PEDIATRIC GUIDELINE

PEDIATRIC EXPERT PANEL MEMBERS

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Acknowledgements: We would like to thank: Becky Skidmore for creating the search strategies; and Harry Ingleby and Thor Bjarnason for contributing to the section on ionizing radiation exposure.

Last updated: August 2024
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Canadian Association of Radiologists
L'Association canadienne des radiologistes

Contents

ABBREVIATIONS

ACR	American College of Radiology
AGREE-II	Appraisal of Guidelines for Research & Evaluation Instrument
AI	Artificial Intelligence
CAR	Canadian Association of Radiologists
CT	Computed Tomography
EP	Expert Panel
EtD	Evidence to Decision
GI	Gastrointestinal
GRADE	Grading of Recommendations Assessment, Development and Evaluation
MRCP	Magnetic Resonance Cholangiopancreatography
MRI	Magnetic Resonance Imaging
NICE	National Institute for Health and Care Excellence
RCR	Royal College of Radiologists
US	Ultrasound
VCUG	Voiding Cystourethrography
XR	Radiograph

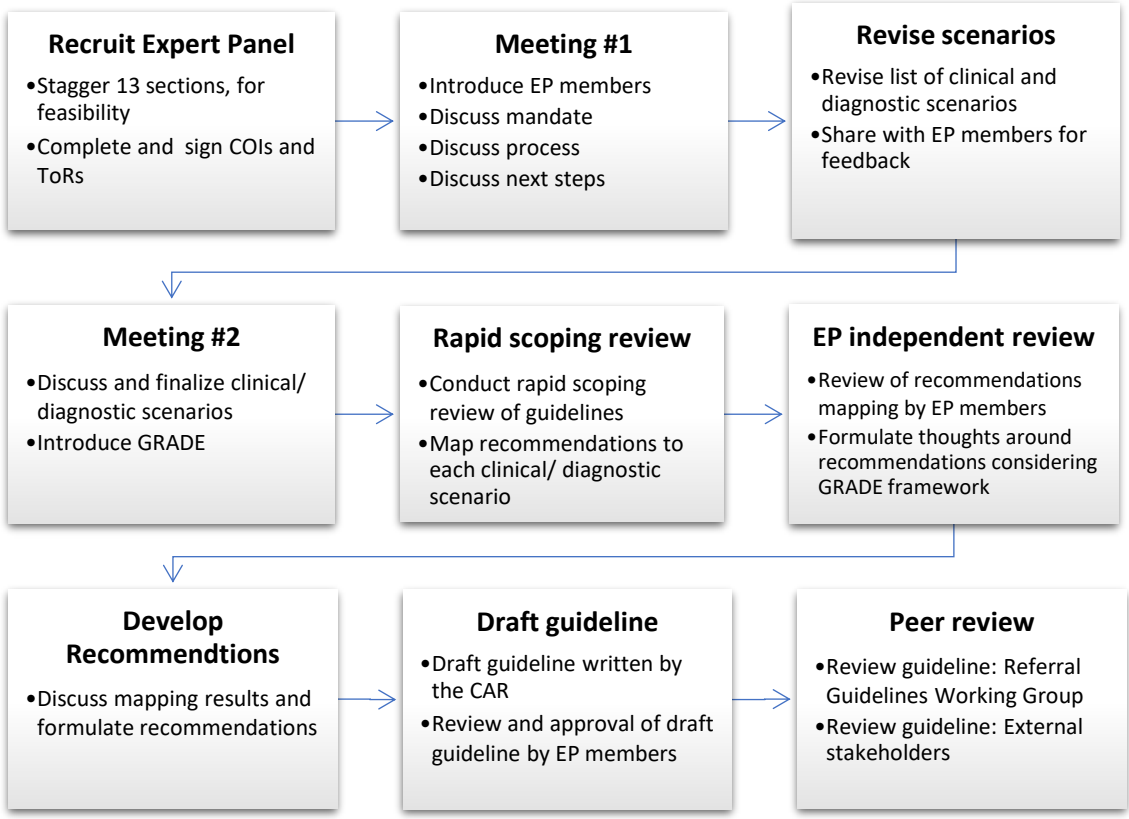
INTRODUCTION

The diagnostic imaging referral recommendations from the Canadian Association of Radiologists (CAR) were published in 2012 (https://car.ca/patient-care/referral-guidelines/). These recommendations were made up of 13 sections, of which one was Pediatrics. In 2020, the CAR, funded by the Canadian Medical Association (CMA), developed a plan to update the CAR diagnostic imaging referral recommendations. The project mandate is to develop a comprehensive set of evidenced-based diagnostic imaging referral guidelines suited for integration into CDS systems.

An Expert Panel (EP) made up of pediatric specialists in the disciplines of radiology, emergency medicine, gastroenterology, general surgery, orthopedic surgery, neurology, neurosurgery, endocrinology, otolaryngology, respirology, urology, a patient representative, and an evidence review/guideline methodologist from across Canada met over a series of 11 meetings from May 2023 to April 2024.

The 78 clinical/diagnostic scenarios in the 2012 CAR recommendations were used as the starting point for discussions. After a review and update of these scenarios, a list of 50 clinical/diagnostic scenarios was created, which informed the systematic search strategy and rapid scoping review.

The general process of the guideline development is presented in Figure 1.



Abbreviations: CAR = Canadian Association of Radiologists; **COI** = Conflict of Interest; **EP** = Expert Panel; **GRADE** = Grading of Recommendations Assessment, Development and Evaluation; **ToR** = Terms of Reference

Figure 1 - Guideline Development Process

WHO ARE THESE RECOMMENDATIONS FOR?

These recommendations are primarily for referring clinicians (e.g., physicians, nurse practitioners, and allied health providers); however, they may also be used by radiologists, patients, and/or patient representatives.

The primary objective of the recommendations is to promote the most appropriate diagnostic imaging procedure(s), so that patients receive these procedure(s) at the right time, resulting in better health outcomes.

Scope

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring.

DISCLAIMER

These recommendations are not intended to stand alone. Medical care should be based on evidence, the patient's presentation, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability.

We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

METHODS OF THE RAPID SCOPING REVIEW

The conduct of the systematic rapid scoping review was guided by empirical review guidance: the Joanna Briggs Institute scoping review guidance [1], the Cochrane Handbook [2], and the rapid review interim guidance from the Cochrane Rapid Review Methods Group [3].

Inclusion Criteria

Publications were included if they met the following criteria:

Guidelines: Providing diagnostic imaging recommendations for one or more of the clinical/diagnostic scenarios identified by the Pediatric EP.

Study design: Guidelines that were produced using three criteria in the AGREE-II assessment tool [4]:

(1) Systematic methods were used to search for evidence: Searched and named at least 1 electronic database using an electronic search strategy (e.g., Medline, Embase, PubMed, CENTRAL);
(2) The criteria for selecting the evidence are clearly described: Described a formal process for study selection; AND reported the inclusion and exclusion criteria; OR if it is based on a systematic review even if it does not provide explicit methods; and
(3) The strengths and limitations of the body of evidence are clearly described: Performed critical appraisal on the included studies (e.g., risk of bias, describe study limitations); OR if it is based on a systematic review and GRADE is performed.

Interventions: Any diagnostic imaging modality (e.g., radiograph [XR], magnetic resonance imaging [MRI], computed tomography [CT], ultrasound [US]) were included.

Date of publication: To identify the most recent guidelines which would contain the most recently published primary studies, and for feasibility, we included guidelines that were published or updated in 2018 and onward.

Language of publication: English, for feasibility.

Search

A systematic search strategy was developed by an experienced information specialist (**Appendix 1**) using the list of clinical/diagnostic scenarios identified by the Pediatrics EP members. The search was run in Medline and Embase on August 10, 2023. The search was limited to publications from 2018 onward to capture the most recent guidelines, and for feasibility. There was no language restriction in the search. Supplemental searching included searching the following national radiology and/or guideline groups: the American College of Radiology (ACR), the National Institute for Health and Care Excellence (NICE), and the Royal College of Radiologists (RCR) 8th Edition (2017).

Title/abstract screening

Using a standardized form in DistillerSR, an online systematic review software [5], one reviewer screened the records in prioritized order, using the artificial intelligence (AI) re-ranking tool in DistillerSR. A stop-screening approach was implemented once 95% of the predicted included studies were identified [6,7]. The AI reviewer tool in DistillerSR excluded the remaining records. The AI audit tool was run to identify any records that were excluded that had high score for inclusion (i.e., a prediction score of 0.85 and above). These records were rescreened to ensure that they should have been excluded. A second reviewer verified a random sample of 10% of the included records and 20% of the excluded records, without knowledge of the inclusion or exclusion decision by the first reviewer. Any disagreements were resolved through discussion and subsequent consensus. The AI audit tool was rerun, and any records with a prediction score of ≥0.85 were rescreened.

Full text screening

Using a standardized form in DistillerSR, one reviewer evaluated the full texts of the guidelines against the eligibility criteria described above in the Inclusion Criteria.

Mapping

Recommendations were extracted from all included guidelines by one reviewer and presented in tabular form for each clinical/ diagnostic scenario. A synopsis (i.e., a condensed version of the evidence table) for each clinical/ diagnostic scenario was created based on the information in the evidence tables. These synopses highlighted the main recommendations across guidelines and highlighted any discordant recommendations. These synopses were produced by the guideline methodologist and distributed to the EP members to help guide discussion when formulating the recommendations.

Critical appraisal

Each guideline was assessed for the level of quality using the AGREE-II instrument [4]. This was performed by one reviewer with a quality control check on a random sample of 10% of the guidelines.

FORMULATING RECOMMENDATIONS

Over 10 virtual meetings (between February 15 and April 23, 2024), the EP members discussed each of the clinical scenarios using the information in the synopses as a guide. When required, the full evidence tables (**Appendix 2**) were consulted for additional information.

NOTE: Details have been removed from Appendix 2 to comply with copyright protection. For additional information on these

recommendations, please access the full publications.

The focus of these recommendations was to provide the recommendation for the initial imaging modality, for the next imaging modality or an alternative to the first imaging modality, in situations where the first imaging modality is negative, indeterminate, may not be available, or if additional imaging is required.

Specifying contrast protocols

Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

Grading of Recommendations Assessment, Development and Evaluation

The Grading of Recommendations Assessment, Development and Evaluation (GRADE) for Guidelines framework [8,9] was used as a guide to determine the strength (i.e., strong, conditional) and direction (i.e., for, against) of the recommendation. As the GRADE methodology requires an Evidence to Decision (EtD) framework for each recommendation, this would not have been feasible as:

(i) We used recommendations from existing guidelines as our evidence base, thereby not allowing for full assessment of each outcome within the primary studies, including the five GRADE domains to evaluate the certainty of the evidence: risk of bias, indirectness, imprecision, inconsistency, and publication bias [10]. Therefore, this information was inferred by the level and strength of the evidence provided in the included guidelines.

