

# BMJ Open

BMJ Open is committed to open peer review. As part of this commitment we make the peer review history of every article we publish publicly available.

When an article is published we post the peer reviewers' comments and the authors' responses online. We also post the versions of the paper that were used during peer review. These are the versions that the peer review comments apply to.

The versions of the paper that follow are the versions that were submitted during the peer review process. They are not the versions of record or the final published versions. They should not be cited or distributed as the published version of this manuscript.

BMJ Open is an open access journal and the full, final, typeset and author-corrected version of record of the manuscript is available on our site with no access controls, subscription charges or pay-per-view fees (<http://bmjopen.bmj.com>).

If you have any questions on BMJ Open's open peer review process please email [info.bmjopen@bmj.com](mailto:info.bmjopen@bmj.com)

# BMJ Open

## CLINICAL PRACTICE GUIDELINE RECOMMENDATIONS FOR PEDIATRIC INJURY CARE: protocol for A SYSTEMATIC REVIEW

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-060054
Article Type:	Protocol
Date Submitted by the Author:	10-Dec-2021
Complete List of Authors:	<p>Moore, Lynne; Centre de recherche du CHU de Québec-Université Laval; Université Laval Faculté de médecine, Department of Social and Preventative Medicine, Université Laval, Québec, Québec, Canada</p> <p>Freire, Gabrielle; University of Toronto Faculty of Medicine, Department of Paediatrics, Division of Emergency Medicine, University of Toronto, Toronto, Canada</p> <p>Ben Abdeljelil, Anis; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Berube, Melanie; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval, Faculty of Nursing, Université Laval, Québec City, Québec, Canada</p> <p>Tardif, Pier-Alexandre; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Gnanvi, Eunice; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Stelfox, Henry; University of Calgary, Departments of Critical Care Medicine, Medicine and Community Health Sciences, O'Brien Institute for Public Health, University of Calgary</p> <p>Beaudin, Marianne; Université de Montréal, Sainte-Justine Hospital, Department of Paediatric Surgery, Université de Montréal, Montréal, Québec, Canada</p> <p>Carsen, Sasha; Children's Hospital of Eastern Ontario, Division of Orthopaedic Surgery, Children's Hospital of Eastern Ontario (CHEO), Ottawa, Ontario, Canada</p> <p>Stang, Antonia; University of Calgary, Pediatrics, Emergency Medicine, and Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada</p>

	<p>Beno, Suzanne; University of Toronto, Division of Emergency Medicine, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada</p> <p>Weiss, Matthew; CHU de Québec-Université Laval, Pediatric Intensivist, Centre Mère-Enfant Soleil du CHU de Québec, Transplant Québec, Québec, Québec, Canada</p> <p>Labrosse, Melanie; Université de Montréal, Department of Pediatrics, Division of Emergency Medicine, CHU Sainte-Justine, Université de Montréal, Montréal, Quebec, Canada</p> <p>Zemek, Roger; Children's Hospital of Eastern Ontario, Department of Pediatrics, Children's Hospital of Eastern Ontario, Ottawa, Canada</p> <p>Gagnon, Isabelle; Montreal Children's Hospital, Division of Pediatric Emergency Medicine, McGill University Health Centre, Montreal Children's Hospital, Montréal, Quebec, Canada</p> <p>Beaulieu, Emilie; Université Laval Faculté de médecine, Département de pédiatrie, Faculté de médecine, Centre Hospitalier Universitaire de Québec-Université Laval, Québec City, Quebec, Canada</p> <p>Berthelot, Simon; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Klassen, Terry; University of Manitoba, George &amp; Fay Yee Centre for Health Care Innovation, Children's Hospital Research Institute of Manitoba, Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, Manitoba, Canada</p> <p>Turgeon, Alexis; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval Faculté de médecine, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada</p> <p>Lauzier, François; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval Faculté de médecine, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada</p> <p>Pike, Ian; The University of British Columbia, Department of Pediatrics, University of British Columbia, BC Injury Research and Prevention Unit, Vancouver, British Columbia, Canada</p> <p>Macpherson, Alison; York University, Faculty of Health, York University, Toronto, Ontario</p> <p>Gabbe, Belinda; Monash University, School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia</p> <p>Yanchar, Natalie; University of Calgary, Department of Surgery, University of Calgary, Calgary, Canada</p>
Keywords:	TRAUMA MANAGEMENT, EPIDEMIOLOGY, PAEDIATRIC SURGERY, PAEDIATRICS

SCHOLARONE™  
Manuscripts

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## CLINICAL PRACTICE GUIDELINE RECOMMENDATIONS FOR PEDIATRIC INJURY CARE: PROTOCOL FOR A SYSTEMATIC REVIEW

Lynne Moore PhD<sup>1,2</sup>, Gabrielle Freire MD MSc<sup>3</sup>, Anis Ben Abdel BPharm MSc<sup>1</sup>, Mélanie Bérubé PRN, PhD<sup>1,4</sup>, Pier-Alexandre Tardif MA MSc<sup>1</sup>, Eunice Gnanvi MSc<sup>1</sup>, Henry T Stelfox MD MSc<sup>5</sup>, Marianne Beaudin MD MSc MPH<sup>6</sup>, Sasha Carsen MD, MBA, FRCSC<sup>7</sup>, Antonia Stang MD MSc<sup>8</sup>, Suzanne Beno DABP MD<sup>9</sup>, Matthew Weiss MD MSc<sup>10</sup>, Melanie Labrosse MD PhD<sup>11</sup>, Roger Zemek MD FRCPC<sup>12</sup>, Isabelle J. Gagnon PT, PhD<sup>13</sup>, Emilie Beaulieu MD MPH<sup>14</sup>, Simon Berthelot MD MSc<sup>1</sup>, Terry Klassen MD MSc<sup>15</sup>, Alexis F Turgeon MD MSc<sup>1,2,16</sup>, François Lauzier MD MSc<sup>1,2,16</sup>, Ian Pike PhD<sup>17</sup>, Alison Macpherson PhD<sup>18</sup>, Belinda Gabbe PhD<sup>19</sup>, Natalie Yanchar MD MSc<sup>20</sup>

<sup>1</sup>Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada

<sup>2</sup>Department of Social and Preventative Medicine, Université Laval, Québec, Québec, Canada

<sup>3</sup>Department of Paediatrics, Division of Emergency Medicine, University of Toronto, Toronto, Canada

<sup>4</sup>Faculty of Nursing, Université Laval, Québec City, Québec, Canada

<sup>5</sup>Departments of Critical Care Medicine, Medicine and Community Health Sciences, O'Brien Institute for Public Health, University of Calgary

<sup>6</sup>Sainte-Justine Hospital, Department of Paediatric Surgery, Université de Montréal, Montréal, Québec, Canada

<sup>7</sup>Division of Orthopaedic Surgery, Children's Hospital of Eastern Ontario (CHEO), Ottawa, Ontario, Canada

<sup>8</sup>Pediatrics, Emergency Medicine, and Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada

<sup>9</sup>Division of Emergency Medicine, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada

<sup>10</sup>Pediatric Intensivist, Centre Mère-Enfant Soleil du CHU de Québec, Transplant Québec, Quebec, Québec, Canada

<sup>11</sup>Department of Pediatrics, Division of Emergency Medicine, CHU Sainte-Justine, Université de Montréal, Montréal, Quebec, Canada

<sup>12</sup>Department of Pediatrics, Children's Hospital of Eastern Ontario, Ottawa, Canada

<sup>13</sup>Division of Pediatric Emergency Medicine, McGill University Health Centre, Montreal Children's Hospital, Montréal, Quebec, Canada

<sup>14</sup>Département de pédiatrie, Faculté de médecine, Centre Hospitalier Universitaire de Québec-Université Laval, Quebec City, Quebec, Canada

<sup>15</sup>George & Fay Yee Centre for Health Care Innovation, Children's Hospital Research Institute of Manitoba, Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, Manitoba, Canada

<sup>16</sup>Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada

<sup>17</sup>Department of Pediatrics, University of British Columbia, BC Injury Research and Prevention Unit, Vancouver, British Columbia, Canada

<sup>18</sup>Faculty of Health, York University, Toronto, Ontario

<sup>19</sup>School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

<sup>20</sup>Department of Surgery, University of Calgary, Calgary, Canada

**Corresponding author:**

Lynne Moore

CHU de Québec Research Center (Enfant-Jésus Hospital)

Axe Santé des Populations et Pratiques Optimales en Santé (Population Health and Optimal Health Practices Research Unit), Traumatologie – Urgence - Soins intensifs (Trauma – Emergency – Critical Care Medicine)

1401, 18e rue, local H-012a, Québec (Québec), G1J 1Z4

Tel. 418-649-0252 #3366

Fax: 418-649-5733

Email: lynne.moore @fmed.ulaval.ca

## ABSTRACT

**Introduction:** Evidence suggests the presence of deficiencies in the quality of care provided to up to half of all pediatric trauma patients in Canada, the US 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 pediatric injury care and appraise their quality.

**Methods and analysis:** We will identify CPG recommendations through a comprehensive search strategy including Medline, Embase, Cochrane library, Web of Science, ClinicalTrials and websites of organisations publishing recommendations on pediatric injury care. We will consider CPGs including at least one recommendation targeting pediatric 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. 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 AGREE II and AGREE-REX instruments respectively. We will synthesize evidence on recommendations using the 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

- This is the first systematic review to synthesize clinical practice guidelines (CPG) recommendations in pediatric injury care
- The quality of CPGs and their recommendations will be evaluated
- Our search strategy is not designed to identify CPGs that do not specifically target pediatric injury care populations

## INTRODUCTION

Injury is the condition that causes the greatest burden of morbidity and mortality for children in most high-income countries.<sup>1</sup> In the US, the child mortality rate due to injury increased by 12% between 2013 and 2016<sup>2</sup> and according to a 2016 report, more than 7% of children suffer a significant head injury before the age of 17.<sup>3</sup> In Canada, 900 children and adolescents die and 35,000 are hospitalised yearly following injury, with costs of over \$4 billion.<sup>4</sup> 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,<sup>5</sup> Canada and the US were respectively ranked 29<sup>th</sup> and 36<sup>th</sup> out of 40 affluent nations for protecting the well-being of children and injuries were cited as the #1 threat to that well-being.

