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

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

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ABSTRACT

Introduction: Evidence suggests the presence of deficiencies in the quality of care provided to up to half of all 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.[1] In the US, the child mortality rate due to injury increased by 12% between 2013 and 2016[2] and according to a 2016 report, more than 7% of children suffer a significant head injury before the age of 17.[3] In Canada, 900 children and adolescents die and 35,000 are hospitalised yearly following injury, with costs of over $4 billion.[4] 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,[5] Canada and the US were respectively ranked 29th and 36th 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.[6] Lack of adherence to evidence-based recommendations may be driven by lack of knowledge of CPGs, heterogeneity in recommendations or concerns about their quality.[7] A synthesis of CPG recommendations is needed to clarify standards of care. Our objective is thus to systematically review CPG recommendations for 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[8] 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[8]

and Cochrane guidelines on systematic reviews[9] and is reported according to the Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) statement.[10] The protocol has been submitted to the International Prospective Register of Systematic Reviews (PROSPERO) and is under revision.

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

Eligibility

We will consider CPGs including at least one recommendation (R) targeting pediatric injury populations (P) on any diagnostic or therapeutic intervention from the acute phase of care (I) with any comparator (C) developed in high-income countries in the last 15 years (A). CGPs are defined as 'statements that include recommendations intended to optimize patient care that are informed by systematic review of evidence and an assessment of benefits and harms of alternative care options'.[11] Pediatric injury populations are defined as children <19 years of age seen in the emergency department (ED) or admitted to hospital following injury. We will also consider CPGs that target injury care for all ages if they include at least one recommendation specific to children as well as CPGs on pediatric healthcare if they include at least one recommendation specific to acute injury care. We will exclude CPGs exclusively pertaining to burns, poisoning, foreign body ingestion, late effects of injury or drowning. Finally, we will exclude publications reporting data on the implementation of or adherence to CPGs published previously but will use them to identify any additional CPGs.

Search strategy

We will systematically search Medical Literature Analysis and Retrieval System Online (MEDLINE), Excerpta Medica dataBASE (EMBASE), Cochrane library, Web of Science, and ClinicalTrials from 2007 to a maximum of 6 months prior to publication. We will also search the websites of organisations publishing recommendations on pediatric injury care, established in consultation with our advisory committee (including injury guidelines for all age groups with specific recommendations for children and CPGs on pediatric healthcare

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

Search strategy

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

Study selection

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

Data extraction

We will develop a standard electronic data abstraction form and a detailed instruction manual. This form will be piloted on a representative sample of 5 publications. Pairs of reviewers with methodological and content expertise will independently extract data from eligible GCPs. For each recommendation within CPGs, we will extract information on the population, intervention, comparator, quality of evidence and strength of recommendations. We will contact the contributing authors if important information is missing or unclear.

Quality

Two reviewers with content expertise will independently assess the quality of included CPGs using the AGREE II tool, which has six domains: scope and purpose, stakeholder involvement, rigour of development, clarity and presentation, applicability and editorial independence.[17] Each domain with a score ≥60% will be considered effectively addressed. CPGs will be considered *high quality* if they score ≥60% in at least three of six AGREE II domains, including domain 3 (rigor of development). If three domains or more scored ≥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.[18] 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.

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Competing interests: None declared.

Provenance and peer review: Not commissioned; externally peer reviewed.

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

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

Table 2. Search strategy for PubMed (September 13th, 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

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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	
ADMINISTRATIVE INFORMATION					
Title					
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
Registration	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
Amendments	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
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	X		P.2
Objectives	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
METHODS					
Eligibility criteria	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			
Information sources	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
Search strategy	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
Data items	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
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	X		P. 4
Risk of bias in individual studies	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
Synthesis	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
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)		X	NA
Confidence in cumulative evidence	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

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

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ABSTRACT

Introduction: Evidence suggests the presence of deficiencies in the quality of care provided to up to half of all 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.[1] In the US, the child mortality rate due to injury increased by 12% between 2013 and 2016[2] and according to a 2016 report, more than 7% of children suffer a significant head injury before the age of 17.[3] In Canada, 900 children and adolescents die and 35,000 are hospitalised yearly following injury, with costs of over $4 billion.[4] 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,[5] Canada and the US were respectively ranked 29th and 36th 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.[6] Lack of adherence to evidence-based recommendations may be driven by lack of knowledge of CPGs, heterogeneity in recommendations or concerns about their quality.[7] A synthesis of CPG recommendations is needed to clarify standards of care. Our objective is thus to systematically review CPG recommendations for 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[8] 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[8]

and Cochrane guidelines on systematic reviews[9] and is reported according to the Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) statement.[10] The protocol has been submitted to the International Prospective Register of Systematic Reviews (PROSPERO) and is under revision.

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

Eligibility

We will consider CPGs including at least one recommendation (R) targeting pediatric injury populations (P) on any diagnostic or therapeutic intervention from the acute phase of care (I) with any comparator (C) developed in high-income countries in the last 15 years (A). CGPs are defined as 'statements that include recommendations intended to optimize patient care that are informed by systematic review of evidence and an assessment of benefits and harms of alternative care options'.[11] Pediatric injury populations are defined as children <19 years of age seen in the emergency department (ED) or admitted to hospital following injury. We will also consider CPGs that target injury care for all ages if they include at least one recommendation specific to children as well as CPGs on pediatric healthcare if they include at least one recommendation specific to acute injury care. We will exclude CPGs exclusively pertaining to burns, poisoning, foreign body ingestion, late effects of injury or drowning. Finally, we will exclude publications reporting data on the implementation of or adherence to CPGs published previously but will use them to identify any additional CPGs.