(ii) We covered 50 clinical/diagnostic scenarios in the Pediatrics section, which could have included several diagnostic imaging modality comparisons. This would have resulted in a minimum of 50 EtD frameworks, but realistically many more, as we would have had to create an EtD for each comparison (e.g., XR vs US, XR vs CT, MRI vs CT) within each clinical/diagnostic scenario.

Therefore, in addition to the diagnostic imaging recommendations presented by each included guideline, and the clinical expertise of the EP members, additional criteria were considered specific to the Canadian healthcare context:

- Certainty of the evidence (as presented in the included guidelines);
- Consideration of benefits and harms (e.g., ionizing radiation exposure);
- Values and preferences;
- Equity, accessibility, and feasibility; and
- Resource use and costs.

The strength and direction of the recommendations are represented by arrow directions and colours. Using GRADE as a guide [8], these can be interpreted as:

- **Strong recommendation ("recommend"), for (↑↑)**: All or almost all informed people would want/recommend this intervention and only a small proportion would not. If this intervention is not offered, the patient or patient representative should request a discussion.
- **Conditional recommendation ("suggest"), for (↑)**: Most informed people would choose/recommend this intervention; however a substantial number would not. This may be conditional upon patient values and preferences, the resources available or the setting in which the intervention will be implemented.
- **Conditional recommendation ("suggest"), against (↓)**: Most informed people would not

choose/recommend this intervention; however a substantial number would. This may be conditional upon patient values and preferences, the resources available or the setting in which the intervention will be implemented.

- **Strong recommendation ("recommend"), against (↓↓)**: All or almost all informed people would not want/recommend this intervention; however a small proportion would.

When there were no guidelines to support recommendations, the EP formulated recommendations based on their clinical expertise while considering values and preferences, resources, cost, equity, and accessibility. These recommendations are denoted with (EP consensus).

The recommendations for each clinical/ diagnostic scenario are presented below, with reference to the guidelines that were included for that scenario. Recommendations are also summarized in tabular form in **Appendix 3**.

INCLUDED GUIDELINES

A total of 2714 unique records were identified through the electronic database searches. After reviewing 877 records, the AI reviewer excluded the remaining records (n=1837), as 97% of the predicted included records had been identified and the likelihood for inclusion of the remaining records was low (highest remaining prediction score of 6.47%). A second reviewer screened a set of randomly selected records (n=522) for verification (~10% of included and 20% of excluded records). Among these, there were seven conflicts between the two human screeners. These conflicts were resolved through discussion. Three additional records were added from the supplemental search. The full text for five records were not retrievable, and eight were not published in English. Among the 81 remaining full texts that were screened for eligibility, 35 were not guidelines providing diagnostic imaging recommendations for pediatric imaging, 31 did not use systematic methods or sufficiently describe the methods used in the formulation of the guideline, 14 were topics not covered in this guideline, and one was excluded for 'other' reasons. A list of excluded records with reasons is available upon request. Recommendations from 32 guidelines (33 publications) were included (**Figure 2 – PRISMA flow diagram**).

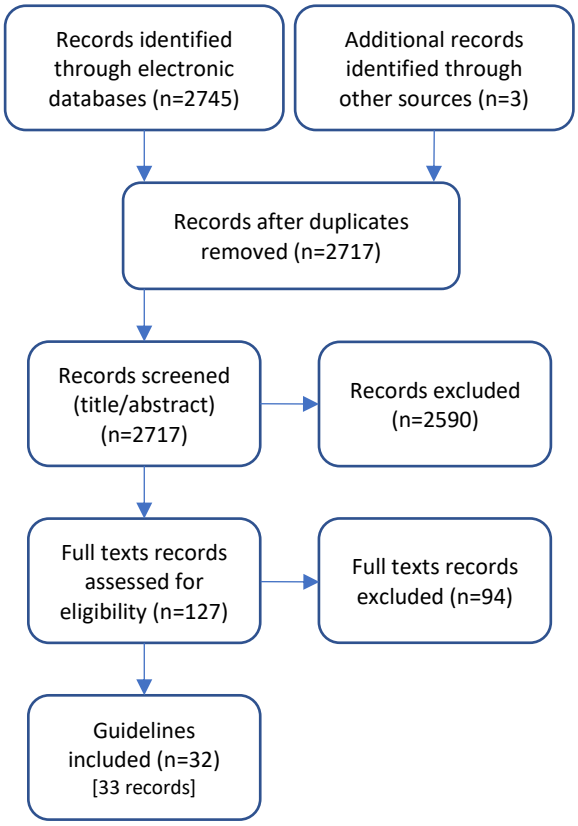


Figure 2 - PRISMA flow diagram

The number of guidelines included per clinical/diagnostic scenario ranged from zero to 10. Where available, the certainty of the evidence and/or strength of the recommendations are highlighted to provide a sense of the certainty of the evidence of the included primary studies (**Appendix 2**).

Most guidelines were rated as moderate or high quality, using the AGREE-II tool (**Appendix 5**). Often, reasons for rating an item down were due to a lack of reporting.

LIMITATIONS OF THE RAPID SCOPING REVIEW

As the unit of inclusion for the rapid scoping review was guidelines, the recommendations were extracted as presented in the guidelines. We also extracted the level/certainty of the evidence based on the criteria presented in the completed guidelines. There were several tools/methods used to assess the level/certainty of the evidence. For feasibility, primary studies were not reviewed, and the level/certainty of the evidence was taken at face value from the guideline.

IONIZING RADIATION EXPOSURE

We have elected to not include any effective dose values (mSv), related metrics, or qualitative descriptors of radiation risk (e.g., symbol, risk level, approximate equivalent background radiation, lifetime additional risk of cancer induction/exam) for several reasons:

1) The Expert Panel members have considered the risks of ionizing radiation (i.e., GRADE for Guidelines benefits and harms) when formulating the recommendations.

2) The levels of ionizing radiation in modern medical imaging equipment should not unduly influence patient decision-making. The anticipated benefits of imaging to the patient, if a test is clinically indicated, are likely to outweigh any potential small risks [11].

3) Per the following points, effective dose values and related metrics such as equivalent background radiation have very large uncertainties, and their utility is thus limited:

- There is uncertainty in the relative values of the effective dose for a reference patient with variation in the standard error [12];
- Effective doses are measured using reference phantoms with population, age and sex-averaged tissue weighting factors [12], therefore these should not be considered as the doses received by specific individuals;
- The publications providing data used to estimate the effective dose per scan (e.g., International Commission on Radiological Protection (ICRP) 1990 [13], 2007[14]) are occasionally updated and may impact the effective dose values;
- There is variation in the average dose from natural background radiation by geographic location. For example, in Canada, the average is 1.8 mSv/year, which ranges from 1.3 mSv/year in Vancouver to 4.1 mSv/year in Winnipeg [15]; and
- There are variables around the equipment (e.g., age) and facility (e.g., protocol) that may impact the actual amount of ionizing radiation exposure used for any particular exam.

EXTERNAL REVIEW

This guideline and its recommendations have been externally reviewed by members of the CAR Diagnostic Imaging Referral Guidelines Working Group (**Box 1**) and Alanna Coleman (Nurse Practitioners Association of Canada).

FUTURE RESEARCH IN THIS AREA

This guideline will be updated upon the emergence of new evidence that may change the validity of the recommendations.

We plan on developing Patient Friendly Summaries for some of the clinical/diagnostic scenarios covered in this guideline. The selection of scenarios will be dependent on a prioritization exercise, as well as funding. These summaries will be made available on the CAR website (www.car.ca).

Box 1. CAR Diagnostic Imaging Referral Guideline Working Group Members

Ryan Margau (co-chair), North York General Hospital, ON
Paul Pageau (co-chair), The Ottawa Hospital, ON

Other members listed alphabetically:
Barb Avard, Patient and Family Advisor, North York General Hospital, ON
Cathy MacLean, University of Saskatchewan, Department of Academic Family Medicine, SK
Mary-Lynn Watson, Dalhousie University, Department of Emergency Medicine, Halifax Infirmary Site, NS
Kaitlin Zaki-Metias, Western University, London, ON

Italicized name is a WG member who was also a member of the Pediatric Expert Panel.

PEDIATRIC CLINICAL/DIAGNOSTIC SCENARIOS

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

RECOMMENDATIONS

PD01. Developmental delay/congenital malformations

Recommendations

1. In children with a suspected congenital malformation of the brain, we recommend **MRI** as the initial imaging modality (↑↑).
   - ↳ **1.1** In infants and neonates, if MRI is unavailable, contraindicated, or if the patient is uncooperative, we suggest **US** as an alternative imaging modality, recognizing the severe limitations for evaluation of cortical malformations (↑).
   - ↳ **1.2** If a congenital malformation of the skull is suspected, or bony anatomy must be evaluated, we recommend **CT** as the next imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD01**).

PD02. Suspected congenital malformations of the spine/spinal dysraphism

Recommendations

1. In infants with suspected congenital malformation of the spine, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **1.1** If additional imaging is required, we recommend **MRI** as the next imaging modality (↑↑).

     The timing of the MRI should be determined by the neurosurgeon.
2. In infants with suspected spinal dysraphism, we recommend **against XR for screening** (↓↓).
3. In low-risk infants with non-suspicious dimple, we suggest **against routine US screening** (↓).
4. In high-risk infants < 6 months of age with risk factors✧, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **4.1** If US is abnormal or equivocal, we recommend **MRI** as the next imaging modality (↑↑).

     The timing of the MRI should be determined by the neurosurgeon.
5. In infants with suspected congenital scoliosis, we recommend **XR** as the initial imaging modality (↑↑).
   - ↳ **5.1** If further characterization of the spinal cord is required, we recommend **US or MRI** as the next imaging modality, depending on the age of the patient (↑↑).

✧ For example, dimple depth (>5 mm), location of lumbosacral dimple (>2.5 cm from the anus), hairy patch, hemangioma, or anorectal/cloacal malformation.

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Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2019 ACR guideline on scoliosis in children [18], and the 2017 RCR iRefer Guideline Pediatric section [17] (**Appendix 2: Table PD02**).

PD03. Hydrocephalus

PD03A. Suspected hydrocephalus

Recommendations

1. In neurologically stable children with suspected hydrocephalus, we recommend **MRI** as the initial imaging modality (↑↑).
   - ↳ **1.1** If MRI is unavailable in an appropriate time frame, is contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality (↑↑).
     - ↳ **1.2** In infants < 6 months or open fontanelle, if MRI and CT are unavailable, we suggest **US** as an alternative imaging modality, recognizing its significant limitations (↑).
2. In neurologically unstable children with suspected hydrocephalus, we recommend **CT** as the initial imaging modality (↑↑).

Recommendations from 1 guideline were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] (**Appendix 2: Table PD03A**).

PD03B. Treated hydrocephalus, shunt malfunction

Recommendations

1. In neurologically stable children with hydrocephalus and suspected shunt malfunction, we recommend **MRI and XR (shunt survey)** as the initial imaging modalities (↑↑).

   Depending on local/regional practice, we suggest a rapid or shortened MRI protocol.