Many clinical practice guidelines (CPG) of pediatric injury care exist, all with the common objective of improving care and outcomes. Evidence suggests that there are deficiencies in the quality of care provided to up to half of all pediatric trauma patients in Canada, the US and Australasia.<sup>6</sup> Lack of adherence to evidence-based recommendations may be driven by lack of knowledge of CPGs, heterogeneity in recommendations or concerns about their quality.<sup>7</sup> A synthesis of CPG recommendations is needed to clarify standards of care. Our objective is thus to systematically review CPG recommendations for pediatric injury care and appraise their quality.

## METHODS

Our research question was formulated using the PICAR (Population; Intervention(s); Comparator(s), Comparison(s), and (key) Content; Attributes of eligible CPGs; and Recommendation characteristics) framework<sup>8</sup> in collaboration with our interdisciplinary and intersectorial project advisory committee comprising 12 Canadian pediatric injury care clinicians (pre-hospital, emergency medicine, trauma surgery, neurosurgery, orthopedics, critical care, nursing, and rehabilitation specialties), 3 pediatric trauma program medical directors (MaB, NY, SuB), and 2 trauma accreditation agency representatives. This protocol was developed using methodological guidelines for systematic reviews of CPGs<sup>8</sup>

1  
2  
3 and Cochrane guidelines on systematic reviews<sup>9</sup> and is reported according to the Preferred  
4 reporting items for systematic review and meta-analysis protocols (PRISMA-P)  
5 statement.<sup>10</sup> The protocol has been submitted to the International Prospective Register of  
6 Systematic Reviews (PROSPERO) and is under revision.  
7  
8  
9

10  
11  
12 **Patient and public involvement:** Patients and/or the public were not involved in the  
13 design, or conduct, or reporting, or dissemination plans of this research.  
14

### 15 16 **Eligibility**

17 We will consider CPGs including at least one recommendation (R) targeting pediatric  
18 injury populations (P) on any diagnostic or therapeutic intervention from the acute phase  
19 of care (I) with any comparator (C) developed in high-income countries in the last 15 years  
20 (A). CPGs are defined as ‘statements that include recommendations intended to optimize  
21 patient care that are informed by systematic review of evidence and an assessment of  
22 benefits and harms of alternative care options’.<sup>11</sup> Pediatric injury populations are defined  
23 as children <19 years of age seen in the emergency department (ED) or admitted to hospital  
24 following injury. We will also consider CPGs that target injury care for all ages if they  
25 include at least one recommendation specific to children as well as CPGs on pediatric  
26 healthcare if they include at least one recommendation specific to acute injury care. We  
27 will exclude CPGs exclusively pertaining to burns, poisoning, foreign body ingestion, late  
28 effects of injury or drowning. Finally, we will exclude publications reporting data on the  
29 implementation of or adherence to CPGs published previously but will use them to identify  
30 any additional CPGs.  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42

### 43 44 **Search strategy**

45 We will systematically search Medical Literature Analysis and Retrieval System Online  
46 (MEDLINE), Excerpta Medica dataBASE (EMBASE), Cochrane library, Web of Science,  
47 and ClinicalTrials from 2007 to a maximum of 6 months prior to publication. We will also  
48 search the websites of organisations publishing recommendations on pediatric injury care,  
49 established in consultation with our advisory committee (including injury guidelines for all  
50 age groups with specific recommendations for children and CPGs on pediatric healthcare  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60



1  
2  
3 if they include at least one recommendation specific to acute injury care) described above  
4 (see Table 1 for a preliminary list).  
5  
6  
7

### 8 ***Search strategy***

9  
10 Our search strategy will be developed with an information specialist using the 2015 Peer  
11 Review of Electronic Search Strategies (PRESS) guideline statement.<sup>12</sup> Our search strategy  
12 will be developed using keywords covering combinations of search terms under the themes  
13 *pediatrics, injury* and *clinical practice guidelines*. MeSH (MEDLINE) or Emtree  
14 (EMBASE) will also be used when appropriate. The search strategy will then be adapted  
15 to other databases. Using a preliminary search strategy (Table 2), we have identified 8358  
16 citations, including all 4 sentinel articles identified *a priori*<sup>13-16</sup>.  
17  
18  
19  
20  
21  
22  
23

### 24 **Study selection**

25 We will manage citations using EndNote (version X9.3.3, New York City: Thomson  
26 Reuters, 2018) software. In the first phase, pairs of reviewers will independently screen  
27 titles and abstracts for eligibility. In the second phase, we will assess full texts to determine  
28 eligibility for final inclusion and record reasons for exclusion. In the third phase, we will  
29 assess the eligibility of recommendations within eligible CPGs. We will first pilot each  
30 phase on samples of 1500 citations until acceptable agreement is reached ( $\kappa > 0.8$ ). If  
31 duplicate CPGs are identified, we will only include the most recent version. For each CPG  
32 identified, we will locate the supporting documents (e.g. methodological details). Another  
33 reviewer will independently verify the completeness of each document set.  
34  
35  
36  
37  
38  
39  
40  
41  
42

### 43 **Data extraction**

44 We will develop a standard electronic data abstraction form and a detailed instruction  
45 manual. This form will be piloted on a representative sample of 5 publications. Pairs of  
46 reviewers with methodological and content expertise will independently extract data from  
47 eligible GCPs. For each recommendation within CPGs, we will extract information on the  
48 population, intervention, comparator, quality of evidence and strength of  
49 recommendations. We will contact the contributing authors if important information is  
50 missing or unclear.  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Quality

Two reviewers with content expertise will independently assess the quality of included CPGs using the AGREE II tool, which has six domains: scope and purpose, stakeholder involvement, rigour of development, clarity and presentation, applicability and editorial independence.<sup>17</sup> 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 six AGREE II domains, including domain 3 (rigor 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.<sup>18</sup> 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.

## Meta-synthesis of recommendations

We will synthesize evidence on recommendations using the 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 & 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.

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 pediatric injury populations. Thus, we may miss recommendations on pediatric injury care if they are included in CPGs that target general pediatric populations (e.g. ED or ICU populations) or trauma populations of all ages if no keywords relating to pediatrics and injury are present in the title or abstract. However, these recommendations are likely to be identified by consulting professional organisation websites listed by research team members (Table 1). In addition, the injury keywords in the research strategy are exhaustive and our goal is to synthesize recommendations specific to children rather than recommendations for adults applied to children.

### CONCLUSIONS

Our systematic review will provide an accessible and quality-rated synthesis of CPG recommendations for healthcare providers treating pediatric trauma. It will also highlight gaps in current CPGs or the necessity to adapt them to local contexts. Ultimately, standardizing care according to best practices could lead to substantial improvements in quality of care and reduce the significant burden of injury for children, their families and society.

### 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.

**Contributors:** All authors were involved in conceiving and designing the protocol. LM and PAT drafted the manuscript. All authors read, revised and approved the final manuscript.

**Funding:** This work was supported by Canadian Institutes of Health Research grant number 461381. The funder had no role in developing the protocol.

**Competing interests:** None declared.

1  
2  
3  
4 **Provenance and peer review:** Not commissioned; externally peer reviewed.  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

For peer review only

Table 1. Preliminary list of organisations publishing recommendations on pediatric injury care

1. Pediatric Emergency Care Applied Research Network	26. Eastern Association for the Surgery of Trauma
2. Pediatric Emergency Research Canada	27. European Society of Anesthesiology
3. Agency for Healthcare Research and Quality	28. International Association for Trauma Surgery and Intensive Care
4. Accreditation Canada	29. International guidelines for skeletal survey imaging
5. American Academy of Orthopedic Surgeons	30. International Trauma Anesthesia and Critical Care Society
6. American Academy of Pediatrics	31. National Association for Healthcare Quality
7. American Association for the Surgery of Trauma	32. National Emergency Medical Services
8. American Association of Neurological Surgeons/Congress of Neurological Surgeons	33. National Guidelines Clearinghouse
9. American Board of Orthopedic Surgery	34. National Institute of Health and Care Excellence
10. American College of radiology	35. National Quality Forum
11. American College of Surgeons	36. Orthopedic Trauma Association
12. American College of Emergency Physicians	37. Pediatric Critical Care Transfusion and Anemia Expertise Initiative
13. American Heart Association pediatric guidelines	38. Pediatric Health Information System database
14. American Pediatric Surgical Association	39. Pediatric Orthopaedic Society of North America
15. American Trauma Society	40. Pediatric Trauma Society
16. Australasian Trauma Society	41. Royal college of Radiologists (paediatric trauma protocols)
17. Australasian Association for Quality in Healthcare	42. Royal College of Paediatrics and Child Health
18. Brain Trauma Foundation	43. Society for Pediatric Radiology (Child Abuse Imaging Committee)
19. British Orthopaedic Association (standards for trauma)	44. Society of Trauma Nurses
20. British Society of Children's Orthopaedic Surgery	45. Scottish Intercollegiate Guidelines Network (SIGN)
21. British Trauma Society	46. TRanslating Emergency Knowledge for Kids
22. Canadian Institutes for Health Information Canadian Pediatric Society	47. Trauma Association of Canada
23. Canadian Paediatric Society	48. Trauma Audit Research Network
24. Canadian Association of Emergency Physicians	49. Trauma.org
25. Choosing Wisely	50. Western Trauma Association
	51. World Health Organization

Table 2. Search strategy for PubMed (September 13<sup>th</sup>, 2021)

Concepts	PubMed search strategy	Research	# 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
Pediatric (controlled vocabulary)	adolescent[MeSH] OR "Child"[Mesh] OR "Infant"[Mesh] OR "Pediatrics"[Mesh]	#4	3,748,622
Pediatric (free text)	adolescen*[TIAB] OR baby[TIAB] OR babies*[TIAB] OR boy[TIAB] OR boys[TIAB] OR child*[TIAB] OR girl*[TIAB] OR infan*[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 pediatric	#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 "Craniocerebral 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	8,358