Search strategy

We will systematically search Medical Literature Analysis and Retrieval System Online (MEDLINE), Excerpta Medica dataBASE (EMBASE), Cochrane library, Web of Science, and ClinicalTrials from 2007 to a maximum of 6 months prior to publication. We will also search the websites of organisations publishing recommendations on pediatric injury care, established in consultation with our advisory committee (including injury guidelines for all age groups with specific recommendations for children and CPGs on pediatric healthcare

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

Search strategy

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

Study selection

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

Data extraction

We will develop a standard electronic data abstraction form and a detailed instruction manual. This form will be piloted on a representative sample of 5 publications. Pairs of reviewers with methodological and content expertise will independently extract data from eligible GCPs. For each recommendation within CPGs, we will extract information on the population, intervention, comparator, quality of evidence and strength of recommendations. We will contact the contributing authors if important information is missing or unclear.

Quality

Two reviewers with content expertise will independently assess the quality of included CPGs using the AGREE II tool, which has six domains: scope and purpose, stakeholder involvement, rigour of development, clarity and presentation, applicability and editorial independence.[17] Each domain with a score ≥60% will be considered effectively addressed. CPGs will be considered *high quality* if they score ≥60% in at least three of six AGREE II domains, including domain 3 (rigor of development). If three domains or more scored ≥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.[18] 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.

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.

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

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Competing interests: None declared.

Provenance and peer review: Not commissioned; externally peer reviewed.

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

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

Table 2. Search strategy for PubMed (September 13th, 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

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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	
ADMINISTRATIVE INFORMATION					
Title					
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
Registration	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
Amendments	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
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	X		P.2
Objectives	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
METHODS					
Eligibility criteria	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			
Information sources	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
Search strategy	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
Data items	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
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	X		P. 4
Risk of bias in individual studies	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
Synthesis	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
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)		X	NA
Confidence in cumulative evidence	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

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Primary Subject Heading:	Evidence based practice
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CLINICAL PRACTICE GUIDELINE RECOMMENDATIONS FOR PEDIATRIC INJURY CARE: PROTOCOL FOR A SYSTEMATIC REVIEW

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ABSTRACT

Introduction: Evidence suggests the presence of deficiencies in the quality of care provided to up to half of all 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.[1] In the US, the child mortality rate due to injury increased by 12% between 2013 and 2016[2] and according to a 2016 report, more than 7% of children suffer a significant head injury before the age of 17.[3] In Canada, 900 children and adolescents die and 35,000 are hospitalised yearly following injury, with costs of over $4 billion.[4] 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,[5] Canada and the US were respectively ranked 29th and 36th 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.[6] Lack of adherence to evidence-based recommendations may be driven by lack of knowledge of CPGs, heterogeneity in recommendations or concerns about their quality.[7] A synthesis of CPG recommendations is needed to clarify standards of care. Our objective is thus to systematically review CPG recommendations for 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[8] 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[8] and Cochrane guidelines on systematic reviews[9] and is reported according to the Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) statement.[10] The protocol has been submitted to the International Prospective Register of Systematic Reviews (PROSPERO #CRD42021226934).

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

Eligibility

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

Search strategy

We will systematically search Medical Literature Analysis and Retrieval System Online (MEDLINE), Excerpta Medica dataBASE (EMBASE), Cochrane library, Web of Science, and ClinicalTrials from January 1st, 2007 to a maximum of 6 months prior to publication. We will also search the websites of organisations publishing recommendations on pediatric

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

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

Study selection

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

Data extraction

We will develop a standard electronic data abstraction form and a detailed instruction manual. This form will be piloted on a representative sample of 5 publications. Pairs of reviewers with methodological and content expertise will independently extract data from eligible GCPs. For each recommendation within CPGs, we will extract information on the population, intervention, comparator, quality of evidence and strength of

recommendations. We will contact the contributing authors if important information is missing or unclear.

Quality

Two reviewers with content expertise will independently assess the quality of included CPGs using the AGREE II tool, which has six domains: scope and purpose, stakeholder involvement, rigour of development, clarity and presentation, applicability and editorial independence.[17] Each domain with a score ≥60% will be considered effectively addressed. CPGs will be considered *high quality* if they score ≥60% in at least three of six AGREE II domains, including domain 3 (rigor of development). If three domains or more scored ≥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.[18] 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.

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.

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

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Competing interests: None declared.

Provenance and peer review: Not commissioned; externally peer reviewed.

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

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

Table 2. Search strategy for PubMed (September 13th, 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

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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	
ADMINISTRATIVE INFORMATION					
Title					
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
Registration	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
Amendments	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
INTRODUCTION					
Rationale	6	Describe the rationale for the review in the context of what is already known	X		P.2
Objectives	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
METHODS					
Eligibility criteria	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			
Information sources	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
Search strategy	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
Data items	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
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	X		P. 4
Risk of bias in individual studies	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
Synthesis	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
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (e.g., publication bias across studies, selective reporting within studies)		X	NA
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (e.g., GRADE)	X		P. 5-6