   - ↳ **1.1** If MRI is unavailable in an appropriate time frame, is contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality (↑↑).
     - ↳ **1.2** In infants < 6 months or open anterior fontanelle, if MRI and CT are unavailable, we suggest **US** as an alternative imaging modality, recognizing its significant limitations (↑).
2. In neurologically unstable children with hydrocephalus and suspected shunt malfunction, we recommend **CT and XR (shunt survey)** as the initial imaging modalities (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD03B**).

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PD04. Craniosynostosis

Recommendations

1. In children with suspected craniosynostosis, we recommend **against skull XR** (↓↓).
2. In children with suspected craniosynostosis, we recommend referral to a clinician expert in the evaluation for craniosynostosis (↑↑).
   - ↳ **2.1** If this is unavailable, we recommend **US of the cranial sutures or low-dose CT**, depending on local practice and availability (↑↑).

Recommendations from 1 guideline were used during the discussions and formulation of these recommendations: the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD04**).

PD05. Mastoiditis

Recommendations

1. In children with suspected mastoiditis, we recommend **CT with contrast** as the initial imaging modality (EP consensus).

No guidelines were identified for this clinical scenario.

PD06. Orbital cellulitis

Recommendations

1. In children with suspected orbital cellulitis, we recommend **CT with contrast** as the initial imaging modality (EP consensus).

   CT orbits or CT orbits and head may be performed according to local practice preference.

No guidelines were identified for this clinical scenario.

PD07. Congenital or acquired hearing loss

Recommendations

1. In children with hearing loss, we recommend **pediatric otolaryngology consultation** prior to imaging investigation (↑↑).

Recommendations from 1 guideline were used during the discussions and formulation of these recommendations: the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD07**).

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PD08. Seizure

PD08A. Febrile seizure

Recommendations

Febrile seizure without any evidence of intracranial infection/inflammation and no underlying structural brain abnormalities.

1. In children with febrile seizure✧, we recommend **against routine imaging** (↓↓).

✧Simple or complex seizure

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2021 ACR guideline on seizures in children [19] (**Appendix 2: Table PD08A**).

PD08B. Non-febrile seizure

Recommendations

1. In children with first presentation of non-febrile/unprovoked seizures (excluding absence seizures) in whom imaging is indicated, we recommend **MRI** as the initial imaging modality (↑↑).
   - ↳ **1.1** If MRI is unavailable, contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD08B**).

PD09. Headache: acute/subacute

Recommendations

1. In children with primary headache (such as tension or migraine), we suggest **against routine imaging**, recognizing there may be clinical difficulty distinguishing primary from secondary headaches (↓).
2. In children with suspected acute/subacute secondary headache (such as suspected brain tumour), we recommend **MRI** as the initial imaging modality (↑↑).
   - ↳ **2.1** If MRI is unavailable, contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality (↑↑).
3. In children with suspected intracranial hemorrhage (subarachnoid, subdural, or intracerebral), we recommend **CT** as the initial imaging modality (↑↑).
4. In children with suspected cerebral venous sinus thrombosis we recommend **CT with contrast or MRI** as the initial imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

CT or MRI may be performed according to local practice preference and/or availability.

If concern for mastoiditis, see PD05. Mastoiditis.
If concern for orbital cellulitis, see PD06. Orbital cellulitis.

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2018 ACR guideline on headaches in children [20], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD09**).

PD10. Headache: chronic/recurrent

Recommendations

1. In children with chronic/recurrent headache and normal neurological examination, we suggest **against routine imaging**, recognizing imaging may be acceptable when there is significant level of patient/parental concern, young age, atypical features, or changes in nature or pattern of headache (↓).
2. In children with chronic/recurrent headache and abnormal neurological examination or papilledema, we recommend **MRI** as the initial imaging modality (↑↑).
   - ↳ **2.1** If MRI is unavailable, contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality (↑↑).

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2018 ACR guideline on headaches in children [20], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD10**).

PD11. Neck mass/nodule

PD11A. Thyroid mass/nodule

Recommendations

1. In children with a thyroid nodule, we recommend **US** as the initial imaging modality (↑↑).
2. In children with suspected goiter/diffuse enlargement with no concerning features✧, we suggest **against routine imaging** (↓).

✧ For example, concerning features would include rapid or asymmetric enlargement, mass effect, dysphagia, dysphonia, or lymphadenopathy

Recommendations from 1 guideline was used during the discussions and formulation of these recommendations: the 2022 European Thyroid Association (ETA) guideline on pediatric thyroid nodules [21] (**Appendix 2: Table PD11A**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

PD11B. Non-thyroid mass/nodule

Recommendations

1. In children with palpable but non-enlarged nodes, we suggest **against routine imaging** (↓).
2. In children with suspected retropharyngeal abscess, we recommend **lateral neck XR** as the initial imaging modality (↑↑).
   - ↳ **2.1** If XR is abnormal, we recommend **CT with contrast** as the next imaging modality (↑↑).
3. In children with non-thyroid neck mass or nodule with suspicion for infection, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **3.1** If further imaging is required, we recommend **CT with contrast** as the next imaging modality (↑↑).
4. In children with non-thyroid neck mass or nodule with suspicion for malignancy, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **4.1** If further imaging is required, we recommend **MRI or CT** as the next imaging modality (↑↑).

   Preference for MRI, but regional practice may influence test.
5. In children with non-thyroid neck mass or nodule with suspicion of congenital anomaly, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **5.1** If further imaging is required, we suggest **MRI** as the next imaging modality (↑).

   Preference for MRI, but CT may be used based on regional practice.

Recommendations from 1 guideline was used during the discussions and formulation of these recommendations: the 2019 ACR guideline on Neck Mass-Adenopathy [22] (**Appendix 2: Table PD11B**).

PD12. Sinusitis

PD12A. Acute sinusitis (including acute complicated)

Recommendations

1. In children with uncomplicated acute sinusitis, we recommend **against routine imaging** (↓↓).
2. In children with complicated sinusitis or in immunocompromised patients, we recommend **CT with contrast** as the initial imaging modality (↑↑).

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2018 ACR guideline on sinusitis in children [23], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD12A**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

PD12B. Chronic sinusitis

Recommendations

1. In children with chronic or recurrent sinusitis, we recommend **against routine imaging** (↓↓).

> *Chronic sinusitis is rare in children. In children with chronic or recurrent sinusitis, otolaryngology consultation may be considered. If imaging is indicated based on a clinical decision rule or guideline* [23]*, CT sinuses is the preferred modality.*

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2018 ACR guideline on sinusitis in children [23] (**Appendix 2: Table PD12B**).

PD13. Torticollis

PD13A. Congenital torticollis

Recommendations

1. In children with suspected congenital torticollis (fibromatosis colli) and unclear clinical diagnosis, we recommend **US** as the initial imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD13A**).

PD13B. New onset torticollis

Recommendations

1. In children with new onset torticollis with non-muscular/atypical history and examination, we recommend **XR** as the initial imaging modality (↑↑).

↳ **1.1** Given the wide range of possible pathology, we recommend **orthopedist, neurosurgeon, or neurologist consultation** prior to further imaging (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD13B**).

PD14. CNS inflammation/infection

Recommendations

1. In children with suspected central nervous system inflammation/infection, we recommend **MRI** as the initial imaging modality (EP consensus).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

↳ **1.1** If MRI is unavailable or contraindicated we suggest **CT** as an alternative imaging modality, recognizing the significant limitations of CT in this context (EP consensus).

CT is insensitive for CNS inflammation and infection and a normal CT does not exclude these diagnoses.

No guidelines were identified for this clinical scenario.

PD15. Back pain

Recommendations

1. Persistent, severe, or recurrent back pain in children is atypical, therefore, when red flags are present✧, we recommend **spine XR** as the initial imaging modality (↑↑).

↳ **1.1** If XR is normal and the following diagnoses are suspected, spinal malignancy, infection, fracture, cauda equina syndrome, ankylosing spondylitis or another inflammatory disorder, we recommend **MRI** as the next imaging modality (↑↑).

↳ **1.2** If XR shows bony pathology and further investigation is required, we recommend **CT or MRI** (↑↑).

✧ Red flags may include the following: Child <5 years; Persistent back pain; Duration > 4 weeks; Worsening pain; Morning stiffness; Night pain; Radicular pain; Vertebral tenderness on palpation; Fever, tachycardia; Abnormal neurological exam; Weight loss, bruising, adenopathy or abdominal mass; Altered spine shape/mobility; Altered gait; Functional disability; Bowel/bladder dysfunction; Past history of cancer/tuberculosis [17,24]

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2022 German Society for Pediatric and Adolescent Medicine guideline on back pain in children and adolescents [25], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD15**).

PD16. Hip pain or limping referable to hip pathology

Recommendations

1. In children with hip pain, we recommend **XR** as the initial imaging modality (↑↑).

↳ **1.1** If further imaging is indicated for the assessment of joint effusion, we recommend **US or MRI** (↑↑).

↳ **1.2** If further imaging is indicated for any other reason, we recommend **MRI** (↑↑).

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2018 ACR guideline on acutely limping children up to the age of 5 [26], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD16**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

PD17. Limping and unable to localize symptoms

Recommendations

1. In limping children too young to localize symptoms, we recommend **XR of the affected extremity** as the initial imaging modality (↑↑).
   - ↳ **1.1** If XR is negative for fracture or other pathology, the need for and type of further imaging should be based on clinical grounds (EP consensus).

     For example, repeat XR in 10-24 days, US of the hip, or MRI of the affected extremity may be considered.

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2018 ACR guideline on acutely limping children up to the age of 5 [26], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD17**).

PD18. Developmental dysplasia of the hip

Recommendations

1. In a newborn < 4-6 weeks of age with risk factors for development dysplasia of the hip and a normal examination, we recommend **against routine imaging** (↓↓).
   - ↳ **1.1** If there are physical findings (e.g., positive Barlow's sign), we recommend **US** (↑↑).
2. In an infant between 4-6 weeks and 4-6 months of age with risk factors for or physical findings suggestive of developmental dysplasia of the hip, we recommend **US** as the initial imaging modality (↑↑).
3. In children 4-6 months of age or older, we recommend **XR** as the initial imaging modality (↑↑).

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2019 ACR guideline on developmental dysplasia of the hip in children [27,28], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD18**).

PD19. Suspected Osgood-Schlatter disease

Recommendations

1. In children with a clinical diagnosis of Osgood-Schlatter disease, we recommend **against routine imaging** (↓↓).
2. In children where clinical diagnosis of Osgood-Schlatter disease is uncertain or if serious bone pathology is being considered, we recommend **XR** as the initial imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD19**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

PD20. Scoliosis

Recommendations

1. In children with a clinical suspicion of scoliosis, we recommend **standing full spine XR** as the initial imaging modality (↑↑).

↳ **1.1** If risk factors✧ are identified on XR, we recommend **full spine MRI** as the next imaging modality (↑↑).

MRI should only be considered after consultation with a pediatric orthopedic surgeon.

✧For example, age 0 to 9 years old, left thoracic curve, short segment curve (4-6 levels), absence of apical segment lordosis/kyphosis, long thoracolumbar curve, rapid curve progression (more than 1° per month), functionally disruptive pain, focal neurologic findings, male sex, and pes cavus [18].