## References

1. Parachute. The cost of injury in Canada: Parachute: Toronto, ON; 2015 [Available from: [http://www.parachutecanada.org/downloads/research/Cost\\_of\\_Injury-2015.pdf](http://www.parachutecanada.org/downloads/research/Cost_of_Injury-2015.pdf).
2. Committee On Pediatric Emergency Medicine, Council On Injury Violence, Poison Prevention, *et al.* Management of Pediatric Trauma. *Pediatrics* 2016;**138**(2) doi: 10.1542/peds.2016-1569 [published Online First: 2016/07/28]
3. Lumba-Brown A, Yeates KO, Sarmiento K, *et al.* Centers for Disease Control and Prevention Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children. *JAMA Pediatr* 2018;**172**(11):e182853. doi: 10.1001/jamapediatrics.2018.2853 [published Online First: 2018/09/08]
4. K. Kellie Leitch. Reaching for the Top: A Report by the Advisor on Healthy Children and Youth [Health Canada] 2007 [Available from: [https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hl-vs/alt\\_formats/hpb-dgps/pdf/child-enfant/2007-advisor-conseillere/advisor-conseillere-eng.pdf](https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hl-vs/alt_formats/hpb-dgps/pdf/child-enfant/2007-advisor-conseillere/advisor-conseillere-eng.pdf) accessed May 13th 2020.
5. UNICEF. World report on child injury prevention 2008 [Available from: [https://www.who.int/violence\\_injury\\_prevention/child/injury/world\\_report/en/](https://www.who.int/violence_injury_prevention/child/injury/world_report/en/) accessed May 13th 2020.
6. Stelfox HT, Bobranska-Artiuch B, Nathens A, *et al.* A systematic review of quality indicators for evaluating pediatric trauma care. *Crit Care Med* 2010;**38**(4):1187-96. doi: 10.1097/CCM.0b013e3181d455fe [published Online First: 2010/02/16]
7. Ryan MA. Adherence to Clinical Practice Guidelines. *Otolaryngol Head Neck Surg* 2017;**157**(4):548-50. doi: 10.1177/0194599817718822 [published Online First: 2017/07/12]
8. Johnston A, Kelly SE, Hsieh SC, *et al.* Systematic reviews of clinical practice guidelines: a methodological guide. *J Clin Epidemiol* 2019;**108**:64-76. doi: 10.1016/j.jclinepi.2018.11.030 [published Online First: 2018/12/12]
9. Higgins J, Thomas J, Chandler J, *et al.* Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane, 2021.
10. Moher D, Shamseer L, Clarke M, *et al.* Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;**4**:1. doi: 10.1186/2046-4053-4-1 [published Online First: 2015/01/03]
11. Institute of Medicine Committee on Standards for Developing Trustworthy Clinical Practice G. Clinical Practice Guidelines We Can Trust. Washington (DC): National Academies Press (US) Copyright 2011 by the National Academy of Sciences. All rights reserved. 2011.
12. McGowan J, Sampson M, Salzwedel DM, *et al.* PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *J Clin Epidemiol* 2016;**75**:40-6. doi: 10.1016/j.jclinepi.2016.01.021 [published Online First: 2016/03/24]
13. Babl FE, Tavender E, Ballard DW, *et al.* Australian and New Zealand Guideline for Mild to Moderate Head Injuries in Children. *Emerg Med Australas* 2021;**33**(2):214-31. doi: 10.1111/1742-6723.13722 [published Online First: 2021/02/03]
14. Kochanek PM, Tasker RC, Carney N, *et al.* Guidelines for the Management of Pediatric Severe Traumatic Brain Injury, Third Edition: Update of the Brain Trauma Foundation Guidelines. *Pediatr Crit Care Med* 2019;**20**(3S Suppl 1):S1-S82. doi: 10.1097/PCC.0000000000001735 [published Online First: 2019/03/05]

- 1  
2  
3 15. Da Dalt L, Parri N, Amigoni A, *et al.* Italian guidelines on the assessment and  
4 management of pediatric head injury in the emergency department. *Ital J Pediatr*  
5 2018;**44**(1):7. doi: 10.1186/s13052-017-0442-0 [published Online First: 2018/01/18]  
6  
7 16. Chung S, Mikrogianakis A, Wales PW, *et al.* Trauma association of Canada Pediatric  
8 Subcommittee National Pediatric Cervical Spine Evaluation Pathway: consensus  
9 guidelines. *J Trauma* 2011;**70**(4):873-84. doi: 10.1097/TA.0b013e3182108823 [published  
10 Online First: 2011/05/26]  
11  
12 17. Brouwers MC, Kho ME, Browman GP, *et al.* AGREE II: advancing guideline  
13 development, reporting and evaluation in health care. *CMAJ* 2010;**182**(18):E839-42. doi:  
14 10.1503/cmaj.090449 [published Online First: 2010/07/07]  
15  
16 18. Brouwers MC, Spithoff K, Kerkvliet K, *et al.* Development and Validation of a Tool  
17 to Assess the Quality of Clinical Practice Guideline Recommendations. *JAMA Netw Open*  
18 2020;**3**(5):e205535. doi: 10.1001/jamanetworkopen.2020.5535 [published Online First:  
19 2020/05/28]  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60



## PRISMA-P 2015 Checklist

This checklist has been adapted for use with protocol submissions to *Systematic Reviews* from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	X		P. 1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such		X	NA
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	X		P. 3
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	X		P.1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	X		P. 7
<b>Amendments</b>	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments		X	NA
Sources	5a	Indicate sources of financial or other support for the review	X		P. 7
Sponsor	5b	Provide name for the review funder and/or sponsor	X		P. 7
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	X		P. 7
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	X		P.2
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	X		P. 3
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for	X		P. 3

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
		eligibility for the review			
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	X		P. 4
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	X		P. 4, Table 2
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	X		P. 4
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	X		P. 4
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	X		P. 5
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	X		P. 4
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	X		P. 4
<b>Risk of bias in individual studies</b>	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	X		P. 5
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized		X	NA
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau)		X	NA
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)		X	NA
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	X		P. 5-6
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)		X	NA
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	X		P. 5-6

# BMJ Open

## CLINICAL PRACTICE GUIDELINE RECOMMENDATIONS FOR PEDIATRIC INJURY CARE: protocol for A SYSTEMATIC REVIEW

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-060054.R1
Article Type:	Protocol
Date Submitted by the Author:	04-Mar-2022
Complete List of Authors:	<p>Moore, Lynne; Centre de recherche du CHU de Québec-Université Laval; Université Laval Faculté de médecine, Department of Social and Preventative Medicine, Université Laval, Québec, Québec, Canada</p> <p>Freire, Gabrielle; University of Toronto Faculty of Medicine, Department of Paediatrics, Division of Emergency Medicine, University of Toronto, Toronto, Canada</p> <p>Ben Abdeljelil, Anis; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Berube, Melanie; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval, Faculty of Nursing, Université Laval, Québec City, Québec, Canada</p> <p>Tardif, Pier-Alexandre; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Gnanvi, Eunice; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Stelfox, Henry; University of Calgary, Departments of Critical Care Medicine, Medicine and Community Health Sciences, O'Brien Institute for Public Health, University of Calgary</p> <p>Beaudin, Marianne; Université de Montréal, Sainte-Justine Hospital, Department of Paediatric Surgery, Université de Montréal, Montréal, Québec, Canada</p> <p>Carsen, Sasha; Children's Hospital of Eastern Ontario, Division of Orthopaedic Surgery, Children's Hospital of Eastern Ontario (CHEO), Ottawa, Ontario, Canada</p> <p>Stang, Antonia; University of Calgary, Pediatrics, Emergency Medicine, and Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada</p>

	<p>Beno, Suzanne; University of Toronto, Division of Emergency Medicine, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada</p> <p>Weiss, Matthew; CHU de Québec-Université Laval, Pediatric Intensivist, Centre Mère-Enfant Soleil du CHU de Québec, Transplant Québec, Québec, Québec, Canada</p> <p>Labrosse, Melanie; Université de Montréal, Department of Pediatrics, Division of Emergency Medicine, CHU Sainte-Justine, Université de Montréal, Montréal, Quebec, Canada</p> <p>Zemek, Roger; Children's Hospital of Eastern Ontario, Department of Pediatrics, Children's Hospital of Eastern Ontario, Ottawa, Canada</p> <p>Gagnon, Isabelle; Montreal Children's Hospital, Division of Pediatric Emergency Medicine, McGill University Health Centre, Montreal Children's Hospital, Montréal, Quebec, Canada</p> <p>Beaulieu, Emilie; Université Laval Faculté de médecine, Département de pédiatrie, Faculté de médecine, Centre Hospitalier Universitaire de Québec-Université Laval, Quebec City, Quebec, Canada</p> <p>Berthelot, Simon; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Klassen, Terry; University of Manitoba, George &amp; Fay Yee Centre for Health Care Innovation, Children's Hospital Research Institute of Manitoba, Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, Manitoba, Canada</p> <p>Turgeon, Alexis; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval Faculté de médecine, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada</p> <p>Lauzier, François; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval Faculté de médecine, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada</p> <p>Pike, Ian; The University of British Columbia, Department of Pediatrics, University of British Columbia, BC Injury Research and Prevention Unit, Vancouver, British Columbia, Canada</p> <p>Macpherson, Alison; York University, Faculty of Health, York University, Toronto, Ontario</p> <p>Gabbe, Belinda; Monash University, School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia</p> <p>Yanchar, Natalie; University of Calgary, Department of Surgery, University of Calgary, Calgary, Canada</p>
<b>Primary Subject Heading</b>:	Evidence based practice
Secondary Subject Heading:	Epidemiology, Paediatrics
Keywords:	TRAUMA MANAGEMENT, EPIDEMIOLOGY, PAEDIATRIC SURGERY, PAEDIATRICS

SCHOLARONE™  
Manuscripts

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## CLINICAL PRACTICE GUIDELINE RECOMMENDATIONS FOR PEDIATRIC INJURY CARE: PROTOCOL FOR A SYSTEMATIC REVIEW

