Prehospital interventions to reduce discomfort caused by immobilization in adult trauma victims: a scoping review protocol

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ABSTRACT

Objective: The objective of this review is to identify the level of discomfort caused by immobilization as reported by trauma victims, and to map all the interventions in the prehospital context where they have been implemented and evaluated in order to reduce discomfort in adult victims of trauma.

Introduction: Immobilization is a cause of discomfort for trauma victims, which has important implications for the deterioration of vital signs and quality of life. However, discomfort caused by immobilization remains an under-explored topic by the scientific community.

Inclusion criteria: This scoping review will consider studies of adult victims of trauma, aged 18 years or over, in prehospital emergency care. Studies that focus on interventions designed to reduce immobilization discomfort, implemented and evaluated by health professionals, of any form, duration, frequency, and dose will be considered.

Methods: An initial search of PubMed and CINAHL will be undertaken, followed by a second search for published and unpublished studies without time restrictions, in major health care–related electronic databases. Studies in English, French, Spanish, and Portuguese will be included. Data extraction will be performed independently by 2 reviewers in a tabular format and will include details about the level of discomfort, interventions, populations, study methods, and outcomes of interest. A narrative synthesis will accompany the results and will describe how they relate to the review objectives.

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Keywords: discomfort; immobilization; trauma

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Introduction

Injuries are a leading cause of mortality and disability worldwide,[1] and have a significant impact on well-being and health care delivery.[2] To reduce the possibility of secondary aggravation of injuries, it is recommended that patients be immobilized in the prehospital setting until examinations rule out the presence of injuries.[3]

Spinal column and spinal cord injuries often occur following high- or low-energy injury mechanisms.[4] Different types of medical devices, used to ensure immobilization of the spine, have been developed to increase their effectiveness and ease of application, and to allow easy approach to the airway and other important procedures.[5] Immobilization is administered to reduce the risk of neurological deterioration by restricting mobilization and, thus, preventing worsening of the injury during extraction, transport, and assessment.[6] In addition to the cervical spine, other body segments of trauma victims may require

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specific immobilization and stabilization techniques,[7] such as the upper and lower limbs,[8] thorax, or pelvis.[9]

Many devices are used to immobilize trauma victims, such as hard collars, straps, blocks, spinal boards, and vacuum mattresses.[5] However, all of these can have iatrogenic implications, such as pressure sores over the sacrum,[10] increased intracranial pressure, augmented risk of aspiration associated with pulmonary restriction,[11] and dysphagia.[12] Other important consequences of immobilization are distress for the patient, increased prehospital rescue time, and difficulty breathing due to the straps.[13]

In many patients, the immobilization period exceeds two hours.[14] Prolonged immobilization often causes discomfort to the patient.[15] Several studies that included volunteers subjected to immobilization reported a significant increase in discomfort when immobilized.[12,16] Discomfort is reported in immobilizations performed both with a spinal board[17] and with a vacuum mattress.[18] Measures, such as reducing tissue interface pressure[19] through new stretcher designs[19] or new craniothoracic immobilizers,[20] may contribute to the reduction of discomfort caused by immobilization; however, it seems that no single system alone is ideal for extraction and transport of a trauma victim.[14] The consequences of immobilization discomfort can be significant, and there is no consensus on the real impact of this discomfort on the patient's well-being and hemodynamic stabilization.[21] Discomfort caused by immobilization has a major impact on quality of care[22] and can also influence the sympathetic nervous system, contributing to abnormal vital signs.[16]

A preliminary search of *JBI Evidence Synthesis*, the Cochrane Database of Systematic Reviews, MEDLINE, and CINAHL revealed that there are no published on in-progress scoping reviews on this topic. There are also no systematic reviews on interventions, and the primary evidence is poorly described, mainly due to the lack of interventions, different types of injury and immobilization, and specific approaches for each type of injury and immobilization. The lack of knowledge about the interventions used to minimize discomfort is an evident weakness in prehospital rescue. For this reason, mapping all existing interventions is especially important.

The objectives of this review are to identify the level of discomfort caused by immobilization as reported by trauma victims, and to map all the interventions in the prehospital context where they have been implemented and evaluated to reduce discomfort in adult victims of trauma.

Review questions

i) What discomfort management interventions are implemented and evaluated in adult trauma victims during prehospital care?
ii) What is the level of discomfort caused by immobilization as reported by trauma victims during prehospital care?
iii) What are the types of trauma, clinical specificities, and anatomical locations of trauma in which these interventions are performed?
iv) What are the specific characteristics of these interventions?
v) Which prehospital care providers are responsible for implementing these interventions?