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2019 ACR guideline on scoliosis in children [18] (**Appendix 2: Table PD20**).

PD21. Short stature/growth failure

Recommendations

1. In children ≥ 2 years of age with short stature/growth failure, we recommend **XR of the left hand and wrist for bone age**✧ as the initial imaging modality (↑↑).

✧ A bone age should be completed according to appropriate reference standards, for example, Greulich and Pyle [29].

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD21**).

PD22. Pneumonia

PD22A. Uncomplicated pneumonia

Recommendations

1. In children with suspected uncomplicated pneumonia, particularly in the presence of tachypnea and/or a low SpO2, we recommend **chest XR** (↑↑).

If suspected bronchiolitis, see PD23. Bronchiolitis.

Recommendations from 5 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2019 ACR guideline on pneumonia in immunocompetent children [30], the 2020 European Society of Paediatric and Neonatal Intensive Care (ESPNIC) guideline on POCUS for critically ill neonates and children [31], the 2020 Polish guideline on the application of lung ultrasound in pneumonia and bronchiolitis [32], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD22A**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

PD22B. Pneumonia with complications, including recurrent pneumonia

Recommendations

1. In children with complicated pneumonia✧, we recommend **chest XR** as the initial imaging modality (↑↑).
   - ↳ **1.1** If further investigation is required for evaluation of pleural effusion, we recommend **US** as the next imaging modality (↑↑).
   - ↳ **1.2** If further investigation is required, for example in the case of suspected bronchiectasis, suspicion of a congenital lung malformation, lung abscess, pneumothorax, necrotizing pneumonia, we recommend **CT** as the next imaging modality (↑↑).

✧For example, recurrent pneumonia, pleural effusion, empyema

Recommendations from 4 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2019 ACR guideline on pneumonia in immunocompetent children [30], the 2020 European Society of Paediatric and Neonatal Intensive Care (ESPNIC) guideline on POCUS for critically ill neonates and children [31], the 2020 Polish guideline on the application of lung ultrasound in pneumonia and bronchiolitis [32] (**Appendix 2: Table PD22B**).

PD23. Bronchiolitis

Recommendations

1. In children with suspected bronchiolitis, we recommend **against routine chest XR** (EP consensus).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2020 European Society of Paediatric and Neonatal Intensive Care (ESPNIC) guideline on POCUS for critically ill neonates and children [31], and the 2020 Polish guideline on the application of lung ultrasound in pneumonia and bronchiolitis [32] (**Appendix 2: Table PD23**).

PD24. Suspected foreign body

PD24A. Suspected foreign body: Gastrointestinal

Recommendations

1. In children with suspected swallowed batteries and magnets, we recommend **discussion with general surgery and/or gastroenterology** (↑↑).
2. In children with suspected swallowed foreign body ingestion (i.e., not battery or magnet), we recommend **XR of the neck, chest, abdomen** as the initial imaging modality (↑↑). If timing of ingestion is uncertain, the pelvis could be included.
   - ↳ **2.1** If object has not passed and follow-up is required, we recommend **XR abdomen and pelvis** (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2020 Italian Society of Pediatric Gastroenterology, Hepatology and Nutrition (SIGENP) guideline on foreign body and caustic ingestion in children [33], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD24A**).

PD24B. Suspected foreign body: Airway

Recommendations

1. In children with suspected inhaled foreign body, we recommend **chest XR (inspiration and expiration views)** as the initial imaging modality (↑↑).

   Right/left decubitus views could be substituted for expiration view if the patient is not cooperative.

   ↳ **1.1** If chest XR is negative or equivocal and there is a significant suspicion of foreign body, we recommend **otolaryngology or surgery consultation** for consideration for bronchoscopy (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD24B**).

PD25. Asthma

Recommendations

1. In children with asthma, we recommend **against routine chest XR** (↓↓).
2. In children with asthma with clinical suspicion of complication of asthma (e.g., pneumothorax) or another cause of recurrent wheezing (e.g., aspiration), we recommend **chest XR** as the initial imaging modality (↑↑).

Recommendations from 5 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2020 CHEST guideline on managing chronic cough as a symptom in children [34], the 2020 European Respiratory Society (ERS) guideline on chronic cough in adults and children [35], the 2017 RCR iRefer guideline Pediatric section [17], and the 2019 Société Française de Médecine d'Urgence (SFMU), the Société de Réanimation de Langue Française (SRLF) and the French Group for Pediatric Intensive Care and Emergencies (FGPICE) guideline on management of severe asthma exacerbation [36] (**Appendix 2: Table 25**).

PD26. Stridor

Recommendations

1. In stable children with acute stridor where epiglottitis or retropharyngeal abscess is suspected and the child is stable enough to undergo imaging, we recommend **lateral neck XR** as the initial imaging modality (↑↑).
2. In children presenting with typical croup, we recommend against routine imaging (↓↓).
3. In children with chronic stridor, we recommend **neck XR** as the initial imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

↳ **3.1** If further evaluation or characterization is required, we recommend **CT or MRI** as the next imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD26**).

PD27. Acute abdominal trauma

Recommendations

1. In children who have sustained abdominal trauma, in whom internal injury is suspected, we recommend **CT** as the initial imaging modality (↑↑).
   ↳ **1.1** In the specific clinical context where CT in not available, we suggest that **US** be used, while considering its significant limitations (↑).

   In the pediatric population, US is not reliable in excluding significant acute injury.

2. In children with suspected urinary system injury, we recommend **excretory phase CT** (↑↑).

Note: Recommendation 2 is a modification of the recommendation in the CAR Trauma guideline [37].

Recommendations were originally published in the 2023 CAR Trauma guideline [37]. Modifications have been made herein.

PD28. Vomiting in infant or young children

PD28A. Bilious vomiting, suspected proximal obstruction

Recommendations

1. In infants and young children with bilious vomiting and suspected proximal obstruction on abdominal XR, we recommend **urgent upper GI series** as the initial imaging modality (↑↑).
   ↳ **1.1** If upper GI series in not immediately available, we suggest **transfer and urgent pediatric surgery consultation** (↑).
      ↳ **1.2** If transfer and upper GI series will not be delayed, we suggest **urgent US** as an alternative, while recognizing its limitations (↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2020 ACR guideline on vomiting in infants [38] (**Appendix 2: Table PD28A**).

PD28B. Suspected distal obstruction

Recommendations

1. In infants and young children with suspected distal obstruction, we recommend **abdominal XR** as the initial imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

↳ **1.1** If XR suggests a distal obstruction, we recommend **contrast enema** as the next imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2020 ACR guideline on vomiting in infants [38] (**Appendix 2: Table PD28B**).

PD28C. Suspected hypertrophic pyloric stenosis (HPS)

Recommendations

1. In infants with suspected hypertrophic pyloric stenosis, we recommend **US abdomen** as the initial imaging modality (↑↑).

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2020 ACR guideline on vomiting in infants [38], and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD28C**).

PD28D. Suspected uncomplication gastroesophageal reflux (GER)

Recommendations

1. In infants and young children with suspected uncomplicated gastroesophageal reflux, we recommend **against routine imaging** (↓↓).

Recommendations from 3 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2020 ACR guideline on vomiting in infants [38], and the 2018 North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) guideline on pediatric gastroesophageal reflux [39] (**Appendix 2: Table PD28D**).

PD29. Persistent neonatal jaundice

Recommendations

1. In infants with persistent neonatal jaundice and conjugated hyperbilirubinemia, we recommend **urgent US** as the initial imaging modality **and urgent referral to pediatric gastroenterology** (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD29**).

PD30. Rectal bleeding

Recommendations

1. In children with suspected Meckel's diverticulum, we recommend **NM** as the initial imaging modality (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

2. In neonates with suspected necrotizing enterocolitis, we recommend **XR** as the initial modality (↑↑).
3. In children with other causes of rectal bleeding (e.g., intussusception, inflammatory bowel disease, juvenile polyposis, etc.), we recommend **US** as the initial imaging modality (↑↑).
    - ↳ **3.1** If vascular anomaly or angiodysplasia is suspected, we suggest **CT** as the next imaging modality (↑).

NM: nuclear medicine

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD30**).

PD31. Acute abdominal/pelvic pain

Recommendations

Suspected appendicitis

1. In children with suspected appendicitis, we recommend **US** as the initial imaging modality (↑↑).
    - ↳ **1.1** If US is equivocal and there is ongoing suspicion of appendicitis, we suggest **repeat US or CT/MRI** as the next imaging modality (↑).

Suspected intussusception

1. In children with suspected intussusception, we recommend **US** as the initial imaging modality (↑↑).

Suspected ovarian torsion*

1. In patients with suspected ovarian torsion, we recommend **transabdominal US** as the initial imaging modality (↑↑).
    - ↳ **1.1** We suggest **Doppler** as an adjunct (↑).

** Recommendations from OBGYN guideline* [40] *with the modification of removal of transvaginal US.*

Inflammatory bowel disease

1. In children with suspected inflammatory bowel disease (e.g., Crohn's, ulcerative colitis), we recommend **US** as the initial imaging modality prior to pediatric gastroenterology consultation (↑↑).
    - ↳ **1.1** If further imaging is required (e.g., for characterization), we recommend **MR enterography** as the next imaging modality (↑↑).
        - ↳ **1.2** If the patient is not cooperative (e.g., age), we recommend an **upper GI and small bowel follow-through** (↑↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

↳ **1.3** In the acute setting where MR enterography is not tolerated, we recommend **CT** (↑↑).

Suspected pancreatitis

1. In children with suspected pancreatitis, we recommend **US** as the initial imaging modality (↑↑).
   ↳ **1.1** If complication of pancreatitis is suspected, we recommend **CT or MRI** as the next imaging modality (↑↑).
   ↳ **1.2** If duct anomaly (e.g., pancreas divisum) is suspected, we recommend **MRI with MRCP** as the next imaging modality (↑↑).

Other causes of abdominal pain

1. In children other causes of abdominal pain, such as suspected renal/ureteral calculi or cholecystitis, we recommend **US** as the initial imaging modality (↑↑).

MR: magnetic resonance

Recommendations from 10 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2019 ACR guideline on suspected appendicitis in child [41], the 2021 Canadian Urological Association (CUA) guideline on the management of ureteral calculi [42], the 2018 European Crohn's and Colitis Organization and the European Society of Paediatric Gastroenterology, Hepatology and Nutrition guideline on pediatric ulcerative colitis [43], the 2018 European Pancreatic Club (EPC) and the Hungarian Pancreatic Study Group (HPSG) guideline on pediatric pancreatitis [44], the 2018 Italian Polispecialistic Society of Young Surgeons (SPIGC) consensus statement on acute appendicitis [45], the 2018 North American Society for Pediatric Gastroenterology, Hepatology and Nutrition Pancreas Committee (NASPGHAN) guideline on acute pancreatitis in pediatric populations [46], the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition Pancreas Committee (NASPGHN) and Society for Pediatric Radiology (SPR) joint guideline on pancreatitis [47], the 2017 RCR iRefer guideline Pediatric section [17], and the 2020 World Society of Emergency Surgery guideline on acute appendicitis [48] (**Appendix 2: Table PD31**).