Lynne Moore PhD<sup>1,2</sup>, Gabrielle Freire MD MSc<sup>3</sup>, Anis Ben Abdel BPharm MSc<sup>1</sup>, Mélanie Bérubé PRN, PhD<sup>1,4</sup>, Pier-Alexandre Tardif MA MSc<sup>1</sup>, Eunice Gnanvi MSc<sup>1</sup>, Henry T Stelfox MD MSc<sup>5</sup>, Marianne Beaudin MD MSc MPH<sup>6</sup>, Sasha Carsen MD, MBA, FRCSC<sup>7</sup>, Antonia Stang MD MSc<sup>8</sup>, Suzanne Beno DABP MD<sup>9</sup>, Matthew Weiss MD MSc<sup>10</sup>, Melanie Labrosse MD PhD<sup>11</sup>, Roger Zemek MD FRCPC<sup>12</sup>, Isabelle J. Gagnon PT, PhD<sup>13</sup>, Emilie Beaulieu MD MPH<sup>14</sup>, Simon Berthelot MD MSc<sup>1</sup>, Terry Klassen MD MSc<sup>15</sup>, Alexis F Turgeon MD MSc<sup>1,2,16</sup>, François Lauzier MD MSc<sup>1,2,16</sup>, Ian Pike PhD<sup>17</sup>, Alison Macpherson PhD<sup>18</sup>, Belinda Gabbe PhD<sup>19</sup>, Natalie Yanchar MD MSc<sup>20</sup>

<sup>1</sup>Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada

<sup>2</sup>Department of Social and Preventative Medicine, Université Laval, Québec, Québec, Canada

<sup>3</sup>Department of Paediatrics, Division of Emergency Medicine, University of Toronto, Toronto, Canada

<sup>4</sup>Faculty of Nursing, Université Laval, Québec City, Québec, Canada

<sup>5</sup>Departments of Critical Care Medicine, Medicine and Community Health Sciences, O'Brien Institute for Public Health, University of Calgary

<sup>6</sup>Sainte-Justine Hospital, Department of Paediatric Surgery, Université de Montréal, Montréal, Québec, Canada

<sup>7</sup>Division of Orthopaedic Surgery, Children's Hospital of Eastern Ontario (CHEO), Ottawa, Ontario, Canada

<sup>8</sup>Pediatrics, Emergency Medicine, and Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada

<sup>9</sup>Division of Emergency Medicine, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada

<sup>10</sup>Pediatric Intensivist, Centre Mère-Enfant Soleil du CHU de Québec, Transplant Québec, Quebec, Québec, Canada

<sup>11</sup>Department of Pediatrics, Division of Emergency Medicine, CHU Sainte-Justine, Université de Montréal, Montréal, Quebec, Canada

<sup>12</sup>Department of Pediatrics, Children's Hospital of Eastern Ontario, Ottawa, Canada

<sup>13</sup>Division of Pediatric Emergency Medicine, McGill University Health Centre, Montreal Children's Hospital, Montréal, Quebec, Canada

<sup>14</sup>Département de pédiatrie, Faculté de médecine, Centre Hospitalier Universitaire de Québec-Université Laval, Quebec City, Quebec, Canada

<sup>15</sup>George & Fay Yee Centre for Health Care Innovation, Children's Hospital Research Institute of Manitoba, Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, Manitoba, Canada

<sup>16</sup>Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada

<sup>17</sup>Department of Pediatrics, University of British Columbia, BC Injury Research and Prevention Unit, Vancouver, British Columbia, Canada

<sup>18</sup>Faculty of Health, York University, Toronto, Ontario

<sup>19</sup>School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

<sup>20</sup>Department of Surgery, University of Calgary, Calgary, Canada

**Corresponding author:**

Lynne Moore

CHU de Québec Research Center (Enfant-Jésus Hospital)

Axe Santé des Populations et Pratiques Optimales en Santé (Population Health and Optimal Health Practices Research Unit), Traumatologie – Urgence - Soins intensifs (Trauma – Emergency – Critical Care Medicine)

1401, 18e rue, local H-012a, Québec (Québec), G1J 1Z4

Tel. 418-649-0252 #3366

Fax: 418-649-5733

Email: lynne.moore@fmed.ulaval.ca

## ABSTRACT

**Introduction:** Evidence suggests the presence of deficiencies in the quality of care provided to up to half of all pediatric trauma patients in Canada, the US 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 pediatric injury care and appraise their quality.

**Methods and analysis:** We will identify CPG recommendations through a comprehensive search strategy including Medline, Embase, Cochrane library, Web of Science, ClinicalTrials and websites of organisations publishing recommendations on pediatric injury care. We will consider CPGs including at least one recommendation targeting pediatric 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. 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 AGREE II and AGREE-REX instruments respectively. We will synthesize evidence on recommendations using the 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 evaluate the quality of CPGs and their recommendations
- Our search strategy is not designed to identify CPGs that do not specifically target pediatric injury care populations
- We will review CPGs from low and middle income countries in future work



## INTRODUCTION

Injury is the condition that causes the greatest burden of morbidity and mortality for children in most high-income countries.<sup>1</sup> In the US, the child mortality rate due to injury increased by 12% between 2013 and 2016<sup>2</sup> and according to a 2016 report, more than 7% of children suffer a significant head injury before the age of 17.<sup>3</sup> In Canada, 900 children and adolescents die and 35,000 are hospitalised yearly following injury, with costs of over \$4 billion.<sup>4</sup> 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,<sup>5</sup> Canada and the US were respectively ranked 29<sup>th</sup> and 36<sup>th</sup> out of 40 affluent nations for protecting the well-being of children and injuries were cited as the #1 threat to that well-being.

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

## METHODS

Our research question was formulated using the PICAR (Population; Intervention(s); Comparator(s), Comparison(s), and (key) Content; Attributes of eligible CPGs; and Recommendation characteristics) framework<sup>8</sup> in collaboration with our interdisciplinary and intersectorial project advisory committee comprising 12 Canadian pediatric injury care clinicians (pre-hospital, emergency medicine, trauma surgery, neurosurgery, orthopedics, critical care, nursing, and rehabilitation specialties), 3 pediatric trauma program medical directors (MaB, NY, SuB), and 2 trauma accreditation agency representatives. This protocol was developed using methodological guidelines for systematic reviews of CPGs<sup>8</sup>

1  
2  
3 and Cochrane guidelines on systematic reviews<sup>9</sup> and is reported according to the Preferred  
4 reporting items for systematic review and meta-analysis protocols (PRISMA-P)  
5 statement.<sup>10</sup> The protocol has been submitted to the International Prospective Register of  
6 Systematic Reviews (PROSPERO) and is under revision.  
7  
8  
9

10  
11  
12 **Patient and public involvement:** Patients and/or the public were not involved in the  
13 design, or conduct, or reporting, or dissemination plans of this research.  
14

### 15 16 **Eligibility**

17 We will consider CPGs including at least one recommendation (R) targeting pediatric  
18 injury populations (P) on any diagnostic or therapeutic intervention from the acute phase  
19 of care (I) with any comparator (C) developed in high-income countries in the last 15 years  
20 (A). CPGs are defined as ‘statements that include recommendations intended to optimize  
21 patient care that are informed by systematic review of evidence and an assessment of  
22 benefits and harms of alternative care options’.<sup>11</sup> Pediatric injury populations are defined  
23 as children <19 years of age seen in the emergency department (ED) or admitted to hospital  
24 following injury. We will also consider CPGs that target injury care for all ages if they  
25 include at least one recommendation specific to children as well as CPGs on pediatric  
26 healthcare if they include at least one recommendation specific to acute injury care. We  
27 will exclude CPGs exclusively pertaining to burns, poisoning, foreign body ingestion, late  
28 effects of injury or drowning. Finally, we will exclude publications reporting data on the  
29 implementation of or adherence to CPGs published previously but will use them to identify  
30 any additional CPGs.  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42

### 43 44 **Search strategy**

45 We will systematically search Medical Literature Analysis and Retrieval System Online  
46 (MEDLINE), Excerpta Medica dataBASE (EMBASE), Cochrane library, Web of Science,  
47 and ClinicalTrials from 2007 to a maximum of 6 months prior to publication. We will also  
48 search the websites of organisations publishing recommendations on pediatric injury care,  
49 established in consultation with our advisory committee (including injury guidelines for all  
50 age groups with specific recommendations for children and CPGs on pediatric healthcare  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 if they include at least one recommendation specific to acute injury care) described above  
4 (see Table 1 for a preliminary list).  
5  
6  
7

### 8 ***Search strategy***

9  
10 Our search strategy will be developed with an information specialist using the 2015 Peer  
11 Review of Electronic Search Strategies (PRESS) guideline statement.<sup>12</sup> Our search strategy  
12 will be developed using keywords covering combinations of search terms under the themes  
13 *pediatrics, injury* and *clinical practice guidelines*. MeSH (MEDLINE) or Emtree  
14 (EMBASE) will also be used when appropriate. The search strategy will then be adapted  
15 to other databases. Using a preliminary search strategy (Table 2), we have identified 8358  
16 citations, including all 4 sentinel articles identified *a priori*<sup>13-16</sup>.  
17  
18  
19  
20  
21  
22  
23

### 24 **Study selection**

25 We will manage citations using EndNote (version X9.3.3, New York City: Thomson  
26 Reuters, 2018) software. In the first phase, pairs of reviewers will independently screen  
27 titles and abstracts for eligibility. In the second phase, we will assess full texts to determine  
28 eligibility for final inclusion and record reasons for exclusion. In the third phase, we will  
29 assess the eligibility of recommendations within eligible CPGs. We will first pilot each  
30 phase on samples of 1500 citations until acceptable agreement is reached ( $\kappa > 0.8$ ). If  
31 duplicate CPGs are identified, we will only include the most recent version. For each GCP  
32 identified, we will locate the supporting documents (e.g. methodological details). Another  
33 reviewer will independently verify the completeness of each document set.  
34  
35  
36  
37  
38  
39  
40  
41  
42

### 43 **Data extraction**

44 We will develop a standard electronic data abstraction form and a detailed instruction  
45 manual. This form will be piloted on a representative sample of 5 publications. Pairs of  
46 reviewers with methodological and content expertise will independently extract data from  
47 eligible GCPs. For each recommendation within CPGs, we will extract information on the  
48 population, intervention, comparator, quality of evidence and strength of  
49 recommendations. We will contact the contributing authors if important information is  
50 missing or unclear.  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Quality

Two reviewers with content expertise will independently assess the quality of included CPGs using the AGREE II tool, which has six domains: scope and purpose, stakeholder involvement, rigour of development, clarity and presentation, applicability and editorial independence.<sup>17</sup> 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 six AGREE II domains, including domain 3 (rigor 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.<sup>18</sup> 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.

