Clinical practice guideline recommendations for pediatric injury care: protocol for a systematic review

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ABSTRACT

Introduction Evidence suggests the presence of deficiencies in the quality of care provided to up to half of all paediatric trauma patients in Canada, the USA and Australia. Lack of adherence to evidence-based recommendations may be driven by lack of knowledge of clinical practice guidelines (CPGs), heterogeneity in recommendations or concerns about their quality. We aim to systematically review CPG recommendations for paediatric injury care and appraise their quality.

Methods and analysis We will identify CPG recommendations through a comprehensive search strategy including Medical Literature Analysis and Retrieval System Online, Excerpta Medica database, Cochrane library, Web of Science, ClinicalTrials and websites of organisations publishing recommendations on paediatric injury care. We will consider CPGs including at least one recommendation targeting paediatric injury populations on any diagnostic or therapeutic intervention from the acute phase of care with any comparator developed in high-income countries in the last 15 years (January 2007 to a maximum of 6 months prior to submission). Pairs of reviewers will independently screen titles, abstracts and full text of eligible articles, extract data and evaluate the quality of CPGs and their recommendations using Appraisal of Guidelines Research and Evaluation (AGREE) II and AGREE Recommendations Excellence instruments, respectively. We will synthesise evidence on recommendations using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Evidence-to-Decision framework and present results within a recommendations matrix.

Ethics and dissemination Ethics approval is not a requirement as this study is based on available published data. The results of this systematic review will be published in a peer-reviewed journal, presented at international scientific meetings and distributed to healthcare providers.

Strengths and limitations of this study

► We will produce a metasynthesis of clinical practice guidelines (CPGs) recommendations using a recommendations matrix.
► Our search strategy is not designed to identify CPGs that do not specifically target paediatric injury care populations.
► CPGs from low-income and middle-income countries were not considered but will be reviewed in future work.

INTRODUCTION

Injury is the condition that causes the greatest burden of morbidity and mortality for children in most high-income countries. In the USA, the child mortality rate due to injury increased by 12% between 2013 and 2016 and according to a 2016 report, more than 7% of children suffer a significant head injury before the age of 17 years. In Canada, 900 children and adolescents die and 35 000 are hospitalised yearly following injury, with costs of over $4 billion. The human and societal burden of childhood injury is even greater. For every child who dies from an injury, 10 survive with lifelong disabilities resulting in enormous emotional and financial hardship for the injured and their families. In a 2017 UNICEF report, Canada and the USA were, respectively, ranked 29th and 36th out of 40 affluent nations for protecting the well-being of children and injuries were cited as the no. 1 threat to that well-being.

Many clinical practice guidelines (CPGs) of paediatric injury care exist, all with the common objective of improving care and outcomes. However, a systematic review of quality indicators for paediatric trauma care...
suggested deficiencies in the quality of care for 8%–45% of patients.6 Lack of adherence to evidence-based recommendations may be driven by lack of knowledge of CPGs, heterogeneity in recommendations or concerns about their quality.7 A synthesis of CPG recommendations is needed to clarify standards of care. Our objective is thus to systematically review CPG recommendations for paediatric injury care and appraise their quality.

**METHODS**

Our research question was formulated using the population; intervention(s); comparator(s); comparison(s) and (key) content; attributes of eligible CPGs; and recommendation characteristics framework8 in collaboration with our interdisciplinary and intersectorial project advisory committee comprising 12 Canadian paediatric injury care clinicians (prehospital, emergency medicine, trauma surgery, neurosurgery, orthopaedics, critical care, nursing and rehabilitation specialties), 3 paediatric trauma programme medical directors (MBeaudin, NY, SBeno) and 2 trauma accreditation agency representatives. This protocol was developed using methodological guidelines for systematic reviews of CPGs9 and Cochrane guidelines on systematic reviews9 and is reported according to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols statement.10

**Patient and public involvement**

Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Eligibility**

We will consider CPGs including at least one recommendation targeting paediatric injury populations on any diagnostic or therapeutic intervention from the acute phase of care with any comparator developed in high-income countries in the last 15 years. CPGs are defined as ‘statements that include recommendations intended to optimise patient care that are informed by systematic review of evidence and an assessment of benefits and harms of alternative care options’.11 Paediatric injury populations are defined as children<19 years of age seen in the emergency department (ED) or admitted to hospital following injury. We will also consider CPGs that target injury care for all ages if they include at least one recommendation specific to children as well as CPGs on paediatric healthcare if they include at least one recommendation specific to acute injury care. We will exclude CPGs exclusively pertaining to burns, poisoning, foreign body ingestion, late effects of injury or drowning. Finally, we will exclude publications reporting data on the implementation of or adherence to CPGs published previously but will use them to identify any additional CPGs. No restrictions based on language will be applied.