PD32. Palpable abdominal or pelvic mass

Recommendations

1. In children with a palpable abdominal or pelvic mass, we recommend **US** as the initial imaging modality (↑↑).
   ↳ **1.1** If US is not available, we suggest **XR abdomen** as an alternative (↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD32**).

PD33. Constipation

Recommendations

The diagnosis of constipation should be made based on clinical history and a physical examination.

1. If imaging is required, we suggest **XR abdomen/pelvis** as the initial imaging modality (↑).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD33**).

PD34. Undescended testes

Recommendations

1. In children with undescended testes, we recommend **against routine imaging** (↓↓).

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Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD34**).

PD35. Fetal renal pelvic dilatation, initial postnatal evaluation

Recommendations

1. In infants with fetal renal pelvic dilatation, we recommend **US** as the initial imaging modality, performed no sooner than 3 days post-partum (↑↑).

   If there is severe bilateral pre-natal hydronephrosis or concern for posterior urethral valves, US could be performed sooner.

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2020 ACR guideline on antenatal hydronephrosis [49] (**Appendix 2: Table PD35**).

PD36. Urinary incontinence

PD36A. Enuresis

Recommendations

1. In children with typical enuresis (i.e., monosymptomatic night-time enuresis), we recommend **against routine imaging** (↓↓).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD36A**).

PD36B. Continual incontinence

Recommendations

1. In children with continuous dribbling or wetting, we recommend **kidney and urinary bladder US** as the initial imaging modality (↑↑).

Recommendations from 2 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16] and the 2017 RCR iRefer guideline Pediatric section [17] (**Appendix 2: Table PD36B**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

PD37. Urinary tract infection

PD37A. Urinary tract infection: First episode

Recommendations

1. In children presenting with a first non-febrile episode of UTI, we recommend **against routine imaging** (↓↓).
2. In children <2 years of age presenting with a first febrile episode of UTI, we recommend **US** as the initial imaging modality (↑↑).
3. In children with complicated/atypical first episode of UTI✧, we recommend **US before discharge from hospital** as the initial imaging modality (↑↑).

✧For example, very ill child, evidence of sepsis, low urine output, raised serum creatinine, abdominal/pelvic mass, infection with organisms other than E. coli and/or failure to respond to appropriate antibiotics within 48 hours

Recommendations from 5 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2021 Egyptian Clinical Practice Guideline on urinary tract infection in infants and children [50]**,** the 2023 Indian Society of Pediatric Nephrology Clinical Practice Guideline on urinary tract infection and primary vesicoureteric reflux [51], the 2017 RCR iRefer guideline Pediatric section [17], and the 2021 Swiss consensus recommendations on urinary tract infections [52] (**Appendix 2: Table PD37A**).

PD37B. Urinary tract infection: Recurrent

Recommendations

1. In children presenting with recurrent UTI, we recommend **US** as the initial imaging modality (↑↑).
   - ↳ **1.1** If US is abnormal, we recommend that any decision for further intervention (e.g., VCUG) should be made **in consultation with an experienced pediatrician, nephrologist, or urologist** (EP consensus).

     VCUG is not indicated in children with recurrent cystitis or non-febrile urinary tract infections. VCUG may be indicated in males with bilateral hydroureteronephrosis, infant with hydronephrosis and UTI.
2. In children presenting with complicated recurrent episode of UTI✧, we recommend **US before discharge from hospital** as the initial imaging modality (↑↑).

✧For example, very ill child, evidence of sepsis, low urine output, raised serum creatinine, abdominal/pelvic mass, infection with organisms other than E. coli and/or failure to respond to appropriate antibiotics within 48 hours

VCUG: voiding cystourethrogram

Recommendations from 4 guidelines were used during the discussions and formulation of these recommendations: the 2012 CAR Guideline Pediatric section [16], the 2021 Egyptian Clinical Practice Guideline on urinary tract infection in infants and children [50], and the 2017 RCR iRefer guideline Pediatric section [17], and the 2021 Swiss consensus recommendations on urinary tract infections [52] (**Appendix 2: Table PD37B**).

The guideline recommendations are designed to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient. Unless the panel agreed a specific protocol is required to optimize patient care/diagnosis, the recommendations do not specify when contrast should or should not be used, as this decision may vary based on clinical presentation, regional practice preferences, preference of the referring clinician, radiologist and the patient, and resource availability.

PD38. Non-accidental trauma

Recommendations

1. In children with suspected non-accidental trauma, we recommend **skeletal survey XR** as the initial imaging modality (↑↑).
2. If there is suspicion of non-accidental head trauma, we suggest **CT head** (↑).
3. In children with abnormal CT head, abnormal skull or spine XR, or persistent neurological symptoms, we recommend **MRI of the head and spine** (↑↑).
4. If there is clinical suspicion of acute intra-abdominal injury, we recommend **CT** (↑↑).

Note: Recommendations 3 and 4 have been added to the original CAR Trauma guideline recommendations [37].

Recommendations were originally published in the 2023 CAR Trauma guideline [37]. Modifications have been made herein.

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APPENDIX 1. SEARCH STRATEGIES

Paediatrics – Diagnostic Imaging
Final Strategy
2023 Aug 10

Ovid Multifile

Database: Embase Classic+Embase <1947 to 2023 August 09>, Ovid MEDLINE(R) ALL <1946 to August 09, 2023>
Search Strategy:
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1 Developmental Disabilities/ (39057)
2 exp Language Development Disorders/ (14315)
3 exp Communication Disorders/ (161360)
4 exp Speech Disorders/ (153739)
5 (developmental* adj3 (delay* or disabilit* or disorder*)).tw,kw,kf. (102712)
6 ((communicat* or language* or speech or speak* or talk*) adj3 (delay* or disabilit* or disorder*)).tw,kw,kf. (49143)
7 exp Congenital Abnormalities/ (2433405)
8 ((birth or congenital*) adj3 (abnormalit* or anomal* or defect* or deform* or malform*)).tw,kw,kf. (245568)
9 exp Spinal Dysraphism/ (25048)
10 ((bifida or cleft or dysraphia or dermal or dysgraphia* or dysraphic* or dysraphism or open or abnormalit* or anomal* or defect* or deform* or malform*) adj3 (spina or spinal or spine or spines)).tw,kw,kf. (61184)
11 (diastematomyelia* or lipomeningocele* or lipomyelomeningocele* or meningomyelocele or myelodysplasia* or neuroschis* or rachischis* or schistorrhach*).tw,kw,kf. (16223)
12 exp Hydrocephalus/ (91834)
13 (hydrocephal* or aqueductal stenos#s or cerebral ventriculomegal*).tw,kw,kf. (78604)
14 ((shunt? adj2 malfunction*) or brain ventricle dilatation* or Costello syndrome or Dandy Walker syndrome or muscle eye brain disease or VACTERL-H association or Walker Warburg syndrome).tw,kw,kf. (5797)
15 exp Craniosynostosis/ (18928)
16 (craniosynostos* or cranio-synostos* or acrocephal* or brachycephal* or craniosteno* or cranio-steno* or craniosynosto* or cranio-synosto* or lambdoid synosto* or metopic synosto* or oxycephal* or (plagiocephal* adj2 synostotic) or sagittal synostos* or scaphocephal* or trigonocephal*).tw,kw,kf. (21009)
17 (craniostenos* or cranio-stenos* or cranial synostos* or cranium synostos* or cranial suture closure* or stenocephal* or (synostos* adj2 craniofacialis)).tw,kw,kf. (1806)
18 (acrocephalosyndactyl* or acro-cephalosyndactyl* or apert syndrome or apert-crouzon disease or chotzen syndrome or kurczynski casperson syndrome or noack syndrome or pfeiffer syndrome).tw,kw,kf. (3388)
19 Mastoiditis/ (6993)
20 (mastoiditis or (mastoid adj2 infect*) or (mastoid adj2 inflam*)).tw,kw,kf. (5438)
21 Orbital Cellulitis/ (2897)
22 (orbit* adj3 cellulitis).tw,kw,kf. (3562)
23 Deafness/cn [congenital] (2680)
24 Hearing Loss, Sensorineural/cn [congenital] (1189)
25 (deaf* adj3 congenital*).tw,kw,kf. (5027)
26 (hear* adj2 (loss* or lost or disorder*) adj3 congenital*).tw,kw,kf. (4243)
27 ((Cockayne or KID or Pendred or Waardenburg) adj syndrome?).tw,kw,kf. (5689)
28 Seizures, Febrile/ (9567)
29 ((convuls* or epilep* or fit or fits or seizur*) adj3 (pyrexi* or fever* or febril)).tw,kw,kf. (4524)
30 ((convuls* or epilep* or seizur*) adj3 (suspect* or suspici*)).tw,kw,kf. (3038)
31 exp Headache/ (315629)
32 (headache? or head ache? or cephalalgi* or cephalg* or cephalodyni* or cephalea or ((cerebral or cranial or cranium or head) adj2 pain*) or cranialgia* or hemicrani* or hemi-crani*).tw,kw,kf. (287358)
33 (thyroid adj3 (lump* or mass$2 or nodule?)).tw,kw,kf. (35005)
34 exp Sinusitis/ (79835)
35 (sinusitis or rhinosinusitis or rhino-sinusitis or (sinus$2 adj3 infect*)).tw,kw,kf. (71813)
36 Torticollis/ (10042)
37 (torticollis or wry neck? or wryneck? or (cervical adj2 dystoni*)).tw,kw,kf. (13842)
38 Central Nervous System Infections/ (9862)
39 Vasculitis, Central Nervous System/ (1476)
40 ((central nervous system? or CNS) adj3 (infect* or inflam* or angiitis or arteritis or vasculitis)).tw,kw,kf. (47133)
41 exp Back pain/ (184999)
42 (backache? or backpain? or dorsalgi* or discogenic pain? or disco-genic pain? or lumbago?).tw,kw,kf. (14321)
43 ((ache or aches or aching or pain*) adj3 back?).tw,kw,kf. (156386)
44 ((ache or aches or aching or pain*) adj3 (hip or hips)).tw,kw,kf. (20189)
45 (coxalgi* or coxodyni*).tw,kw,kf. (446)
46 (limp or limps or limping).tw,kw,kf. (6056)
47 Developmental Dysplasia of the Hip/ (4492)
48 ((congenital* or developmental*) adj3 hip? adj3 (dislocat* or displac* or dysplasi*)).tw,kw,kf. (5953)
49 exp Osteochondrosis/ (3362)
50 (osteochondros#s or osteo-chondros#s).tw,kw,kf. (5489)
51 ((Koehler* or Navicular* or Osgood-Schlatter* or Scheuerman*) adj3 (disease? or disorder? or syndrome?)).tw,kw,kf. (2621)
52 ((adolescen* or juvenile* or Scheuerman*) adj3 (hyperkyphosis or hyper-kyphosis or kyphosis)).tw,kw,kf. (1258)
53 Scoliosis/ (54480)
54 scolios#s.tw,kw,kf. (61791)
55 (short* adj2 stature?).tw,kw,kf. (36804)
56 ((Bloom or Cockayne or de Lange or Dubowitz or Ellis van Creveld or floating harbo?r or Hunter or Hurler or Johanson Blizzard or Kabuki makeup or Kabuki make-up or Marinesco Sjogren or Noonan or Prader Willi or Robinow or Schaaf Yang or Seckel or Turner or Weill Marchesani or Weismann Netter) adj syndrome?).tw,kw,kf. (38894)
57 (grow$3 adj2 (fail or failed or failing or failure?)).tw,kw,kf. (16118)
58 ((Barth or Beckwith Wiedemann or Laron or Marfan or Nevo or Nijmegen breakage or Schwartz Jampel or Shwachman or Simpson Golabi Behmel or Sotos) adj synrome?).tw,kw,kf. (0)
59 exp Pneumonia/ (753435)
60 pneumoni*.tw,kw,kf. (571961)
61 (lobar or lung? or inflam*).tw,kw,kf. (4879129)

