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Study Protocol

STUDY PROTOCOL

Management and outcomes of traumatic paediatric spinal cord injuries in low- and middle-income countries: a scoping review protocol

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Abstract

Background: Traumatic spinal cord injury (TSCI) accounts for a significant proportion of deaths and disability worldwide and this is largely concentrated in low- and middle-income countries (LMICs). Though rare, a subset of TSCIs occurs in children, which can lead to long-term comorbidities if not managed within the optimal time frame. However, the lack of pre-hospital care, infrastructure and specialist manpower in LMICs may pose a challenge for health practitioners to provide quality and consistent standard of care to the children. The variety in practice and lack of clarity on management and outcomes of TSCIs in LMICs necessitates an evaluation of the literature. This scoping review protocol outlines how the authors will address the said topic of interest. **Methods:** MEDLINE, Embase and Global Index Medicus will be searched from database inception to date in order to identify the relevant studies. Paediatric patients (ages 18 or below) with a TSCI managed in an LMIC country will be included. Surgical and conservative management of TSCIs will be considered. Original research, reviews, commentaries, editorials and case reports will be included. **Results:** Primary outcomes will include TSCI epidemiology, presentation, management, morbidity, mortality and long-term complications. Secondary outcomes will include delays in receiving care. **Discussion:** This scoping review will be the first to evaluate the current landscape of paediatric TSCI management and outcomes in LMICs, highlighting pertinent themes that may be used to guide further research as well as health system strengthening efforts by policymakers and stakeholders.

INTRODUCTION

Traumatic spinal cord injury (TSCI) is a term used to define any external insult to the vertebral column, which leads to mechanical compression or distortion of the spinal cord, causing diminished or loss of function below the level of the injury of the cord [1]. It is a subset of neurotrauma diseases, which collectively represent a significant portion of the global burden of disease. It disproportionately affects individuals in low- and middle-income countries (LMICs) more than high-income countries (HICs); recent reports cite TSCI incidence to be almost twice as high in LMICs [2].

Five percent of all TSCIs occur in the paediatric population [3]. Despite being a small percentage of TSCIs, the effects of the injuries can have a significant impact on the quality of life of the individual, especially if not given adequate care acutely. Reports have shown that adults with paediatric-onset TSCIs are more likely to require care for activities of daily living [4, 5]. The impact of the injury extends to the family members of the child too. For example, caring for a child with tetraplegia—a condition often caused by TSCIs [6]—incurs significant financial costs and demands substantial time and labour resources from family members [7]. This can lead to

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added psychological stress and impair the wellbeing of the family, which could further affect the care provided to the child.

Given the potential consequences of paediatric TSCIs, it is important to provide timely and effective intervention to the patients. However, the lack of advanced technology and specialized workforce in LMICs poses a challenge to adhere to the guidelines developed by HICs [8, 9]. The lack of contextually appropriate evidence-based guidelines further compounds the issue, causing practice to be hospital-specific and/or up to the discretion of the individual clinicians. This leads to a wide variety in the management of the patients and, thus, a lack of clarity on the best practice that would produce optimal patient outcomes. This presents the question: how are paediatric TSCIs managed in LMICs? To our knowledge, there have yet to be studies evaluating the management and outcomes of paediatric TSCIs in LMICs, hence necessitating the need for a review of the literature.

We will conduct a scoping review instead of a systematic review because the evidence relating to the epidemiology, presentation, management and outcomes of paediatric TSCIs in Africa has not been comprehensively reviewed. Systematic reviews answer focused research questions following the Population, Intervention, Comparator/Control, Outcome (PICO) framework, whereas scoping reviews can explore several questions in a broad sense. Given our interest in the epidemiology, presentation, management and outcomes of TSCI, a scoping review is, therefore, more suitable for our investigation.

Primary aims

(i) Identify the treatment modalities and management plans available (e.g. conservative management, surgery and use of specialist therapy) in managing paediatric TSCIs in LMICs.
(ii) Assess the clinical outcomes defined as rates of complications, morbidity and mortality among paediatric TSCI patients in LMICs.

Secondary aims

(i) Assess the epidemiology of TSCIs in different LMICs.
(ii) Assess the availability of diagnostic modalities such as neuroimaging (MRI, CT scan).
(iii) Assess the delay to treatment of TSCIs.

METHODS AND ANALYSIS

The scoping review will be conducted per the Arksey and O'Malley framework [10] and reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR) guidelines [11].

This protocol has been reported in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidelines [12].

Eligibility criteria

Inclusion criteria

All relevant documents published in a peer-reviewed journal that discuss the epidemiology, presentation, management and outcomes of paediatric TSCIs in LMICs will be included.