**Search strategy**

We will systematically search Medical Literature Analysis and Retrieval System Online (MEDLINE), Excerpta Medica dataBASE (EMBASE), Cochrane library, Web of Science and ClinicalTrials from 1 January 2007 to a maximum of 6 months prior to publication. We will also search the websites of organisations publishing recommendations on paediatric injury care, established in consultation with our advisory committee (including injury guidelines for all age groups with specific recommendations for children and CPGs on paediatric healthcare if they include at least one recommendation specific to acute injury care) described above (see table 1 for a preliminary list).

Our search strategy will be developed with an information specialist using the 2015 Peer Review of Electronic Search Strategies guideline statement.12 Our search strategy will be developed using keywords covering combinations of search terms under the themes pediatrics, injury and clinical practice guidelines. MeSH (MEDLINE) or EMTREE (EMBASE) will also be used when appropriate. The search strategy will then be adapted to other databases. Using a preliminary search strategy (from 1 January 2007 to 13 September 2021; table 2), we have identified 8358 citations, including all 4 sentinel articles identified a priori.13–16

**Study selection**

We will manage citations using EndNote (V.X9.3.3, Thomson Reuters, New York City, 2018) software. In the first phase, pairs of reviewers will independently screen titles and abstracts for eligibility. In the second phase, we will assess full texts to determine eligibility for final inclusion and record reasons for exclusion. In the third phase, we will assess the eligibility of recommendations within eligible CPGs. We will first pilot each phase on samples of 1500 citations until acceptable agreement is reached (kappa>0.8). If duplicate CPGs are identified, we will only include the most recent version. For each CPG identified, we will locate the supporting documents (eg, methodological details). Another reviewer will independently verify the completeness of each document set.

**Data extraction**

We will develop a standard electronic data abstraction form and a detailed instruction manual. This form will be piloted on a representative sample of five publications. Pairs of reviewers with methodological and content expertise will independently extract data from eligible CPGs. For each recommendation within CPGs, we will extract information on the population, intervention, comparator, quality of evidence and strength of recommendations. We will contact the contributing authors if important information is missing or unclear.

**Quality**

Two reviewers with content expertise will independently assess the quality of included CPGs using the Appraisal of Guidelines Research and Evaluation (AGREE) II tool, which has six domains: scope and purpose, stakeholder involvement, rigour of development, clarity and
presentation, applicability and editorial independence. Each domain with a score $\geq 60\%$ will be considered effectively addressed. CPGs will be considered high quality if they score $\geq 60\%$ in at least three of the six AGREE II domains, including domain 3 (rigour of development). If three domains or more scored $\geq 60\%$ and domain 3 scored $<60\%$, the CPG will be considered of moderate quality. CPGs scoring $<60\%$ in two or more domains and scoring $<50\%$ in domain 3 will be considered of low quality. Two content experts will then use the AGREE Recommendations Excellence (AGREE-REX) instrument to independently assess the clinical applicability and implementability of guideline recommendations. AGREE-REX has nine items covering evidence, clinical applicability, values and preferences and implementability. To ensure feasibility and timeliness of our review, if more than 10 CPGs are identified, we will apply AGREE-REX only to CPGs of moderate or high quality according to AGREE II.

### Metasynthesis of recommendations

We will synthesise evidence on recommendations using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) Evidence-to-Decision framework: the quality of CPGs from which recommendations were extracted (AGREE II), levels of evidence for benefits and harms, strength of recommendations, clinical applicability and implementability (AGREE-REX) and the number of times a recommendation appears in eligible CPGs. We will use these elements to develop a recommendations matrix that will be piloted on a random sample of CPG recommendations. Matrix data will then be extracted independently by pairs of reviewers for each recommendation. We will stratify the synthesis by injury type, that is, traumatic brain injury, spinal cord injury, thoracoabdominal, orthopaedic and multisystem. CPGs from low-income and middle-income countries will be addressed in a separate review.

