital medical responses to major incidents can be used as a stand-alone document, but it will also be embedded in the established major incident reporting database.⁵ Upon accessing the template, the recorder must provide a short summary before proceeding to question 1. The summary will consist of relevant pre-incident data and information about the time, mechanism, location, and accessibility of the incident. Completion of the full major incident-reporting template will be optional.

Discussion

This study developed a template for reporting on the use of HEMS for an immediate prehospital medical response to a major incident. We achieved a consensus among 17 clinicians with HEMS experience. The template included 21 variables in a stand-alone format. We implemented this template in an existing database (majorincidentreporting.net) to allow global open access for reporting on the use of HEMS in major incidents.⁴

In most countries, HEMS is an integral part of major incident management and planning, but uniformity is lacking in reports on the use of HEMS.⁷ Major incidents are infrequent events that often have devastating impacts on regional infrastructures and people's lives. Optimized major incident management has been shown to improve outcome¹⁵; however, planners must strive for efficient use of limited resources. By obtaining a consensus on data reporting, we may be able to generate a body of experiences from previous incidents that can inform our responses to future challenges. Furthermore, the template categories can be used to structure manuscripts and to guide editorial reviews of case reports. The data recorded on the HEMS background and major incident characteristics relevant to HEMS allow readers to assess whether the findings might be valid in other settings. The HEMS response to the major incident section contains data useful for establishing a time line, for determining the number and types of resources to dispatch, and for estimating how these resources could be used on scene. Finally, the key lessons section can offer personnel the ability to describe in their own words the challenges and successes encountered during a major incident. The free-text sections may provide data for future qualitative studies.

Several definitions of a major incident exist. In the current template, we applied the definition used in a previous template for continuity.⁴ The presence of multiple definitions for a major incident^{4,16-18} and more or less synonymous wording, such as mass casualty incidents or disasters, may be sources of confusion. Therefore, uniform nomenclature is called for.

We chose the Delphi method because it is useful for gaining information in the absence of sufficient research on the topic,⁸ which was the case for the use of HEMS in major incidents. E-mail correspondence provided a cost- and time-effective alternative to physical attendance to consensus meetings. Additionally, e-mail anonymity reduced the possibility that dominant individuals might influence opinions, which may be a concern in physical meetings.¹⁰ Although all the experts were recruited from the EUPHOREA network, they were not aware of the identities of other participants until after the consensus process was completed. After each of the 5 rounds, the study authors summarized results, merged very similar questions, and suggested subheadings for the template. In this work, the study authors attempted to maintain objectivity to minimize their influence on the process.⁹

This study had some limitations. First, the expert group may have been overly homogenous; thus, it may not have covered the

entire spectrum of opinions.¹⁹ Also, the consensus group consisted only of clinicians from European countries; this potential bias may limit the global application of the template. However, because most HEMS services are currently available only in high-income countries, we believe that the results from the current expert group are generalizable. Finally, during the final rounds, 2 experts withdrew from the process. As described previously, a poor response rate can present a challenge; however, our small dropout rate (2/17) was not expected to compromise the study results.²⁰

Conclusion

We developed a consensus-based template for reporting on HEMS responses to major incidents based on the opinions of a group of European HEMS physicians. This template was designed to supplement an existing template for reporting on prehospital medical management in major incidents. Uniform data on the HEMS response to major incidents can facilitate the collection, analysis, and exchange of valuable experiences. In addition, it may provide a basis for scientific evaluations on the use of this scarce, resource-demanding service in such situations. The implementation of systematic, structured reports on HEMS use in major incidents represents an important step in making vital data available for conducting comparative analyses and drawing valid conclusions. We urge global HEMS systems to implement and disseminate this template.

Author contributions

SF conceived the idea. All authors took part in study design. SF and ASJ collected and analyzed the data. Decisions in all the rounds were based on consensus between all the authors and suggestions from the consensus group. All authors took part in writing the manuscript and provided final approval.

Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.amj.2016.08.003>.

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