Appendix 1. Search Strategies

62 exp Bronchiolitis/ (36909)
63 bronchiolit*.tw,kw,kf. (34146)
64 exp Foreign Bodies/ (112695)
65 (foreign adj (body or bodies)).tw,kw,kf. (91488)
66 gossypiboma?.tw,kw,kf. (1066)
67 ((retain* or retention*) adj3 (surgical adj3 (implement? or instrument? or item? or needle? or sponge? or tool?))).tw,kw,kf. (989)
68 exp Asthma/ (462957)
69 asthma*.tw,kw,kf. (463699)
70 Respiratory Sounds/ (17561)
71 ((breath* or lung? or respirator*) adj3 sound?).tw,kw,kf. (9654)
72 (crackle? or rales or rhonch* or stridor* or wheez*).tw,kw,kf. (63739)
73 ((blunt or closed) adj (trauma? or injury or injuries) adj3 abdom?n*).tw,kw,kf. (1852)
74 Vomiting/ and (bile or biliary or bilious).ti,kf,kw. (1600)
75 ((vomit* or emes#s) adj3 (bile or biliary or bilious)).tw,kw,kf. (3175)
76 cholemes#s.tw,kw,kf. (0)
77 ((vomit* or emes#s) adj3 (infant* or neonat* or newborn*)).tw,kw,kf. (1991)
78 Pyloric Stenosis, Hypertrophic/ (2563)
79 ((hypertrophic or infantile) adj3 pyloric steno#s).tw,kw,kf. (2)
80 exp Gastroesophageal Reflux/ (107683)
81 ((gastroesophageal or gastro-esophageal or gastrooesophageal or gastro-oesophageal or gastric acid or esophagogastr* or oesophagogastr* or esophag* or oesophag*) adj2 (reflux$2 or regurg*)).tw,kw,kf. (83524)
82 (GERD or GORD).tw,kw,kf. (35480)
83 exp Jaundice, Neonatal/ (15658)
84 ((breastmilk or breast milk or newborn or neonat*) adj3 (icterus or jaundic*)).tw,kw,kf. (10923)
85 (bronze baby syndrome? or erythroleukoblastos*).tw,kw,kf. (101)
86 ((rectal* or rectum* or rectocolic or recto-colic) adj3 (bleed* or blood* or h?emorrhag*)).tw,kw,kf. (20796)
87 h?ematochezi*.tw,kw,kf. (8765)
88 ((f?ecal or f?eces or stool?) adj3 (bleed* or blood*)).tw,kw,kf. (36235)
89 Meckel Diverticulum/ (9826)
90 (Meckel* adj1 (diverticle* or diverticul*)).tw,kw,kf. (9636)
91 exp Intestinal Polyposis/ (24874)
92 Polypos#s.tw,kw,kf. (45316)
93 exp Inflammatory Bowel Diseases/ (301613)
94 (inflam* adj3 bowel?).tw,kw,kf. (180020)
95 (IBD and (inflam* or bowel*)).tw,kw,kf. (95855)
96 ((crohn? or cleron) adj3 (disease* or morbus or colitis* or colitides or enteriti*)).tw,kw,kf. (157394)
97 ((regional* or granulomatous or terminal*) adj3 (colitis* or colitides or enteriti* or ileitis or ileitides or ileocolitis or ileo-colitis or enterocolitis* or entero-colitis*)).tw,kw,kf. (7094)
98 ((colitis* or colitides or colorectitis or colo-rectitis or proctocolitis or procto-colitis or rectocolitis or recto-colitis) adj3 (ulcer* or idiopathic* or gravis or mucosa*)).tw,kw,kf. (140419)
99 (((colon or colonic) adj3 ulceration) and chronic$).tw,kw,kf. (167)
100 exp Abdominal Pain/ (256594)
101 (abdom#n* adj3 pain*).tw,kw,kf. (215940)
102 exp Pelvic Pain/ (35754)
103 ((pelvic* or pelvis*) adj3 pain*).tw,kw,kf. (36076)
104 Appendicitis/ (46506)
105 appendicit*.tw,kw,kf. (53423)
106 (appendi* adj3 inflam*).tw,kw,kf. (3685)
107 Renal Colic/ (4412)
108 ((kidney? or renal or ureteral) adj3 colic?).tw,kw,kf. (7532)
109 exp Cholecystitis/ (49759)
110 cholecystit#s.tw,kw,kf. (42099)
111 ((gallbladder? or gall bladder?) adj3 empy?ema*).tw,kw,kf. (689)
112 exp Pancreatitis/ (185792)
113 (pancreatit#s or pancreatic parenchyma* or peripancreatic fat necros#s or peri-pancreatic fat necros#s).tw,kw,kf. (175300)
114 exp Pyelonephritis/ (48420)
115 (pyelonephrit#s or pyelo-nephrit#s or (inflam* adj3 (kidney* or nephron*))).tw,kw,kf. (46991)
116 Ovarian Torsion/ (917)
117 ((ovarian or ovary or adnexal) adj2 torsion*).tw,kw,kf. (4430)
118 Intussusception/ (18422)
119 intus?usception.tw,kw,kf. (23384)
120 (invagination* adj3 (intestinal* or prolapse*)).tw,kw,kf. (1159)
121 ((palpable adj3 (lump? or mass$s)) and (abdom#n* or pelvic* or pelvis*)).tw,kw,kf. (195)
122 Constipation/ (128628)
123 (constipat* or (colon$2 adj3 inertia?) or dyschezia?).tw,kw,kf. (87991)
124 Cryptorchidism/ (20725)
125 (cryptorchidism* or cryptorchism* or cryptoidism* or kryptorchism*).tw,kw,kf. (16057)
126 ((impalpable or undescended or maldescensus) adj3 (testes or testis or testic*)).tw,kw,kf. (8507)
127 exp Hydronephrosis/ and (Fetus/ or exp Infant, Newborn/) (4456)
128 exp Hydronephrosis/ and (f?etus* or f?etal or newborn? or neonat*).ti,kw,kf. (2298)
129 ((hydronephro* or hydro nephro*) adj3 (f?etus* or f?etal or newborn? or neonat*)).tw,kw,kf. (1233)
130 ((kidney? or renal) adj3 pelvi# dilat* adj5 (f?etus* or f?etal or newborn? or neonat*)).tw,kw,kf. (119)
131 exp Enuresis/ (15908)
132 (enures#s or (involuntary adj3 urin*)).tw,kw,kf. (14512)
133 exp Urinary Tract Infections/ (200049)
134 ((urinary or bladder* or kidney* or urethra or ureter) adj3 (inflam* or infect*)).tw,kw,kf. (178836)
135 (cystit#s or urethrit#s).tw,kw,kf. (46943)
136 ((nonaccidental or deliberate or intended) adj3 (injury or injuries or trauma*)).tw,kw,kf. (2095)
137 (physical* adj3 (abus* or assault*)).tw,kw,kf. (27895)
138 or/1-137 [CONDITIONS OF INTEREST] (10905114)
139 exp Infant/ or exp Child/ or Adolescent/ (8398798)
140 (infant* or infanc* or baby or babies or child* or toddler* or preschool* or school next age* or boy or boys or girl or girls or adolescen* or teen or teens or teenager* or youth or youths or high-school*).tw,kw,kf. (5725015)
141 Pediatrics/ (159151)
142 p?ediatric*.tw,kw,kf. (1225813)
143 or/139-142 [PAEDIATRIC POPULATION] (10010498)
144 138 and 143 [CONDITIONS OF INTEREST - PAEDIATRIC POPULATION] (2501628)
145 Diagnostic Imaging/ (292664)
146 dg.fs. [diagnostic imaging] (1447432)