## Meta-synthesis of recommendations

We will synthesize evidence on recommendations using the 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 & 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; i.e. traumatic brain injury, spinal cord injury, thoracoabdominal, orthopaedic, and multisystem. CPGs from low and middle countries will be addressed in a separate review.

1  
2  
3 Discrepancies in all phases of the review will be resolved by initial review by a senior  
4 member of the research team (NY) followed by consensus among members of the  
5 intersectorial project advisory committee, when necessary.  
6  
7  
8  
9

### 10 **Limitations of study**

11 For feasibility reasons, our search strategy was not developed to systematically identify  
12 CPGs that do not specifically target pediatric injury populations. Thus, we may miss  
13 recommendations on pediatric injury care if they are included in CPGs that target general  
14 pediatric populations (e.g. ED or ICU populations) or trauma populations of all ages if no  
15 keywords relating to pediatrics and injury are present in the title or abstract. However, these  
16 recommendations are likely to be identified by consulting professional organisation  
17 websites listed by research team members (Table 1). In addition, the injury keywords in  
18 the research strategy are exhaustive and our goal is to synthesize recommendations specific  
19 to children rather than recommendations for adults applied to children.  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30

### 31 **ETHICS AND DISSEMINATION**

32 Research ethics approval is not required as it is a secondary analysis of published data.  
33 Results of our study will be disseminated in a peer-reviewed journal, international scientific  
34 meetings, and an accessible synthesis will be distributed to healthcare providers through  
35 clinical and healthcare quality associations.  
36  
37  
38  
39  
40

41 **Contributors:** LM, GF, ABA, MB, PAT, EG, HTS, MBe, SC, AS, SB, MW, ML, RZ, IJG, EB,  
42 SB, TK, AFT, FL, IP, AM, BG, and NY were involved in conceiving and designing the  
43 protocol. LM and PAT drafted the manuscript. LM, GF, ABA, MB, PAT, EG, HTS, MBe, SC,  
44 AS, SB, MW, ML, RZ, IJG, EB, SB, TK, AFT, FL, IP, AM, BG, and NY read, revised and  
45 approved the final manuscript.  
46

47 **Funding:** This work was supported by Canadian Institutes of Health Research grant  
48 number 461381. The funder had no role in developing the protocol.  
49

50  
51 **Competing interests:** None declared.  
52

53 **Provenance and peer review:** Not commissioned; externally peer reviewed.  
54  
55  
56  
57  
58  
59  
60

Table 1. Preliminary list of organisations publishing recommendations on pediatric injury care

1. Pediatric Emergency Care Applied Research Network	26. Eastern Association for the Surgery of Trauma
2. Pediatric Emergency Research Canada	27. European Society of Anesthesiology
3. Agency for Healthcare Research and Quality	28. International Association for Trauma Surgery and Intensive Care
4. Accreditation Canada	29. International guidelines for skeletal survey imaging
5. American Academy of Orthopedic Surgeons	30. International Trauma Anesthesia and Critical Care Society
6. American Academy of Pediatrics	31. National Association for Healthcare Quality
7. American Association for the Surgery of Trauma	32. National Emergency Medical Services
8. American Association of Neurological Surgeons/Congress of Neurological Surgeons	33. National Guidelines Clearinghouse
9. American Board of Orthopedic Surgery	34. National Institute of Health and Care Excellence
10. American College of radiology	35. National Quality Forum
11. American College of Surgeons	36. Orthopedic Trauma Association
12. American College of Emergency Physicians	37. Pediatric Critical Care Transfusion and Anemia Expertise Initiative
13. American Heart Association pediatric guidelines	38. Pediatric Health Information System database
14. American Pediatric Surgical Association	39. Pediatric Orthopaedic Society of North America
15. American Trauma Society	40. Pediatric Trauma Society
16. Australasian Trauma Society	41. Royal college of Radiologists (paediatric trauma protocols)
17. Australasian Association for Quality in Healthcare	42. Royal College of Paediatrics and Child Health
18. Brain Trauma Foundation	43. Society for Pediatric Radiology (Child Abuse Imaging Committee)
19. British Orthopaedic Association (standards for trauma)	44. Society of Trauma Nurses
20. British Society of Children's Orthopaedic Surgery	45. Scottish Intercollegiate Guidelines Network (SIGN)
21. British Trauma Society	46. TRanslating Emergency Knowledge for Kids
22. Canadian Institutes for Health Information Canadian Pediatric Society	47. Trauma Association of Canada
23. Canadian Paediatric Society	48. Trauma Audit Research Network
24. Canadian Association of Emergency Physicians	49. Trauma.org
25. Choosing Wisely	50. Western Trauma Association
	51. World Health Organization

Table 2. Search strategy for PubMed (September 13<sup>th</sup>, 2021)

Concepts	PubMed search strategy	Research	# 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
Pediatric (controlled vocabulary)	adolescent[MeSH] OR "Child"[Mesh] OR "Infant"[Mesh] OR "Pediatrics"[Mesh]	#4	3,748,622
Pediatric (free text)	adolescen*[TIAB] OR baby[TIAB] OR babies*[TIAB] OR boy[TIAB] OR boys[TIAB] OR child*[TIAB] OR girl*[TIAB] OR infan*[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 pediatric	#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 "Craniocerebral 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	8,358



## References

1. Parachute. The cost of injury in Canada: Parachute: Toronto, ON; 2015 [Available from: [http://www.parachutecanada.org/downloads/research/Cost\\_of\\_Injury-2015.pdf](http://www.parachutecanada.org/downloads/research/Cost_of_Injury-2015.pdf).
2. Committee On Pediatric Emergency Medicine, Council On Injury Violence, Poison Prevention, *et al.* Management of Pediatric Trauma. *Pediatrics* 2016;**138**(2) doi: 10.1542/peds.2016-1569 [published Online First: 2016/07/28]
3. Lumba-Brown A, Yeates KO, Sarmiento K, *et al.* Centers for Disease Control and Prevention Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children. *JAMA Pediatr* 2018;**172**(11):e182853. doi: 10.1001/jamapediatrics.2018.2853 [published Online First: 2018/09/08]
4. K. Kellie Leitch. Reaching for the Top: A Report by the Advisor on Healthy Children and Youth [Health Canada] 2007 [Available from: [https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hl-vs/alt\\_formats/hpb-dgps/pdf/child-enfant/2007-advisor-conseillere/advisor-conseillere-eng.pdf](https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hl-vs/alt_formats/hpb-dgps/pdf/child-enfant/2007-advisor-conseillere/advisor-conseillere-eng.pdf) accessed May 13th 2020.
5. UNICEF. World report on child injury prevention 2008 [Available from: [https://www.who.int/violence\\_injury\\_prevention/child/injury/world\\_report/en/](https://www.who.int/violence_injury_prevention/child/injury/world_report/en/) accessed May 13th 2020.
6. Stelfox HT, Bobranska-Artiuch B, Nathens A, *et al.* A systematic review of quality indicators for evaluating pediatric trauma care. *Crit Care Med* 2010;**38**(4):1187-96. doi: 10.1097/CCM.0b013e3181d455fe [published Online First: 2010/02/16]
7. Ryan MA. Adherence to Clinical Practice Guidelines. *Otolaryngol Head Neck Surg* 2017;**157**(4):548-50. doi: 10.1177/0194599817718822 [published Online First: 2017/07/12]
8. Johnston A, Kelly SE, Hsieh SC, *et al.* Systematic reviews of clinical practice guidelines: a methodological guide. *J Clin Epidemiol* 2019;**108**:64-76. doi: 10.1016/j.jclinepi.2018.11.030 [published Online First: 2018/12/12]
9. Higgins J, Thomas J, Chandler J, *et al.* Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane, 2021.
10. Moher D, Shamseer L, Clarke M, *et al.* Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;**4**:1. doi: 10.1186/2046-4053-4-1 [published Online First: 2015/01/03]
11. Institute of Medicine Committee on Standards for Developing Trustworthy Clinical Practice G. Clinical Practice Guidelines We Can Trust. Washington (DC): National Academies Press (US) Copyright 2011 by the National Academy of Sciences. All rights reserved. 2011.
12. McGowan J, Sampson M, Salzwedel DM, *et al.* PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *J Clin Epidemiol* 2016;**75**:40-6. doi: 10.1016/j.jclinepi.2016.01.021 [published Online First: 2016/03/24]
13. Babl FE, Tavender E, Ballard DW, *et al.* Australian and New Zealand Guideline for Mild to Moderate Head Injuries in Children. *Emerg Med Australas* 2021;**33**(2):214-31. doi: 10.1111/1742-6723.13722 [published Online First: 2021/02/03]
14. Kochanek PM, Tasker RC, Carney N, *et al.* Guidelines for the Management of Pediatric Severe Traumatic Brain Injury, Third Edition: Update of the Brain Trauma Foundation Guidelines. *Pediatr Crit Care Med* 2019;**20**(3S Suppl 1):S1-S82. doi: 10.1097/PCC.0000000000001735 [published Online First: 2019/03/05]



- 1  
2  
3 15. Da Dalt L, Parri N, Amigoni A, *et al.* Italian guidelines on the assessment and  
4 management of pediatric head injury in the emergency department. *Ital J Pediatr*  
5 2018;**44**(1):7. doi: 10.1186/s13052-017-0442-0 [published Online First: 2018/01/18]  
6  
7 16. Chung S, Mikrogianakis A, Wales PW, *et al.* Trauma association of Canada Pediatric  
8 Subcommittee National Pediatric Cervical Spine Evaluation Pathway: consensus  
9 guidelines. *J Trauma* 2011;**70**(4):873-84. doi: 10.1097/TA.0b013e3182108823 [published  
10 Online First: 2011/05/26]  
11  
12 17. Brouwers MC, Kho ME, Browman GP, *et al.* AGREE II: advancing guideline  
13 development, reporting and evaluation in health care. *CMAJ* 2010;**182**(18):E839-42. doi:  
14 10.1503/cmaj.090449 [published Online First: 2010/07/07]  
15  
16 18. Brouwers MC, Spithoff K, Kerkvliet K, *et al.* Development and Validation of a Tool  
17 to Assess the Quality of Clinical Practice Guideline Recommendations. *JAMA Netw Open*  
18 2020;**3**(5):e205535. doi: 10.1001/jamanetworkopen.2020.5535 [published Online First:  
19 2020/05/28]  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## PRISMA-P 2015 Checklist