(i) TSCI is defined as 'external injury to the vertebral column which leads to mechanical compression or distortion of the spinal cord leading to diminished or lost function below the spinal cord level of the injury' [1].
(ii) The paediatric populations will be defined as individuals aged between 0 and 18 years.
(iii) LMICs will be defined using the World Bank Criteria based on the 2020/21 fiscal year [13].

Study types including journal articles, reviews, case reports and letters will be included. There will be no restrictions on the period of publication and only publications in English and French will be considered.

Exclusion criteria

The following articles will be considered as outside the scope of this work and will be excluded:

(i) articles that do not include LMIC patients or do not have disaggregated data about the LMIC population,
(ii) articles that do not include paediatric patients or do not have disaggregated data about the paediatric population,
(iii) articles that do not discuss TSCIs or do not have disaggregated data about TSCIs,
(iv) articles that do not discuss epidemiology, presentation, management or outcomes of patients with paediatric TSCIs,
(v) articles that are neither written in English nor French, and
(vi) conference abstracts (due to the lack of in-depth information available).

Information sources

The search strategy will be executed on MEDLINE, Embase and Global Index Medicus.

Search strategy

A search strategy has been developed to identify studies related to the management and/or outcomes of paediatric patients with TSCIs in LMICs. Synonyms relating to terms describing individual LMICs, TSCIs, management and outcome will be used (Supplementary).

Data management

Data records will be downloaded from respective databases in comma-separated values formatted files. They will then be imported into Rayyan [14] where

deduplication, title and abstract screening, and full-text screening will take place. Further data extraction and quality assessment will be carried out on Microsoft Excel (Microsoft, Richmond, VA, USA).

Study selection

A calibration exercise will be carried out before title and abstract screening in order to ensure adequate understanding of the inclusion criteria by study screeners. Deduplication will be undertaken on Rayyan. Each study will then be screened using title and abstract, by two independent reviewers, against the pre-defined inclusion and exclusion criteria. Potentially eligible studies will be further screened for full-text review. Disagreements will be discussed amongst the reviewers, and in case of no resolution, an appeal will be made to a senior author.

Data extraction

Full-text screened articles will be exported into a previously made data extraction proforma on Microsoft Excel (Microsoft, Richmond, VA, USA). Data will be extracted on (i) study design, (ii) patient demographics, (iii) country of origin, (iv) TSCI characteristics, (v) mechanism of injury, (vi) neuroimaging modality used, (vii) type of intervention, (viii) delay of care, (ix) outcomes of care and (x) long-term complications. Data extraction will be performed in two stages, a pilot stage followed by a proper stage. The pilot stage will consist of having multiple authors, each going through the same 10 randomly selected articles to extract data. This is to assure the reliability of the proforma and that all participant authors were able to extract data accurately and homogeneously. Feedback from the pilot stage will inform any necessary changes to be made, upon discussion, in order to accurately capture the pertinent themes in the literature.

Data synthesis

Study characteristics will be summarized using descriptive statistics and presented in a table. Data relating to study characteristics will be grouped into categories where appropriate. Categorization might be based on the mechanism of injury, LMICs or will be finalized in discussions with the team wherever necessary if notable differences emerge in study findings.

Characteristics of the study population will be reported; this includes age, study setting and the country being studied. Characteristics of the injury will be noted such as mechanism of injury, location of injury and American Spinal Injury Association chart score [15] at presentation, discharge and follow-up. Neuroimaging modalities used to diagnose TSCIs will also be reported. Types of conservative and operative approaches to the injuries as well as any specialist therapy input received will be highlighted whenever applicable. The treatment outcomes will be described: mortality rate, morbidity rate and short-term and long-term complications. An analysis of these outcomes will enable comparison and discussion of effectiveness of treatment techniques adopted in LMICs with HICs as well as within LMICs. Any delays to treatment will also be noted.

Limitations

There is an extensive amount of literature published in Mandarin Chinese, Arabic, Russian, Spanish, Portuguese, Hindi and Bengali that will not be addressed by this review. Governmental reports and articles from non–peer-reviewed journals may also contain valuable data that will not be captured by this review.

AUTHORS' CONTRIBUTION

D.U.D., S.S., S.B. and U.S.K. contributed to the conception and design of the study. D.U.D. and S.Z.Y.O. drafted the manuscript. All authors revised the manuscript critically for important intellectual content and approved for the manuscript to be published. D.U.D. and S.Z.Y.O. contributed equally and are joint first authors.

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ETHICS AND DISSEMINATION

This study will exclusively involve secondary data collection and no human participants will be involved in the design or dissemination of this research; hence, ethical approval was not required. The results from this study will be disseminated through a peer-reviewed journal.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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