147 (diagnos* adj3 (image? or imaging)).tw,kw,kf. (142084)
148 (x-ray* or xray*).tw,kw,kf. (987718)
149 Image Interpretation, Computer-Assisted/ (91803)
150 exp Imaging, Three-Dimensional/ (219319)
151 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw,kf. (50275)
152 exp Ultrasonography/ (1491682)
153 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw,kf. (1152328)
154 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw,kf. (26513)
155 exp Radiography/ (2690188)
156 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw,kf. (643183)
157 (fluoroscop* or fluoro-scop*).tw,kw,kf. (92749)
158 exp Radionuclide Imaging/ (452311)
159 ((radionuclide* adj2 imag*) or (radio-nuclide* adj2 imag*) or (radionuclide* adj2 scan*) or (radio-nuclide* adj2 scan*) or (radioisotope* adj2 imag*) or (radio-isotope* adj2 imag*) or (radioisotope* adj2 scan*) or (radio-isotope* adj2 scan*) or scintigra* or scinti-gra* or scintiphotograph* or scinti-photograph* or scintiscan* or scinti-scan* or scanograph* or lymphoscintigra* or lympho-scintigra*).tw,kw,kf. (158460)
160 exp Tomography/ (3463929)
161 (tomograph* or tomo-graph*).tw,kw,kf. (1219149)
162 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw,kf. (412009)
163 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw,kf. (18301)
164 (magnetic resonance imag* or MRI or MRIs or fMRI or fMRIs or NMR imag* or chemical shift imag* or magneti#ation transfer contrast imag* or spin echo imag* or zeugmatograph* or zeugmato-graph*).tw,kw,kf. (1321338)
165 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw,kf. (4240)
166 Nuclear Medicine/ (45685)
167 ((nuclear or atomic) adj1 medicine?).tw,kw,kf. (48672)
168 (nuclear adj1 radiolog*).tw,kw,kf. (1326)
169 (sialogra* or salivogra* or sialoscintigra* or sialo-scintigra*).tw,kw,kf. (3377)
170 (enteroclys* or enterogra*).tw,kw,kf. (6516)
171 (esophagra* or oesophagra* or esophagogra* or oesophagogra*).tw,kw,kf. (7370)
172 ((CT or virtual) adj colonoscop*).tw,kw,kf. (1959)
173 (contrast adj (study or studies or medium)).tw,kw,kf. (47639)
174 (cholangiopancreatogra* or cholangio-pancreatogra* or ERCP or MRCP).tw,kw,kf. (58784)
175 cholecystogra*.tw,kw,kf. (5498)
176 (angiograph* or angio-graph* or angiogram* or angio-gram*).tw,kw,kf. (588438)
177 (perfusion adj3 (image? or imaging)).tw,kw,kf. (43732)
178 or/145-177 [IMAGING] (8611939)
179 144 and 178 [CONDITIONS OF INTEREST - PAEDIATRIC POPULATION - IMAGING] (580829)
180 exp Animals/ not Humans/ (17607187)
181 179 not 180 [ANIMAL-ONLY REMOVED] (485686)
182 (case reports or case series or address or autobiography or bibliography or biography or comment or dictionary or directory or editorial or "expression of concern" or festschrift or historical article or interactive tutorial or lecture or legal case or legislation or news or newspaper article or patient education handout or personal narrative or portrait or video-audio media or webcast or (letter not (letter and randomized controlled trial))).pt. (7006214)
183 181 not 182 [IRRELEVANT PUBLICATION TYPES REMOVED] (401905)
184 exp Guidelines as Topic/ (884348)
185 exp Clinical Protocols/ (311505)
186 Guideline.pt. (16579)
187 Practice Guideline.pt. (30566)
188 standards.fs. (767333)
189 Consensus Development Conference.pt. (12365)
190 Consensus Development Conference, NIH.pt. (801)
191 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw,kf. (557132)
192 (expert consensus or consensus statement* or consensus conference* or clinical guideline? or practice guideline? or treatment guideline? or practice parameter* or position statement* or policy statement* or CPG or CPGs).tw,kw,kf. (316008)
193 or/184-192 [GUIDELINE FILTER] (2284226)
194 183 and 193 [CONDITIONS OF INTEREST - PAEDIATRIC POPULATION - IMAGING - GUIDELINES] (10019)
195 limit 194 to yr="2018-current" (4831)
196 195 use medall [MEDLINE RECORDS] (1043)
197 exp developmental disorder/ (60790)
198 exp developmental language disorder/ (14315)
199 exp communication disorder/ (161360)
200 exp speech disorder/ (153739)
201 (developmental* adj3 (delay* or disabilit* or disorder*)).tw,kw,kf. (102712)
202 ((communicat* or language* or speech or speak* or talk*) adj3 (delay* or disabilit* or disorder*)).tw,kw,kf. (49143)
203 exp congenital disorder/ (3146039)
204 ((birth or congenital*) adj3 (abnormalit* or anomal* or defect* or deform* or malform*)).tw,kw,kf. (245568)
205 exp spinal dysraphism/ (25048)
206 ((bifida or cleft or dysraphia or dermal or dysgraphia* or dysraphic* or dysraphism or open or abnormalit* or anomal* or defect* or deform* or malform*) adj3 (spina or spinal or spine or spines)).tw,kw,kf. (61184)
207 (diastematomyelia* or lipomeningocele* or lipomyelomeningocele* or meningomyelocele or myelodysplasia* or neuroschis* or rachischis* or schistorrhach*).tw,kw,kf. (16223)
208 exp hydrocephalus/ (91834)
209 (hydrocephal* or aqueductal stenos#s or cerebral ventriculomegal*).tw,kw,kf. (78604)
210 ((shunt? adj2 malfunction*) or brain ventricle dilatation* or Costello syndrome or Dandy Walker syndrome or muscle eye brain disease or VACTERL-H association or Walker Warburg syndrome).tw,kw,kf. (5797)
211 exp craniofacial synostosis/ (11630)
212 (craniosynostos* or cranio-synostos* or acrocephal* or brachycephal* or craniosteno* or cranio-steno* or craniosynosto* or cranio-synosto* or lambdoid synosto* or metopic synosto* or oxycephal* or (plagiocephal* adj2 synostotic) or sagittal synostos* or scaphocephal* or trigonocephal*).tw,kw,kf. (21009)
213 (craniostenos* or cranio-stenos* or cranial synostos* or cranium synostos* or cranial suture closure* or stenocephal* or (synostos* adj2 craniofacialis)).tw,kw,kf. (1806)
214 (acrocephalosyndactyl* or acro-cephalosyndactyl* or apert syndrome or apert-crouzon disease or chotzen syndrome or

kurczynski casperson syndrome or noack syndrome or pfeiffer syndrome).tw,kw,kf. (3388)
215 mastoiditis/ (6993)
216 (mastoiditis or (mastoid adj2 infect*) or (mastoid adj2 inflam*)).tw,kw,kf. (5438)
217 orbit cellulitis/ (2805)
218 (orbit* adj3 cellulitis).tw,kw,kf. (3562)
219 exp congenital deafness/ (7168)
220 (deaf* adj3 congenital*).tw,kw,kf. (5027)
221 (hear* adj2 (loss* or lost or disorder*) adj3 congenital*).tw,kw,kf. (4243)
222 ((Cockayne or KID or Pendred or Waardenburg) adj syndrome?).tw,kw,kf. (5689)
223 exp febrile convulsion/ (13700)
224 ((convuls* or epilep* or fit or fits or seizur*) adj3 (pyrexi* or fever* or febril)).tw,kw,kf. (4524)
225 ((convuls* or epilep* or seizur*) adj3 (suspect* or suspici*)).tw,kw,kf. (3038)
226 headache/ (315588)
227 (headache? or head ache? or cephalalgi* or cephalg* or cephalodyni* or cephalea or ((cerebral or cranial or cranium or head) adj2 pain*) or cranialgia* or hemicrani* or hemi-crani*).tw,kw,kf. (287358)
228 (thyroid adj3 (lump* or mass$2 or nodule?)).tw,kw,kf. (35005)
229 exp sinusitis/ (79835)
230 (sinusitis or rhinosinusitis or rhino-sinusitis or (sinus$2 adj3 infect*)).tw,kw,kf. (71813)
231 exp torticollis/ (10042)
232 (torticollis or wry neck? or wryneck? or (cervical adj2 dystoni*)).tw,kw,kf. (13842)
233 exp central nervous system infection/ (348543)
234 exp central nervous system vasculitis/ (13827)
235 ((central nervous system? or CNS) adj3 (infect* or inflam* or angiitis or arteritis or vasculitis)).tw,kw,kf. (47133)
236 exp backache/ (139918)
237 (backache? or backpain? or dorsalgi* or discogenic pain? or disco-genic pain? or lumbago?).tw,kw,kf. (14321)
238 ((ache or aches or aching or pain*) adj3 back?).tw,kw,kf. (156386)
239 ((ache or aches or aching or pain*) adj3 (hip or hips)).tw,kw,kf. (20189)
240 (coxalgi* or coxodyni*).tw,kw,kf. (446)
241 (limp or limps or limping).tw,kw,kf. (6056)
242 hip dysplasia/ (15557)
243 ((congenital* or developmental*) adj3 hip? adj3 (dislocat* or displac* or dysplasi*)).tw,kw,kf. (5953)
244 osteochondrosis/ (2645)
245 (osteochondros#s or osteo-chondros#s).tw,kw,kf. (5489)
246 ((Koehler* or Navicular* or Osgood-Schlatter* or Scheuerman*) adj3 (disease? or disorder? or syndrome?)).tw,kw,kf. (2621)
247 ((adolescen* or juvenile* or Scheuerman*) adj3 (hyperkyphosis or hyper-kyphosis or kyphosis)).tw,kw,kf. (1258)
248 exp scoliosis/ (66093)
249 scolios#s.tw,kw,kf. (61791)
250 (short* adj2 stature?).tw,kw,kf. (36804)
251 ((Bloom or Cockayne or de Lange or Dubowitz or Ellis van Creveld or floating harbo?r or Hunter or Hurler or Johanson Blizzard or Kabuki makeup or Kabuki make-up or Marinesco Sjogren or Noonan or Prader Willi or Robinow or Schaaf Yang or Seckel or Turner or Weill Marchesani or Weismann Netter) adj syndrome?).tw,kw,kf. (38894)
252 (grow$3 adj2 (fail or failed or failing or failure?)).tw,kw,kf. (16118)
253 ((Barth or Beckwith Wiedemann or Laron or Marfan or Nevo or Nijmegen breakage or Schwartz Jampel or Shwachman or Simpson Golabi Behmel or Sotos) adj synrome?).tw,kw,kf. (0)
254 exp pneumonia/ (753435)
255 pneumoni*.tw,kw,kf. (571961)
256 (lobar or lung? or inflam*).tw,kw,kf. (4879129)
257 exp bronchiolitis/ (36909)
258 bronchiolit*.tw,kw,kf. (34146)
259 exp foreign body/ (112695)
260 (foreign adj (body or bodies)).tw,kw,kf. (91488)
261 gossypiboma?.tw,kw,kf. (1066)
262 ((retain* or retention*) adj3 (surgical adj3 (implement? or instrument? or item? or needle? or sponge? or tool?))).tw,kw,kf. (989)
263 exp asthma/ (462957)
264 asthma*.tw,kw,kf. (463699)
265 exp abnormal respiratory sound/ (77496)
266 ((breath* or lung? or respirator*) adj3 sound?).tw,kw,kf. (9654)
267 (crackle? or rales or rhonch* or stridor* or wheez*).tw,kw,kf. (63739)
268 ((blunt or closed) adj (trauma? or injury or injuries) adj3 abdom?n*).tw,kw,kf. (1852)
269 bilious vomiting/ (863)
270 ((vomit* or emes#s) adj3 (bile or biliary or bilious)).tw,kw,kf. (3175)
271 cholemes#s.tw,kw,kf. (0)
272 ((vomit* or emes#s) adj3 (infant* or neonat* or newborn*)).tw,kw,kf. (1991)
273 hypertrophic pylorus stenosis/ (2020)
274 ((hypertrophic or infantile) adj3 pyloric steno#s).tw,kw,kf. (2)
275 exp gastroesophageal reflux/ (107683)
276 ((gastroesophageal or gastro-esophageal or gastrooesophageal or gastro-oesophageal or gastric acid or esophagogastr* or oesophagogastr* or esophag* or oesophag*) adj2 (reflux$2 or regurg*)).tw,kw,kf. (83524)
277 (GERD or GORD).tw,kw,kf. (35480)
278 newborn jaundice/ (8856)
279 ((breastmilk or breast milk or newborn or neonat*) adj3 (icterus or jaundic*)).tw,kw,kf. (10923)
280 (bronze baby syndrome? or erythroleukoblastos*).tw,kw,kf. (101)
281 ((rectal* or rectum* or rectocolic or recto-colic) adj3 (bleed* or blood* or h?emorrhag*)).tw,kw,kf. (20796)
282 h?ematochezi*.tw,kw,kf. (8765)
283 ((f?ecal or f?eces or stool?) adj3 (bleed* or blood*)).tw,kw,kf. (36235)
284 Meckel diverticulum/ (9826)
285 (Meckel* adj1 (diverticle* or diverticul*)).tw,kw,kf. (9636)
286 exp intestinal polyposis/ (24874)
287 polypos#s.tw,kw,kf. (45316)
288 exp inflammatory bowel disease/ (301613)
289 (inflam* adj3 bowel?).tw,kw,kf. (180020)
290 (IBD and (inflam* or bowel*)).tw,kw,kf. (95855)
291 ((crohn? or cleron) adj3 (disease* or morbus or colitis* or colitides or enteriti*)).tw,kw,kf. (157394)