This checklist has been adapted for use with protocol submissions to *Systematic Reviews* from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	X		P. 1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such		X	NA
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	X		P. 3
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	X		P.1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	X		P. 7
<b>Amendments</b>	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments		X	NA
Sources	5a	Indicate sources of financial or other support for the review	X		P. 7
Sponsor	5b	Provide name for the review funder and/or sponsor	X		P. 7
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	X		P. 7
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	X		P.2
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	X		P. 3
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for	X		P. 3

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
		eligibility for the review			
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	X		P. 4
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	X		P. 4, Table 2
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	X		P. 4
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	X		P. 4
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	X		P. 5
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	X		P. 4
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	X		P. 4
<b>Risk of bias in individual studies</b>	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	X		P. 5
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized		X	NA
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau)		X	NA
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)		X	NA
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	X		P. 5-6
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)		X	NA
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	X		P. 5-6

# BMJ Open

## CLINICAL PRACTICE GUIDELINE RECOMMENDATIONS FOR PEDIATRIC INJURY CARE: protocol for A SYSTEMATIC REVIEW

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2021-060054.R2
Article Type:	Protocol
Date Submitted by the Author:	01-Apr-2022
Complete List of Authors:	<p>Moore, Lynne; Centre de recherche du CHU de Québec-Université Laval; Université Laval Faculté de médecine, Department of Social and Preventative Medicine, Université Laval, Québec, Québec, Canada</p> <p>Freire, Gabrielle; University of Toronto Faculty of Medicine, Department of Paediatrics, Division of Emergency Medicine, University of Toronto, Toronto, Canada</p> <p>Ben Abdeljelil, Anis; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Berube, Melanie; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval, Faculty of Nursing, Université Laval, Québec City, Québec, Canada</p> <p>Tardif, Pier-Alexandre; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Gnanvi, Eunice; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Stelfox, Henry; University of Calgary, Departments of Critical Care Medicine, Medicine and Community Health Sciences, O'Brien Institute for Public Health, University of Calgary</p> <p>Beaudin, Marianne; Université de Montréal, Sainte-Justine Hospital, Department of Paediatric Surgery, Université de Montréal, Montréal, Québec, Canada</p> <p>Carsen, Sasha; Children's Hospital of Eastern Ontario, Division of Orthopaedic Surgery, Children's Hospital of Eastern Ontario (CHEO), Ottawa, Ontario, Canada</p> <p>Stang, Antonia; University of Calgary, Pediatrics, Emergency Medicine, and Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada</p>

	<p>Beno, Suzanne; University of Toronto, Division of Emergency Medicine, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada</p> <p>Weiss, Matthew; CHU de Québec-Université Laval, Pediatric Intensivist, Centre Mère-Enfant Soleil du CHU de Québec, Transplant Québec, Québec, Québec, Canada</p> <p>Labrosse, Melanie; Université de Montréal, Department of Pediatrics, Division of Emergency Medicine, CHU Sainte-Justine, Université de Montréal, Montréal, Quebec, Canada</p> <p>Zemek, Roger; Children's Hospital of Eastern Ontario, Department of Pediatrics, Children's Hospital of Eastern Ontario, Ottawa, Canada</p> <p>Gagnon, Isabelle; Montreal Children's Hospital, Division of Pediatric Emergency Medicine, McGill University Health Centre, Montreal Children's Hospital, Montréal, Quebec, Canada</p> <p>Beaulieu, Emilie; Université Laval Faculté de médecine, Département de pédiatrie, Faculté de médecine, Centre Hospitalier Universitaire de Québec-Université Laval, Québec City, Quebec, Canada</p> <p>Berthelot, Simon; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada</p> <p>Klassen, Terry; University of Manitoba, George &amp; Fay Yee Centre for Health Care Innovation, Children's Hospital Research Institute of Manitoba, Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, Manitoba, Canada</p> <p>Turgeon, Alexis; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval Faculté de médecine, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada</p> <p>Lauzier, François; Centre de recherche du CHU de Québec-Université Laval, Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada; Université Laval Faculté de médecine, Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada</p> <p>Pike, Ian; The University of British Columbia, Department of Pediatrics, University of British Columbia, BC Injury Research and Prevention Unit, Vancouver, British Columbia, Canada</p> <p>Macpherson, Alison; York University, Faculty of Health, York University, Toronto, Ontario</p> <p>Gabbe, Belinda; Monash University, School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia</p> <p>Yanchar, Natalie; University of Calgary, Department of Surgery, University of Calgary, Calgary, Canada</p>
<b>Primary Subject Heading</b>:	Evidence based practice
Secondary Subject Heading:	Epidemiology, Paediatrics
Keywords:	TRAUMA MANAGEMENT, EPIDEMIOLOGY, PAEDIATRIC SURGERY, PAEDIATRICS



1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## CLINICAL PRACTICE GUIDELINE RECOMMENDATIONS FOR PEDIATRIC INJURY CARE: PROTOCOL FOR A SYSTEMATIC REVIEW

Lynne Moore PhD<sup>1,2</sup>, Gabrielle Freire MD MSc<sup>3</sup>, Anis Ben Abdel BPharm MSc<sup>1</sup>, Mélanie Bérubé PRN, PhD<sup>1,4</sup>, Pier-Alexandre Tardif MA MSc<sup>1</sup>, Eunice Gnanvi MSc<sup>1</sup>, Henry T Stelfox MD MSc<sup>5</sup>, Marianne Beaudin MD MSc MPH<sup>6</sup>, Sasha Carsen MD, MBA, FRCSC<sup>7</sup>, Antonia Stang MD MSc<sup>8</sup>, Suzanne Beno DABP MD<sup>9</sup>, Matthew Weiss MD MSc<sup>10</sup>, Melanie Labrosse MD PhD<sup>11</sup>, Roger Zemek MD FRCPC<sup>12</sup>, Isabelle J. Gagnon PT, PhD<sup>13</sup>, Emilie Beaulieu MD MPH<sup>14</sup>, Simon Berthelot MD MSc<sup>1</sup>, Terry Klassen MD MSc<sup>15</sup>, Alexis F Turgeon MD MSc<sup>1,2,16</sup>, François Lauzier MD MSc<sup>1,2,16</sup>, Ian Pike PhD<sup>17</sup>, Alison Macpherson PhD<sup>18</sup>, Belinda Gabbe PhD<sup>19</sup>, Natalie Yanchar MD MSc<sup>20</sup>

<sup>1</sup>Population Health and Optimal Health Practices Research Unit, Trauma – Emergency – Critical Care Medicine, Centre de Recherche du CHU de Québec – Université Laval (Hôpital de l'Enfant-Jésus), Québec City, Québec, Canada

<sup>2</sup>Department of Social and Preventative Medicine, Université Laval, Québec, Québec, Canada

<sup>3</sup>Department of Paediatrics, Division of Emergency Medicine, University of Toronto, Toronto, Canada

<sup>4</sup>Faculty of Nursing, Université Laval, Québec City, Québec, Canada

<sup>5</sup>Departments of Critical Care Medicine, Medicine and Community Health Sciences, O'Brien Institute for Public Health, University of Calgary

<sup>6</sup>Sainte-Justine Hospital, Department of Paediatric Surgery, Université de Montréal, Montréal, Québec, Canada

<sup>7</sup>Division of Orthopaedic Surgery, Children's Hospital of Eastern Ontario (CHEO), Ottawa, Ontario, Canada

<sup>8</sup>Pediatrics, Emergency Medicine, and Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Alberta, Canada

<sup>9</sup>Division of Emergency Medicine, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada

<sup>10</sup>Pediatric Intensivist, Centre Mère-Enfant Soleil du CHU de Québec, Transplant Québec, Quebec, Québec, Canada

<sup>11</sup>Department of Pediatrics, Division of Emergency Medicine, CHU Sainte-Justine, Université de Montréal, Montréal, Quebec, Canada

<sup>12</sup>Department of Pediatrics, Children's Hospital of Eastern Ontario, Ottawa, Canada

<sup>13</sup>Division of Pediatric Emergency Medicine, McGill University Health Centre, Montreal Children's Hospital, Montréal, Quebec, Canada

<sup>14</sup>Département de pédiatrie, Faculté de médecine, Centre Hospitalier Universitaire de Québec-Université Laval, Quebec City, Quebec, Canada

<sup>15</sup>George & Fay Yee Centre for Health Care Innovation, Children's Hospital Research Institute of Manitoba, Department of Pediatrics and Child Health, University of Manitoba, Winnipeg, Manitoba, Canada

<sup>16</sup>Department of Anesthesiology and Critical Care Medicine, Division of Critical Care Medicine, Université Laval, Québec City, Québec, Canada

<sup>17</sup>Department of Pediatrics, University of British Columbia, BC Injury Research and Prevention Unit, Vancouver, British Columbia, Canada

<sup>18</sup>Faculty of Health, York University, Toronto, Ontario

<sup>19</sup>School of Public Health and Preventive Medicine, Monash University, Melbourne, Victoria, Australia

<sup>20</sup>Department of Surgery, University of Calgary, Calgary, Canada

**Corresponding author:**

Lynne Moore

CHU de Québec Research Center (Enfant-Jésus Hospital)

Axe Santé des Populations et Pratiques Optimales en Santé (Population Health and Optimal Health Practices Research Unit), Traumatologie – Urgence - Soins intensifs (Trauma – Emergency – Critical Care Medicine)

1401, 18e rue, local H-012a, Québec (Québec), G1J 1Z4

Tel. 418-649-0252 #3366

Fax: 418-649-5733

Email: lynne.moore@fmed.ulaval.ca



## ABSTRACT

**Introduction:** Evidence suggests the presence of deficiencies in the quality of care provided to up to half of all pediatric trauma patients in Canada, the US 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 pediatric injury care and appraise their quality.