Inclusion criteria

Participants

This scoping review will consider studies that focus on adult patients aged 18 years and older who are victims of trauma and have been immobilized. Trauma victims are considered to be those with injuries, or suspected injuries, caused by blunt or penetrating force mechanisms, falls, explosions, heat, cold, or chemical toxins.[23]

Concept

There are two core concepts that need to be considered: i) discomfort caused by immobilization, and ii) interventions administered to reduce discomfort.

This scoping review will consider all interventions (pharmacological and nonpharmacological) implemented and evaluated by prehospital care providers, including, but not limited to, nurses, physicians, paramedics, emergency technicians, and ambulance officers, for victims of trauma, with the aim of reducing their immobilization discomfort. Discomfort is defined as an unpleasant feeling or sensation in the body that can be categorized as pain or other unpleasant physical feelings or sensations, such as fatigue, sleeplessness, or shortness of breath.[24] For this review, we will only consider the discomfort caused by immobilization, and not the discomfort caused by the trauma itself.

For this review, interventions will include any kind of treatment performed as prehospital care with

the following characteristics: mechanism of action, duration, dose, frequency, and adverse reactions and contraindications.

This review will also consider the type of immobilization and the anatomical region immobilized.

Context

The clinical setting will be prehospital emergency care only. Prehospital emergency care involves the delivery of critical care in a resource-limited and physically challenging environment,[25] and is the first part of the trauma treatment and care system.[26] Prehospital care is provided by prehospital care providers at the scene of the event and during transport to the hospital, following defined documentation standards, triage protocols, clinical guidelines, hands-off procedures, referral methods, and protocols.[27] The average prehospital care time for trauma victims can be varied, from minutes to hours, as it depends on the need for additional care and the distance to the hospital itself.[27]

Types of sources

Quantitative and qualitative studies and systematic reviews will be included in this review. Quantitative studies will include experimental studies, such as randomized controlled trials, non-randomized controlled trials, quasi-experimental studies, and prospective and retrospective observational studies. We will consider qualitative studies using qualitative data, such as phenomenological studies, grounded theory, and ethnography design, for inclusion. Systematic reviews with or without meta-analysis or meta-synthesis, comprehensive systematic reviews, or mixed methods reviews will also be considered. This review will also consider non-research, text, and opinion/narrative-type literature.

Methods

The proposed review will be conducted in accordance with the JBI methodology for scoping reviews[28] and in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR).[29] The current protocol followed the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P).[30] This scoping review protocol is registered in Open Science Framework (https://osf.io/4scg5/).

Search strategy

A three-step search strategy will be used in this review to find published and unpublished studies. After conducting an initial search in MEDLINE (PubMed) and CINAHL (EBSCO) to identify articles on this subject, we analyzed the text words contained in the titles and abstracts, and the index terms used to describe these articles. This was used to develop a full search strategy for MEDLINE (PubMed), including the identified keywords and index terms (Appendix I). In the second phase, the search will be conducted across all databases using the identified keywords and index terms. Lastly, the reference lists of all included reports and articles will be searched for further studies.

The databases to be searched include MEDLINE (PubMed), CINAHL (EBSCO), Scopus, Embase, APA PsycINFO (EBSCO), *JBI Evidence Synthesis,* Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials.

The search for unpublished studies will include Repositório Científico de Acesso Aberto de Portugal (RCAAP), OpenGrey, Banco de Teses da CAPES, International Paramedic Practice, and Amber: the Home of Ambulance Service Research.

Published and unpublished studies in English, French, Spanish, and Portuguese will be included, without time restrictions. Studies in other languages will be excluded due to time and financial constraints for translations.

Study selection

After completing the search, all identified citations will be uploaded into EndNote v.X9 (Clarivate Analytics, PA, USA) and duplicates will be removed. To assess the eligibility of papers against the inclusion criteria for the review, 2 independent reviewers (MM and FM) with experience in immobilizing trauma victims will review the titles and abstracts.

