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LIMITATIONS IN PREHOSPITAL COMMUNICATION BETWEEN TRAUMA HELICOPTER, AMBULANCE SERVICES, AND DISPATCH CENTERS

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□ **Abstract—Background: Prehospital communication with Emergency Medical Services (EMS) is carried out in hectic situations. Proper communication among all medical personal is required to enhance collaboration, to provide the best care and enable shared situational awareness. Objective: The objective of this article was to give insight into current Dutch prehospital emergency care communication among all EMS and evaluate the usage of a new physician staffed helicopter EMS (P-HEMS) cancellation model. Methods: Trauma-related P-HEMS dispatches between November 1, 2014 and May 31, 2015 for the Lifeliner 1 were included; a random sample of 100 dispatches was generated. Tape recordings on all verbal prehospital communication between the dispatch center, EMS, and P-HEMS were transcribed and analyzed. Qualitative content analysis was performed, using open coding to code key messages. Results: Ninety-two tape recordings were analyzed. The most frequent reason for P-HEMS dispatch was suspicion of brain injury (24%). The cancellation model was followed in 66%, overruled in 9%, and not applicable in 25%. The main reason for not adhering to the model was hemodynamic stability. In 5% of P-HEMS dispatches, a complete ABCD (airway, breathing, circulation, disability) methodology was used for handover, in 9% a complete Situation-Background-Assessment-Recommendation technique, in 2% a complete Mechanism-Injuries-Signs-Treatment method was used. The other handovers were incomplete. Conclusions: Prehospital handover between EMS on-scene and P-HEMS often entails insufficient information. The cancellation model for P-HEMS is frequently used and promotes adequate information transfer. To increase joined decision-making, more patient and situational information needs to be handed over. Standardization of prehospital trauma handovers will facilitate this and improve trauma patient's outcome.** © **2016 Elsevier Inc. All rights reserved.**

□ **Keywords—prehospital; Emergency Medical Services; communication; helicopter; ambulances; trauma**

INTRODUCTION

In the Netherlands, prehospital trauma care is provided by Emergency Medical Services (EMS). Since 1995 this care is extended with the advance medical care of the Physician staffed Helicopter Emergency Medical Services (P-HEMS). For patients suffering major trauma, P-HEMS provide comprehensive prehospital care including airway management, administration of specific medication, and trauma surgical interventions. The Netherlands is divided into four regions covered by its own P-HEMS, the so-called Lifeliners. The LifeLiner One (LL1) P-HEMS covers the Trauma Region North West North (TRNWN) (1). The LL1 is dispatched

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approximately 1200 times each year, of which almost 92% are trauma-related dispatches. Of these dispatches, approximately 69% are done by helicopter and the remaining 31% by car (2). In the Netherlands, P-HEMS dispatch is based mainly on the initial distress call to the EMS dispatch center (DC) by a bystander, often a layperson. When a distress call meets certain criteria the P-HEMS are dispatched simultaneously to EMS (primary dispatch). EMS often arrive on scene first; after evaluation EMS report back to DC and P-HEMS with a situational report. Based on this information a joint decision is made to either continue or cancel P-HEMS dispatch. When P-HEMS have not primarily been dispatched, a secondary dispatch can be requested by the EMS crew on scene based on their first assessment (2). Dispatchers are clinically trained nurses or have an EMS background. The DCs use a computerized system that assists dispatchers in the decision-making process of what type of EMS to deploy. The system used is the Advanced Medical Priority Dispatch System, or the digital version, Professional Quality Assurance; these make sure every dispatcher adheres to a protocol, eliminating the factors of personal experience and knowledge from the decision-making process (3,4). The EMS and P-HEMS deployment sequence is displayed in Figure 1. Several types of EMS can be dispatched at the same time. Prehospital communication between all these EMS is often done in hectic and unpredictable situations while taking care of critically ill patients. These situations require quick actions, often with uncertainties on the patients' medical condition, time, or resources (5). Dialogue on all the medical and practical support goes via a "narrow" interactive communication channel, a C2000 radiotelephone, as part of the digital communication network that leverages mobile broadband connectivity to expedite prehospital health care providers (6). In order for the P-HEMS to be able to communicate with EMS, they need to be patched into the conversation by the DC (7). An important part of the DC work is the coordination and sharing of information with other authorities involved in the dispatch; this cooperation enables shared situational awareness (SSA) (8). A recent review of factors that hindered the prehospital trauma care organization in realizing satisfactory SSA showed, among others: information gaps, lack of smooth communication, and no standardized common operational communication tool to negatively influence SSA (9). They likewise report that when EMS personnel focus solely on their individual tasks this negatively affects information transmission and leads to a hiatus in incident information flow. In November 2014 the LL1 started the validation of a new cancellation criteria model for P-HEMS (Figure 2), based on an earlier performed study in our region (10). While in flight, the P-HEMS physician will follow the cancellation flowchart by use of the information handed to him or her by EMS crew or DC. Based on this information a decision will be made to either continue or to cancel the P-HEMS dispatch. The Dutch team configuration with both paramedics and physicians on the P-HEMS is one used in many different countries across the globe, including the United States, the UK, Australia, Germany, France, and Japan (11–13). However, little has been published on the content and type of critical information that is needed to manage a dispatch with both EMS and P-HEMS, especially in the Dutch setting. The aim of this study was to investigate how the new P-HEMS cancellation model was used in prehospital communication. We intended to review the flow of information, validate the data that are reported in the P-HEMS database, to verify if and how the cancellation model was reported on and followed or not followed, the rationale behind model deviation, and what parameters of the model were mentioned. Furthermore, we aimed to evaluate if standardized common operational communication tools were used (Mechanism, Injuries, Signs, and Treatment [MIST], Situation Background Assessment Recommendation [SBAR], Airway Breathing Circulation Disability Exposure, or other parameters), if there were information gaps, and what factors are of influence.

MATERIALS AND METHODS

Design

A qualitative descriptive approach was chosen to complement the lack of data on reporting and communicating in the prehospital trauma setting between EMS and P-HEMS. All trauma-related P-HEMS dispatched within the study period November 1, 2014 through May 31, 2015 of the cancellation study were included, of which a random sample of 100 cases was drawn using an Internet-based research randomizing tool. Tape recordings of the entire prehospital communication between DC, EMS, and P-HEMS were collected and transcribed verbatim for every dispatch. Data were analyzed using qualitative content analysis (14). Two researchers (A.H. and G.G.) transcribed the recordings individually and a third researcher (F.B.) reviewed the differences for each transcript. Each transcript was reviewed using open coding to code the key messages. Information on whether the cancellation model was followed, parameters of the cancellation model, rational for model deviation, which communication format (e.g., SBAR, MIST) was used, and whether recording matched the P-HEMS database were reviewed. The statistical data analysis was performed using SPSS 21.0. Statistical Analysis program (SPSS Inc., Chicago, IL). All three modes for outcome