**Methods and analysis:** We will identify CPG recommendations through a comprehensive search strategy including Medline, Embase, Cochrane library, Web of Science, ClinicalTrials and websites of organisations publishing recommendations on pediatric injury care. We will consider CPGs including at least one recommendation targeting pediatric 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 AGREE II and AGREE-REX instruments respectively. We will synthesize evidence on recommendations using the 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 CPG recommendations using a recommendations matrix
- Our search strategy is not designed to identify CPGs that do not specifically target pediatric injury care populations
- CPGs from low 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.<sup>1</sup> In the US, the child mortality rate due to injury increased by 12% between 2013 and 2016<sup>2</sup> and according to a 2016 report, more than 7% of children suffer a significant head injury before the age of 17.<sup>3</sup> In Canada, 900 children and adolescents die and 35,000 are hospitalised yearly following injury, with costs of over \$4 billion.<sup>4</sup> 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,<sup>5</sup> Canada and the US were respectively ranked 29<sup>th</sup> and 36<sup>th</sup> out of 40 affluent nations for protecting the well-being of children and injuries were cited as the #1 threat to that well-being.

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

## METHODS

Our research question was formulated using the PICAR (Population; Intervention(s); Comparator(s), Comparison(s), and (key) Content; Attributes of eligible CPGs; and Recommendation characteristics) framework<sup>8</sup> in collaboration with our interdisciplinary and intersectorial project advisory committee comprising 12 Canadian pediatric injury care clinicians (pre-hospital, emergency medicine, trauma surgery, neurosurgery, orthopedics,

1  
2  
3 critical care, nursing, and rehabilitation specialties), 3 pediatric trauma program medical  
4 directors (MaB, NY, SuB), and 2 trauma accreditation agency representatives. This  
5 protocol was developed using methodological guidelines for systematic reviews of CPGs<sup>8</sup>  
6 and Cochrane guidelines on systematic reviews<sup>9</sup> and is reported according to the Preferred  
7 reporting items for systematic review and meta-analysis protocols (PRISMA-P)  
8 statement.<sup>10</sup> The protocol has been submitted to the International Prospective Register of  
9 Systematic Reviews (PROSPERO #CRD42021226934).

16  
17 **Patient and public involvement:** Patients and/or the public were not involved in the  
18 design, or conduct, or reporting, or dissemination plans of this research.

### 21 **Eligibility**

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

### 48 **Search strategy**

49 We will systematically search Medical Literature Analysis and Retrieval System Online  
50 (MEDLINE), Excerpta Medica dataBASE (EMBASE), Cochrane library, Web of Science,  
51 and ClinicalTrials from January 1<sup>st</sup>, 2007 to a maximum of 6 months prior to publication.  
52 We will also search the websites of organisations publishing recommendations on pediatric  
53  
54  
55  
56  
57  
58  
59

1  
2  
3 injury care, established in consultation with our advisory committee (including injury  
4 guidelines for all age groups with specific recommendations for children and CPGs on  
5 pediatric healthcare if they include at least one recommendation specific to acute injury  
6 care) described above (see Table 1 for a preliminary list).  
7  
8  
9

10  
11  
12 Our search strategy will be developed with an information specialist using the 2015 Peer  
13 Review of Electronic Search Strategies (PRESS) guideline statement.<sup>12</sup> Our search strategy  
14 will be developed using keywords covering combinations of search terms under the themes  
15 *pediatrics*, *injury* and *clinical practice guidelines*. MeSH (MEDLINE) or Emtree  
16 (EMBASE) will also be used when appropriate. The search strategy will then be adapted  
17 to other databases. Using a preliminary search strategy (from January 1<sup>st</sup>, 2007 to  
18 September 13<sup>th</sup>, 2021; Table 2), we have identified 8358 citations, including all 4 sentinel  
19 articles identified *a priori*<sup>13-16</sup>.  
20  
21  
22  
23  
24  
25  
26

### 27 **Study selection**

28  
29 We will manage citations using EndNote (version X9.3.3, New York City: Thomson  
30 Reuters, 2018) software. In the first phase, pairs of reviewers will independently screen  
31 titles and abstracts for eligibility. In the second phase, we will assess full texts to determine  
32 eligibility for final inclusion and record reasons for exclusion. In the third phase, we will  
33 assess the eligibility of recommendations within eligible CPGs. We will first pilot each  
34 phase on samples of 1500 citations until acceptable agreement is reached ( $\kappa > 0.8$ ). If  
35 duplicate CPGs are identified, we will only include the most recent version. For each CPG  
36 identified, we will locate the supporting documents (e.g. methodological details). Another  
37 reviewer will independently verify the completeness of each document set.  
38  
39  
40  
41  
42  
43  
44  
45

### 46 **Data extraction**

47  
48 We will develop a standard electronic data abstraction form and a detailed instruction  
49 manual. This form will be piloted on a representative sample of 5 publications. Pairs of  
50 reviewers with methodological and content expertise will independently extract data from  
51 eligible CPGs. For each recommendation within CPGs, we will extract information on the  
52 population, intervention, comparator, quality of evidence and strength of  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 recommendations. We will contact the contributing authors if important information is  
4 missing or unclear.  
5  
6

### 8 **Quality**

9  
10 Two reviewers with content expertise will independently assess the quality of included  
11 CPGs using the AGREE II tool, which has six domains: scope and purpose, stakeholder  
12 involvement, rigour of development, clarity and presentation, applicability and editorial  
13 independence.<sup>17</sup> Each domain with a score  $\geq 60\%$  will be considered effectively  
14 addressed. CPGs will be considered *high quality* if they score  $\geq 60\%$  in at least three of six  
15 AGREE II domains, including domain 3 (rigor of development). If three domains or more  
16 scored  $\geq 60\%$ , and domain 3 scored  $< 60\%$ , the CPG will be considered of *moderate quality*.  
17 CPGs scoring  $< 60\%$  in two or more domains and scoring  $< 50\%$  in domain 3 will be  
18 considered of *low quality*. Two content experts will then use the AGREE  
19 Recommendations Excellence (AGREE-REX) instrument to independently assess the  
20 clinical applicability and implementability of guideline recommendations.<sup>18</sup> AGREE-REX  
21 has nine items covering evidence, clinical applicability, values and preferences, and  
22 implementability. To ensure feasibility and timeliness of our review, if more than 10 CPGs  
23 are identified, we will apply AGREE-REX only to CPGs of moderate or high quality  
24 according to AGREE II.  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37

### 38 **Meta-synthesis of recommendations**

39 We will synthesize evidence on recommendations using the GRADE Evidence-to-  
40 Decision framework: the quality of CPGs from which recommendations were extracted  
41 (AGREE II), levels of evidence for benefits and harms, strength of recommendations,  
42 clinical applicability & implementability (AGREE-REX), and the number of times a  
43 recommendation appears in eligible CPGs. We will use these elements to develop a  
44 recommendations matrix that will be piloted on a random sample of CPG  
45 recommendations. Matrix data will then be extracted independently by pairs of reviewers  
46 for each recommendation. We will stratify the synthesis by injury type; i.e. traumatic brain  
47 injury, spinal cord injury, thoracoabdominal, orthopaedic, and multisystem. CPGs from  
48 low and middle countries will be addressed in a separate review.  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3  
4  
5 Discrepancies in all phases of the review will be resolved by initial review by a senior  
6 member of the research team (NY) followed by consensus among members of the  
7 intersectorial project advisory committee, when necessary.  
8  
9

### 10 11 12 **Limitations of study**

13 For feasibility reasons, our search strategy was not developed to systematically identify  
14 CPGs that do not specifically target pediatric injury populations. Thus, we may miss  
15 recommendations on pediatric injury care if they are included in CPGs that target general  
16 pediatric populations (e.g. ED or ICU populations) or trauma populations of all ages if no  
17 keywords relating to pediatrics and injury are present in the title or abstract. However, these  
18 recommendations are likely to be identified by consulting professional organisation  
19 websites listed by research team members (Table 1). In addition, the injury keywords in  
20 the research strategy are exhaustive and our goal is to synthesize recommendations specific  
21 to children rather than recommendations for adults applied to children.  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31

### 32 **ETHICS AND DISSEMINATION**

33 Research ethics approval is not required as it is a secondary analysis of published data.  
34 Results of our study will be disseminated in a peer-reviewed journal, international scientific  
35 meetings, and an accessible synthesis will be distributed to healthcare providers through  
36 clinical and healthcare quality associations.  
37  
38  
39  
40  
41

42 **Contributors:** LM, GF, ABA, MB, PAT, EG, HTS, MBe, SC, AS, SB, MW, ML, RZ, IJG, EB,  
43 SB, TK, AFT, FL, IP, AM, BG, and NY were involved in conceiving and designing the  
44 protocol. LM and PAT drafted the manuscript. LM, GF, ABA, MB, PAT, EG, HTS, MBe, SC,  
45 AS, SB, MW, ML, RZ, IJG, EB, SB, TK, AFT, FL, IP, AM, BG, and NY read, revised and  
46 approved the final manuscript.  
47  
48

49 **Funding:** This work was supported by Canadian Institutes of Health Research grant  
50 number 461381. The funder had no role in developing the protocol.  
51

52 **Competing interests:** None declared.  
53

54 **Provenance and peer review:** Not commissioned; externally peer reviewed.  
55  
56  
57  
58  
59  
60

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

For peer review only

Table 1. Preliminary list of organisations publishing recommendations on pediatric injury care

