2018-04-26

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Time is Money: The True Cost of Helicopter EMS (HEMS)
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BACKGROUND

Multiple studies have been published that attempt to examine the relevant benefits of utilizing helicopter transport (HEMS) over traditional ground-based emergency medical services (EMS). Unfortunately, these studies suffer from poor methodology and are confounded by substantial differences in training and expertise of the personnel involved in the medical transfer. Our EMS system in Central Massachusetts is unique in that when a physician from an outside hospital calls for an HEMS transport, the pilot determines if weather conditions permit a safe flight without having any further knowledge about the patient. If flying is deemed unsafe, the helicopter personnel will retrieve the patient by traditional ground ambulance. This allowed us to control for these two transfer modalities while eliminating the confounder of crew expertise.

Objectives

The goal of this study is to investigate whether the reduction in time to appropriate care through the use of Helicopter Emergency Medical Services (HEMS) reduces overall mortality over Ground Emergency Medical Services (GEMS). We hypothesize that the overall mortality of these inter-facility transfers is comparable, regardless of mode of transport and admitting diagnosis, if accompanied by highly-trained personnel. Furthermore, the appropriate use of HEMS may reduce the transfer time, cost of hospitalization and reduce long-term disability over transport via GEMS.

METHODS

Once IRB approval was obtained, we utilized an “Eligible Participant Sheet” to create a list of medical record numbers of eligible subject participants. This data collection sheet was designed so that subjects were not readily identifiable. Our research group chose a single subject’s medical record number, at random, and accessed the record. The relevant subject data will be copied to the “Data Collection Sheet.” The data was verified and the “Eligible Participant Sheet” was marked as complete for that subject. This process will be repeated until all of the medical records have been accessed in a random order. At the end of this process, we had one list of MRNs and a separate list of data with no link between the two. The following data were extracted from the included charts:

- Flight Time
- Demographic Information
- In-Patient Mortality Data
- Transport Details
- All Patient Refined Diagnosis Diagnosis
- Time of Call
- Related Severity
- Requesting Institution
- Groups (APR-DRG)
- Risk of Mortality

Patient Inclusion and Exclusion Criteria

- 2129 Patients
- 655 Scene Calls
- 1473 Transfers
- 10%
- 90%
- 151 LifeDrive
- 1323 LifeFlight

Acknowledgements and Funding Sources

Massachusetts College of Emergency Medicine Physicians (MACEP)
Resident Research Grant $2000
University of Massachusetts - Department Emergency Medicine
Dr. Eike Blohm
Dr. Stacy Weisberg
Dr. Steven Bird
Phil Moriarty
Dr. Joseph Tennyson
Dr. Marc Gautreau
Brian McQuaid

Statistical Analysis

Our group used the de-identified data to examine mortality data and conduct primary analyses. The primary endpoint for this study was overall mortality. Secondary endpoints included differences in transfer time, disability-adjusted life years saved through appropriate use of HEMS and quality-adjusted life years saved through appropriate use of HEMS. These research endpoints of mortality and time of transport was reached by analyzing the categorical data with a Pearson’s X2 analysis. Scalar data was analyzed using a Student’s T-Test or ANOVA.

The primary outcomes were analyzed further as a subgroup analysis based on patient severity scores and admitting diagnosis. Severity was assessed based on their All Patient Refined Diagnosis Related Groups (APR-DRG) data. After a patient is admitted, they are assigned a number between 1 and 4 that corresponds to the severity of their illness based on the primary diagnosis. All analyses and statistical significance were done through Excel and PRISM software.

RESULTS

Conclusions

We conclude that the transfer times are very similar between the two transfer modalities examined. It is unclear to us at this point in our research whether these seemingly few minutes saved leads to improved patient outcomes or whether the additional cost of the helicopter service.

We also conclude that there was no statistical difference in the mean age or gender of the individuals transferred between the two modalities. However, we discovered that the mean Severity of Illness score and Mortality Risk were both statistically significantly higher for LifeDrive patients than LifeFlight patients.

One of the reassuring findings of our data is that there is not a statistically significant difference in mortality despite the transport modality used. Our conclusion of this study is that mortality outcomes may have more to do with the level of skill and training of the transferring providers instead of the transfer modality itself.