Discrepancies in all phases of the review will be resolved by initial review by a senior member of the research team (NY) followed by consensus among members of the intersectorial project advisory committee, when necessary.

### Limitations of study

For feasibility reasons, our search strategy was not developed to systematically identify CPGs that do not specifically target paediatric injury populations. Thus, we may miss recommendations on paediatric injury care if they are included in CPGs that target general paediatric populations (eg, ED or Intensive Care Unit populations) or trauma populations of all ages if no keywords relating to paediatrics and injury are present in the title or abstract. However, these recommendations are likely to be identified by consulting professional organisation websites.
Table 2: Search strategy for PubMed (13 September 2021)

| Concepts                        | PubMed search strategy                                                                 | Research | No. of results |
|---------------------------------|----------------------------------------------------------------------------------------|----------|----------------|
| Guideline (controlled vocabulary) | “Guideline”[Publication Type] OR “Guidelines as Topic”[Mesh]                           | #1       | 204 535        |
| Guideline (free text)           | Guide*[TIAB] OR guideline*[TIAB] OR guidelines*[TIAB] OR “practice guideline”*[TIAB] OR “practice guidelines”*[TIAB] | #2       | 761 250        |
| Total for guideline              | #1 OR #2                                                                               | #3       | 866 374        |
| Paediatric (controlled vocabulary) | adolescent*[MeSH] OR “Child”*[Mesh] OR “Infant”*[Mesh] OR “Pediatrics”*[Mesh]         | #4       | 3 748 622      |
| Paediatric (free text)          | adolescent*[TIAB] OR baby*[TIAB] OR babies*[TIAB] OR boy*[TIAB] OR boys*[TIAB] OR child*[TIAB] OR girl*[TIAB] OR infant*[TIAB] OR kid*[TIAB] OR kids*[TIAB] OR neonat*[TIAB] OR newborn*[TIAB] OR paediatric*[TIAB] OR pediatric*[TIAB] OR “skeletally immature”*[TIAB] OR toddler*[TIAB] | #5       | 2 529 627      |
| Total for paediatric            | #4 OR #5                                                                               | #6       | 4 467 031      |
| Trauma (controlled vocabulary)  | “Brain Hemorrhage, Traumatic”*[MeSH] OR “Brain Injuries”*[MeSH:NoExp] OR “Coma, Post-Head Injury”*[MeSH:NoExp] OR “Cranioencephalic Trauma”*[MeSH:NoExp] OR “Diffuse Axonal Injury”*[MeSH:NoExp] OR “Fractures, Bone”*[Mesh] OR “Head Injuries, Closed”*[MeSH:NoExp] OR “Head Injuries, Penetrating”*[MeSH:NoExp] OR “Intracranial Hemorrhage, Traumatic”*[MeSH] OR “Orthopedics/surgery”*[Mesh] OR “Skull Fractures”*[MeSH] OR “Spinal Cord Injuries”*[Mesh] OR “Wounds and Injuries”*[Mesh] | #7       | 946 800        |
| Trauma (free text)              | Fractur*[TIAB] OR Injur*[TIAB] OR TBI*[TIAB] OR trauma*[TIAB]                          | #8       | 1 272 601      |
| Total for trauma                | #7 OR #8                                                                               | #9       | 1 720 079      |
| Overall                         | #3 AND #6 AND #9                                                                       | #10      | 12 522         |
| Exclusion 1                     | #10 NOT [Editorial[ptyp] OR Letter[ptyp] OR Case Reports[ptyp] OR Comment[ptyp]]       | #11      | 11 232         |
| Exclusion 2                     | Limit to articles since 2007                                                          | #12      | 8358           |

listed by research team members (table 1). In addition, the injury keywords in the research strategy are exhaustive and our goal is to synthesise recommendations specific to children rather than recommendations for adults applied to children.

**ETHICS AND DISSEMINATION**

Research ethics approval is not required as it is a secondary analysis of published data. Results of our study will be disseminated in a peer-reviewed journal, international scientific meetings and an accessible synthesis will be distributed to healthcare providers through clinical and healthcare quality associations.

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