1. Pediatric Emergency Care Applied Research Network	26. Eastern Association for the Surgery of Trauma
2. Pediatric Emergency Research Canada	27. European Society of Anesthesiology
3. Agency for Healthcare Research and Quality	28. International Association for Trauma Surgery and Intensive Care
4. Accreditation Canada	29. International guidelines for skeletal survey imaging
5. American Academy of Orthopedic Surgeons	30. International Trauma Anesthesia and Critical Care Society
6. American Academy of Pediatrics	31. National Association for Healthcare Quality
7. American Association for the Surgery of Trauma	32. National Emergency Medical Services
8. American Association of Neurological Surgeons/Congress of Neurological Surgeons	33. National Guidelines Clearinghouse
9. American Board of Orthopedic Surgery	34. National Institute of Health and Care Excellence
10. American College of radiology	35. National Quality Forum
11. American College of Surgeons	36. Orthopedic Trauma Association
12. American College of Emergency Physicians	37. Pediatric Critical Care Transfusion and Anemia Expertise Initiative
13. American Heart Association pediatric guidelines	38. Pediatric Health Information System database
14. American Pediatric Surgical Association	39. Pediatric Orthopaedic Society of North America
15. American Trauma Society	40. Pediatric Trauma Society
16. Australasian Trauma Society	41. Royal college of Radiologists (paediatric trauma protocols)
17. Australasian Association for Quality in Healthcare	42. Royal College of Paediatrics and Child Health
18. Brain Trauma Foundation	43. Society for Pediatric Radiology (Child Abuse Imaging Committee)
19. British Orthopaedic Association (standards for trauma)	44. Society of Trauma Nurses
20. British Society of Children's Orthopaedic Surgery	45. Scottish Intercollegiate Guidelines Network (SIGN)
21. British Trauma Society	46. TRanslating Emergency Knowledge for Kids
22. Canadian Institutes for Health Information Canadian Pediatric Society	47. Trauma Association of Canada
23. Canadian Paediatric Society	48. Trauma Audit Research Network
24. Canadian Association of Emergency Physicians	49. Trauma.org
25. Choosing Wisely	50. Western Trauma Association
	51. World Health Organization



Table 2. Search strategy for PubMed (September 13<sup>th</sup>, 2021)

Concepts	PubMed search strategy	Research	# 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
Pediatric (controlled vocabulary)	adolescent[MeSH] OR "Child"[Mesh] OR "Infant"[Mesh] OR "Pediatrics"[Mesh]	#4	3,748,622
Pediatric (free text)	adolescen*[TIAB] OR baby[TIAB] OR babies*[TIAB] OR boy[TIAB] OR boys[TIAB] OR child*[TIAB] OR girl*[TIAB] OR infan*[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 pediatric	#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 "Craniocerebral 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	8,358

## References

1. Parachute. The cost of injury in Canada: Parachute: Toronto, ON; 2015 [Available from: [http://www.parachutecanada.org/downloads/research/Cost\\_of\\_Injury-2015.pdf](http://www.parachutecanada.org/downloads/research/Cost_of_Injury-2015.pdf).
2. Committee On Pediatric Emergency Medicine, Council On Injury Violence, Poison Prevention, *et al.* Management of Pediatric Trauma. *Pediatrics* 2016;**138**(2) doi: 10.1542/peds.2016-1569 [published Online First: 2016/07/28]
3. Lumba-Brown A, Yeates KO, Sarmiento K, *et al.* Centers for Disease Control and Prevention Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children. *JAMA Pediatr* 2018;**172**(11):e182853. doi: 10.1001/jamapediatrics.2018.2853 [published Online First: 2018/09/08]
4. K. Kellie Leitch. Reaching for the Top: A Report by the Advisor on Healthy Children and Youth [Health Canada] 2007 [Available from: [https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hl-vs/alt\\_formats/hpb-dgps/pdf/child-enfant/2007-advisor-conseillere/advisor-conseillere-eng.pdf](https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hl-vs/alt_formats/hpb-dgps/pdf/child-enfant/2007-advisor-conseillere/advisor-conseillere-eng.pdf) accessed May 13th 2020.
5. UNICEF. World report on child injury prevention 2008 [Available from: [https://www.who.int/violence\\_injury\\_prevention/child/injury/world\\_report/en/](https://www.who.int/violence_injury_prevention/child/injury/world_report/en/) accessed May 13th 2020.
6. Stelfox HT, Bobranska-Artiuch B, Nathens A, *et al.* A systematic review of quality indicators for evaluating pediatric trauma care. *Crit Care Med* 2010;**38**(4):1187-96. doi: 10.1097/CCM.0b013e3181d455fe [published Online First: 2010/02/16]
7. Ryan MA. Adherence to Clinical Practice Guidelines. *Otolaryngol Head Neck Surg* 2017;**157**(4):548-50. doi: 10.1177/0194599817718822 [published Online First: 2017/07/12]
8. Johnston A, Kelly SE, Hsieh SC, *et al.* Systematic reviews of clinical practice guidelines: a methodological guide. *J Clin Epidemiol* 2019;**108**:64-76. doi: 10.1016/j.jclinepi.2018.11.030 [published Online First: 2018/12/12]
9. Higgins J, Thomas J, Chandler J, *et al.* Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021). Cochrane, 2021.
10. Moher D, Shamseer L, Clarke M, *et al.* Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Syst Rev* 2015;**4**:1. doi: 10.1186/2046-4053-4-1 [published Online First: 2015/01/03]
11. Institute of Medicine Committee on Standards for Developing Trustworthy Clinical Practice G. Clinical Practice Guidelines We Can Trust. Washington (DC): National Academies Press (US) Copyright 2011 by the National Academy of Sciences. All rights reserved. 2011.
12. McGowan J, Sampson M, Salzwedel DM, *et al.* PRESS Peer Review of Electronic Search Strategies: 2015 Guideline Statement. *J Clin Epidemiol* 2016;**75**:40-6. doi: 10.1016/j.jclinepi.2016.01.021 [published Online First: 2016/03/24]
13. Babl FE, Tavender E, Ballard DW, *et al.* Australian and New Zealand Guideline for Mild to Moderate Head Injuries in Children. *Emerg Med Australas* 2021;**33**(2):214-31. doi: 10.1111/1742-6723.13722 [published Online First: 2021/02/03]
14. Kochanek PM, Tasker RC, Carney N, *et al.* Guidelines for the Management of Pediatric Severe Traumatic Brain Injury, Third Edition: Update of the Brain Trauma Foundation Guidelines. *Pediatr Crit Care Med* 2019;**20**(3S Suppl 1):S1-S82. doi: 10.1097/PCC.0000000000001735 [published Online First: 2019/03/05]

- 1  
2  
3 15. Da Dalt L, Parri N, Amigoni A, *et al.* Italian guidelines on the assessment and  
4 management of pediatric head injury in the emergency department. *Ital J Pediatr*  
5 2018;**44**(1):7. doi: 10.1186/s13052-017-0442-0 [published Online First: 2018/01/18]  
6  
7 16. Chung S, Mikrogianakis A, Wales PW, *et al.* Trauma association of Canada Pediatric  
8 Subcommittee National Pediatric Cervical Spine Evaluation Pathway: consensus  
9 guidelines. *J Trauma* 2011;**70**(4):873-84. doi: 10.1097/TA.0b013e3182108823 [published  
10 Online First: 2011/05/26]  
11  
12 17. Brouwers MC, Kho ME, Browman GP, *et al.* AGREE II: advancing guideline  
13 development, reporting and evaluation in health care. *CMAJ* 2010;**182**(18):E839-42. doi:  
14 10.1503/cmaj.090449 [published Online First: 2010/07/07]  
15  
16 18. Brouwers MC, Spithoff K, Kerkvliet K, *et al.* Development and Validation of a Tool  
17 to Assess the Quality of Clinical Practice Guideline Recommendations. *JAMA Netw Open*  
18 2020;**3**(5):e205535. doi: 10.1001/jamanetworkopen.2020.5535 [published Online First:  
19 2020/05/28]  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## PRISMA-P 2015 Checklist

This checklist has been adapted for use with protocol submissions to *Systematic Reviews* from Table 3 in Moher D et al: Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews* 2015 4:1

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
<b>ADMINISTRATIVE INFORMATION</b>					
<b>Title</b>					
Identification	1a	Identify the report as a protocol of a systematic review	X		P. 1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such		X	NA
<b>Registration</b>	2	If registered, provide the name of the registry (e.g., PROSPERO) and registration number in the Abstract	X		P. 3
Contact	3a	Provide name, institutional affiliation, and e-mail address of all protocol authors; provide physical mailing address of corresponding author	X		P.1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	X		P. 7
<b>Amendments</b>	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments		X	NA
Sources	5a	Indicate sources of financial or other support for the review	X		P. 7
Sponsor	5b	Provide name for the review funder and/or sponsor	X		P. 7
Role of sponsor/funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	X		P. 7
<b>INTRODUCTION</b>					
<b>Rationale</b>	6	Describe the rationale for the review in the context of what is already known	X		P.2
<b>Objectives</b>	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	X		P. 3
<b>METHODS</b>					
<b>Eligibility criteria</b>	8	Specify the study characteristics (e.g., PICO, study design, setting, time frame) and report characteristics (e.g., years considered, language, publication status) to be used as criteria for	X		P. 3

Section/topic	#	Checklist item	Information reported		Line number(s)
			Yes	No	
		eligibility for the review			
<b>Information sources</b>	9	Describe all intended information sources (e.g., electronic databases, contact with study authors, trial registers, or other grey literature sources) with planned dates of coverage	X		P. 4
<b>Search strategy</b>	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	X		P. 4, Table 2
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	X		P. 4
Selection process	11b	State the process that will be used for selecting studies (e.g., two independent reviewers) through each phase of the review (i.e., screening, eligibility, and inclusion in meta-analysis)	X		P. 4
Data collection process	11c	Describe planned method of extracting data from reports (e.g., piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	X		P. 5
<b>Data items</b>	12	List and define all variables for which data will be sought (e.g., PICO items, funding sources), any pre-planned data assumptions and simplifications	X		P. 4
<b>Outcomes and prioritization</b>	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	X		P. 4
<b>Risk of bias in individual studies</b>	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	X		P. 5
<b>Synthesis</b>	15a	Describe criteria under which study data will be quantitatively synthesized		X	NA
	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data, and methods of combining data from studies, including any planned exploration of consistency (e.g., $I^2$ , Kendall's tau)		X	NA
	15c	Describe any proposed additional analyses (e.g., sensitivity or subgroup analyses, meta-regression)		X	NA
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	X		P. 5-6
<b>Meta-bias(es)</b>	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)		X	NA
<b>Confidence in cumulative evidence</b>	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	X		P. 5-6