A pilot screening process will be conducted independently by both co-reviewers on an initial 25 titles and abstracts. The results of the screening will then be compared and discussed; if required, changes will be made to the eligibility criteria to ensure that both reviewers are in agreement. This pilot process will continue until at least 75% agreement occurs between the co-reviewers.[28]

The full articles will be retrieved for all studies that meet the inclusion criteria. Two reviewers (MM

and FM) will independently examine these against the inclusion criteria. Any disagreements arising between the two reviewers will be resolved with a third reviewer (ES). Citations from eligible studies retrieved in full will be imported into Rayyan (Qatar Computing Research Institute, Doha, Qatar). Full-text studies that do not meet the inclusion criteria will be excluded and the reasons presented in an appendix in the final review. The results of the study selection will be presented in full in a PRISMA flow diagram in the final review.[31]

Data extraction

To collect the relevant data from each article and include specific details about the study participants, concept, context, and methods, data will be extracted from the studies using a modified version of the JBI data extraction instrument (see Appendix II).[28] This data extraction tool will be tested on 3 included studies by both reviewers independently. The results will be compared and discussed to ensure that all relevant data has been extracted, and that there is consistency in analysis between reviewers; however, the data extraction tool may be further refined during the review process. Two reviewers (MM and FM) will extract the data independently. Once again, any disagreements that arise between the reviewers will be resolved with a third reviewer (ES). If necessary, the authors of the included papers will be contacted for further information or data clarification.

Data analysis and presentation

The extracted data will be presented in tabular format in line with the review questions. A narrative synthesis will accompany the tabulated results and describe how they relate to the review objectives. A data reporting table was created specifically for this scoping review (Appendix III). Furthermore, the typology of prehospital interventions, as well as each review question, will be presented as bar charts to indicate the prevalence of each intervention, trauma type, and prehospital care provider. This may be further refined for use during the review process.

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Appendix I: Search strategy

MEDLINE (PubMed)
Date searched: March 15, 2022

Search	Query	Records retrieved
#1	"Pain"[Title/Abstract] OR "Pain"[MeSH Terms] OR "pain measurement"[MeSH Terms] OR "pain clinics"[MeSH Terms] OR "pain threshold"[MeSH Terms] OR "discomfor*"[Title/Abstract] OR "hurt*"[Title/Abstract] OR "iatrogenic injury"[Title/Abstract] OR "uncomfortable"[Title/Abstract] OR "psychological distress"[MeSH Terms] OR "anguish"[Title/Abstract] OR "fracture*"[Title/Abstract] OR "dislocation*"[Title/Abstract] OR "trauma*"[Title/Abstract] OR "multiple trauma"[MeSH Terms] OR "bone injur*"[Title/Abstract] OR "spinal cord injuries"[MeSH Terms] OR "spinal injuries"[MeSH Terms] OR "polytrauma"[Title/Abstract]	1,596,058
#2	"immobilization"[MeSH Terms] OR "immobilisation"[Title/Abstract] OR "cervical collar"[Title/Abstract] OR "hard collar"[Title/Abstract] OR "backboard"[Title/Abstract] OR "head immobilizers"[Title/Abstract] OR "prehospital spinal immobilization"[Title/Abstract] OR "prehospital spinal immobilisation"[Title/Abstract] OR "stretchers"[MeSH Terms] OR "vacuum mattress"[Title/Abstract] OR "spinal board"[Title/Abstract] OR "Hardboard"[Title/Abstract] OR "Blocks"[Title/Abstract] OR "straps"[Title/Abstract] OR "splints"[MeSH Terms] OR "immobilisation devices"[Title/Abstract] OR "immobilization devices"[Title/Abstract] OR "spinal immobilization"[Title/Abstract] OR "spinal immobilisation"[Title/Abstract]	171,045
#3	"ambulances"[MeSH Terms] OR "emergency medical technicians"[MeSH Terms] OR "air ambulances"[MeSH Terms] OR "emergency medical services"[MeSH Terms] OR "emt"[Title/Abstract] OR "emergency responders"[MeSH Terms] OR "field triage"[Title/Abstract] OR "out-of-hospital"[Title/Abstract] OR "HEMS"[Title/Abstract] OR "emergency medical services"[MeSH Terms]	206,169
#4	#1 AND #2 AND #3	753
Language limits (English, French, Spanish, and Portuguese)		705

Appendix II: Data extraction instrument

Evidence source details and characteristics	
Citation details (eg, author/s, date, title, journal, volume, issue, pages)	
Country	
Context	
Participants' details (eg, age/sex and number)	
Type of research (quantitative, qualitative, mixed methods, review, design, and methodology)	
Scoping review details	
Type of trauma	
Anatomical location immobilized	
Level of discomfort	
Type of intervention to reduce discomfort (including mechanism of action, duration, dose, frequency, adverse reactions, and contraindications)	
Outcomes measured	
Prehospital providers who performs the intervention	

Appendix III: Data presentation template

Study	Intervention/ prehospital providers	Anatomical location immobilized	Type of immobilization	Study population/ clinical specificities	Characteristics of intervention (frequency, duration and dose)	Outcomes	Adverse reactions	Contraindications	Key findings