Pre-hospital factors that lead to increased mortality and morbidity in trauma patients in developing countries: a systematic review

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Introduction

Trauma is a growing global concern and the WHO estimates that injuries account for one-sixth of the global adult disease burden. Furthermore, there is a disproportionate number of trauma related deaths that occur lower middle-income countries compared to higher income countries. Studies show that deficiencies in care in preventable related deaths include pre-hospital delays, delays in treatment and inadequate resuscitation. Additionally, most trauma related deaths occur in the prehospital setting and it is in the lower to middle income countries where structured emergency medical services are lacking.

Materials and Methods

PubMed/MEDLINE, EMBASE, and Cochrane were used to identify relevant peer-reviewed literature describing or evaluating prehospital emergency care in trauma patients in developing countries. Studies included for analysis included those that reported prehospital interventions or lack of interventions in trauma patients in developing countries. Interventions included triage, airway management, oxygen administration, intravenous fluid administration, splinting, spinal immobilization, wound care, and patient transport time. The outcome assessed was patient morbidity and mortality. Studies that were not conducted in a developing country and non-English articles were excluded after title and abstract review. Only primary journal articles published in English were included in this analysis. Articles were excluded from analysis if they did not contain any pre-hospital data and were not focused on trauma patients.

Keyword search strategies

The following search strings were utilized:
- "developing countries (MeSH) AND Emergency Medical Services (MeSH)"
- "prehospital emergency response) AND "Developing Countries "(Mesh)"
- "prehospital intervention AND Developing Countries [MeSH]"
- "Prehospital Emergency Response AND Third World Countries"

There were 8 studies that met our predefined inclusion criteria.

Results

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Country</th>
<th>Barriers</th>
<th>Injuries</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hasmi, et al.</td>
<td>n = 84 Ghana</td>
<td>Pre-hospital delay</td>
<td>Trauma patients</td>
<td>Prehospital delays accounted for the majority of mortality.</td>
<td></td>
</tr>
<tr>
<td>Khan, et al.</td>
<td>n = 1,348 USA, Mexico</td>
<td>Pre-hospital delay</td>
<td>Trauma patients</td>
<td>Average time of injury to emergency room 64.3 +/- 20.9 minutes with mortality percentage of 20.5%.</td>
<td></td>
</tr>
<tr>
<td>Sethi, et al.</td>
<td>n = 978 Pakistan</td>
<td>Pre-hospital delay</td>
<td>Trauma patients</td>
<td>Average time of injury to emergency room 6.2 hours while alive patients had mortality percentage of 53%.</td>
<td></td>
</tr>
<tr>
<td>Yeboah, et al.</td>
<td>n = 1,348 USA</td>
<td>Pre-hospital care</td>
<td>Blunt/penetrating</td>
<td>Trauma patients</td>
<td>Mortality = 1.15 (0.64-2.07)</td>
</tr>
<tr>
<td>Arreola-Risa</td>
<td>n = 97 Indonesia</td>
<td>Pre-hospital delay</td>
<td>Trauma patients</td>
<td>Mortality = 1.15 (0.64-2.07)</td>
<td></td>
</tr>
<tr>
<td>Smith, et al.</td>
<td>n = 3,786 Mexico</td>
<td>Pre-hospital care</td>
<td>Blunt/penetrating</td>
<td>Trauma patients</td>
<td>Mortality = 1.15 (0.64-2.07)</td>
</tr>
<tr>
<td>Beyda, et al.</td>
<td>n = 482 Qatar</td>
<td>Transfer time, prehospital care</td>
<td>Trauma patients</td>
<td>Mortality = 1.15 (0.64-2.07)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Exclusion methodology flowchart

Discussion

In this study, we aimed to identify and categorize the contributing prehospital factors that lead to increased mortality and morbidity in trauma patients in developing countries. In this systematic review, we were able to analyze data from eight studies. Only prehospital delay had enough papers with data and thus was the only factor we were able to perform a meta-analysis. Our analysis found that patients who experienced a prehospital delay had an 86% increase in mortality. While univariate analysis demonstrated that prolonged scene time was associated with increased mortality, this was not statistically significant. Limitations may have influenced the outcome of this study and need to be addressed. While low- and middle-income countries carry the heaviest global burden of injuries, a scarcity of trauma and injury data exists. Consequently, there is an apparent lack of quality research conducted and there are limited number of epidemiologists and other trained researchers, and there is little funding support.

Moving forward, it should be a goal for countries and their governments to establish a central clearinghouse of health information, especially trauma registries. Additionally, more research in developing countries should be conducted to begin to ameliorate the paucity of literature that can then start driving evidence-based improvements and initiatives in healthcare.

Conclusion

This study adds to the scarce literature how a lack of prehospital infrastructure is associated with an increased likelihood of mortality. It also highlights the importance and necessity of an increase in quality primary research conducted in developing countries.

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