292 ((regional* or granulomatous or terminal*) adj3 (colitis* or colitides or enteriti* or ileitis or ileitides or ileocolitis or ileo-colitis or enterocolitis* or entero-colitis*)).tw,kw,kf. (7094)
293 ((colitis* or colitides or colorectitis or colo-rectitis or proctocolitis or procto-colitis or rectocolitis or recto-colitis) adj3 (ulcer* or idiopathic* or gravis or mucosa*)).tw,kw,kf. (140419)
294 (((colon or colonic) adj3 ulceration) and chronic$).tw,kw,kf. (167)
295 exp abdominal pain/ (256594)
296 (abdom#n* adj3 pain*).tw,kw,kf. (215940)
297 exp pelvic pain/ (35754)
298 ((pelvic* or pelvis*) adj3 pain*).tw,kw,kf. (36076)
299 exp appendicitis/ (56882)
300 appendicit*.tw,kw,kf. (53423)
301 (appendi* adj3 inflam*).tw,kw,kf. (3685)
302 exp kidney colic/ (5020)
303 ((kidney? or renal or ureteral) adj3 colic?).tw,kw,kf. (7532)
304 cholecystitis/ (35085)
305 cholecystit#s.tw,kw,kf. (42099)
306 ((gallbladder? or gall bladder?) adj3 empy?ema*).tw,kw,kf. (689)
307 exp pancreatitis/ (185792)
308 (pancreatit#s or pancreatic parenchyma* or peripancreatic fat necros#s or peri-pancreatic fat necros#s).tw,kw,kf. (175300)
309 exp pyelonephritis/ (48420)
310 (pyelonephrit#s or pyelo-nephrit#s or (inflam* adj3 (kidney* or nephron*))).tw,kw,kf. (46991)
311 ovary torsion/ (1383)
312 ((ovarian or ovary or adnexal) adj2 torsion*).tw,kw,kf. (4430)
313 exp intussusception/ (27489)
314 intus?usception.tw,kw,kf. (23384)
315 (invagination* adj3 (intestinal* or prolapse*)).tw,kw,kf. (1159)
316 ((palpable adj3 (lump? or mass$s)) and (abdom#n* or pelvic* or pelvis*)).tw,kw,kf. (195)
317 exp constipation/ (131626)
318 (constipat* or (colon$2 adj3 inertia?) or dyschezia?).tw,kw,kf. (87991)
319 cryptorchism/ (25257)
320 (cryptorchidism* or cryptorchism* or cryptoidism* or kryptorchism*).tw,kw,kf. (16057)
321 ((impalpable or undescended or maldescensus) adj3 (testes or testis or testic*)).tw,kw,kf. (8507)
322 hydronephrosis/ and (exp fetus disease/ or fetus/ or newborn/) (4919)
323 hydronephrosis/ and (f?etus* or f?etal or newborn? or neonat*).ti,kw,kf. (2297)
324 ((hydronephro* or hydro nephro*) adj3 (f?etus* or f?etal or newborn? or neonat*)).tw,kw,kf. (1233)
325 ((kidney? or renal) adj3 pelvi# dilat* adj5 (f?etus* or f?etal or newborn? or neonat*)).tw,kw,kf. (119)
326 exp enuresis/ (15908)
327 (enures#s or (involuntary adj3 urin*)).tw,kw,kf. (14512)
328 exp urinary tract infection/ (200049)
329 ((urinary or bladder* or kidney* or urethra or ureter) adj3 (inflam* or infect*)).tw,kw,kf. (178836)
330 (cystit#s or urethrit#s).tw,kw,kf. (46943)
331 ((nonaccidental or deliberate or intended) adj3 (injury or injuries or trauma*)).tw,kw,kf. (2095)
332 (physical* adj3 (abus* or assault*)).tw,kw,kf. (27895)
333 or/197-332 [CONDITIONS OF INTEREST] (11780886)
334 exp child/ or exp adolescent/ (7796952)
335 (infant* or infanc* or baby or babies or child* or toddler* or preschool* or school next age* or boy or boys or girl or girls or adolescen* or teen or teens or teenager* or youth or youths or high-school*).tw,kw,kf. (5725015)
336 exp pediatrics/ (202817)
337 p?ediatric*.tw,kw,kf. (1225813)
338 or/334-337 [PAEDIATRIC POPULATION] (9761111)
339 333 and 338 [CONDITIONS OF INTEREST - PAEDIATRIC POPULATION] (2714546)
340 diagnostic imaging/ (292664)
341 (diagnos* adj3 (image? or imaging)).tw,kw,kf. (142084)
342 (x-ray* or xray*).tw,kw,kf. (987718)
343 computer assisted tomography/ (898720)
344 computer assisted diagnosis/ (68110)
345 exp three-dimensional imaging/ (219319)
346 ((3D or 3-D or 3-dimension* or three dimension*) adj (image? or imaging)).tw,kw,kf. (50275)
347 exp echography/ (1491682)
348 (ultrasound* or ultrasonograph* or ultra-sonograph* or ultrasonic* or ultra-sonic*).tw,kw,kf. (1152328)
349 (echograph* or echo-graph* or echotomograph* or echo-tomograph* or echosonograph* or echo sonograph*).tw,kw,kf. (26513)
350 exp radiography/ (2690188)
351 (radiograph* or radiographic imag* or roentgenograph* or roentgeno-graph*).tw,kw,kf. (643183)
352 (fluoroscop* or fluoro-scop*).tw,kw,kf. (92749)
353 exp scintiscanning/ (215767)
354 ((radionuclide* adj2 imag*) or (radio-nuclide* adj2 imag*) or (radionuclide* adj2 scan*) or (radio-nuclide* adj2 scan*) or (radioisotope* adj2 imag*) or (radio-isotope* adj2 imag*) or (radioisotope* adj2 scan*) or (radio-isotope* adj2 scan*) or scintigra* or scinti-gra* or scintiphotograph* or scinti-photograph* or scintiscan* or scinti-scan* or scanograph* or lymphoscintigra* or lympho-scintigra*).tw,kw,kf. (158460)
355 exp tomography/ (3463929)
356 (tomograph* or tomo-graph*).tw,kw,kf. (1219149)
357 (CAT scan* or CT scan* or PET scan* or PET imag* or PT scan* or PT imag*).tw,kw,kf. (412009)
358 (SPECTCT or SPECT CT or "SPECT/CT").tw,kw,kf. (18301)
359 (magnetic resonance imag* or MRI or MRIs or fMRI or fMRIs or NMR imag* or chemical shift imag* or magneti#ation transfer contrast imag* or spin echo imag* or zeugmatograph* or zeugmato-graph*).tw,kw,kf. (1321338)
360 (cineradiograph* or cine-radiograph* or cinefluorograph* or cine-fluorograph* or radiocinematograph* or radio-cinematograph*).tw,kw,kf. (4240)
361 nuclear medicine/ (45685)
362 ((nuclear or atomic) adj1 medicine?).tw,kw,kf. (48672)
363 (nuclear adj1 radiolog*).tw,kw,kf. (1326)
364 (sialogra* or salivogra* or sialoscintigra* or sialo-scintigra*).tw,kw,kf. (3377)
365 (enteroclys* or enterogra*).tw,kw,kf. (6516)
366 (esophagra* or oesophagra* or esophagogra* or oesophagogra*).tw,kw,kf. (7370)
367 ((CT or virtual) adj colonoscop*).tw,kw,kf. (1959)
368 (contrast adj (study or studies or medium)).tw,kw,kf. (47639)
369 (cholangiopancreatogra* or cholangio-pancreatogra* or ERCP or MRCP).tw,kw,kf. (58784)

370 cholecystogra*.tw,kw,kf. (5498)
371 (angiograph* or angio-graph* or angiogram* or angio-gram*).tw,kw,kf. (588438)
372 (perfusion adj3 (image? or imaging)).tw,kw,kf. (43732)
373 or/340-372 [IMAGING] (8476711)
374 339 and 373 [CONDITIONS OF INTEREST - PAEDIATRIC POPULATION - IMAGING] (595814)
375 (exp animal/ or exp animal experimentation/ or exp animal model/ or exp animal experiment/ or nonhuman/ or exp vertebrate/) not (exp human/ or exp human experimentation/ or exp human experiment/) (13180449)
376 374 not 375 [ANIMAL-ONLY REMOVED] (591178)
377 (conference abstract or editorial or letter).pt. (8798466)
378 case report/ or exp case study/ or directory/ (5452829)
379 376 not (377 or 378) [IRRELEVANT PUBLICATION TYPES REMOVED] (309237)
380 exp practice guideline/ (742088)
381 (consensus or guideline* or guidance? or standards or recommendation*).ti,kw,kf. (557132)
382 (expert consensus or consensus statement* or consensus conference* or clinical guideline? or practice guideline? or treatment guideline? or practice parameter* or position statement* or policy statement* or CPG or CPGs).tw,kw,kf. (316008)
383 or/380-382 [GUIDELINE FILTER] (1328574)
384 379 and 383 [CONDITIONS OF INTEREST - PAEDIATRIC POPULATION - IMAGING - GUIDELINES] (6984)
385 limit 384 to yr="2018-current" (2754)
386 385 use emczd [EMBASE RECORDS] (2167)
387 196 or 386 [BOTH DATABASES] (3210)
388 remove duplicates from 387 (2745) [TOTAL UNIQUE RECORDS]
389 388 use medall [MEDLINE UNIQUE RECORDS] (1042)
390 388 use emczd [EMBASE UNIQUE RECORDS] (1703)

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APPENDIX 2. EVIDENCE TABLES

Table PD01. Development delay/congenital malformations

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound	
CAR 2012 [16]	**L01. SUSPECTED CONGENITAL MALFORMATION OF THE BRAIN** - MRI: Indicated [B]: MRI is the definitive examination for suspected congenital malformation of the brain, providing the best definition of brain anatomy. - CT: Indicated [B]: In suspected congenital malformation of the skull, CT is required for the evaluation of bony anatomy. 3-D reconstruction is indicated for patients with craniosynostosis and craniofacial syndromes. **L08. SUSPECTED CEREBRAL PALSY OR DEVELOPMENTAL DELAY** - MRI: Specialized investigation [A]: The clinical diagnosis of cerebral palsy or developmental delay is rarely aided by imaging. However, MRI can demonstrate periventricular leukomalacia or hypoxic-ischemic injury in children with cerebral palsy. MRI can also demonstrate abnormalities in some genetic/metabolic conditions associated with developmental delay. - CT: Specialized investigation [A]: CT may be considered if MRI is contraindicated.
RCR 2017 [17]	**P07. CONGENITAL DISORDERS OF THE BRAIN IN CHILDREN** - MRI [B] - US [C] - CT [C] **P13. DEVELOPMENTAL DELAY: SUSPECTED CEREBRAL PALSY** - MRI [A]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD02. Suspected congenital malformation of the spine/ spinal dysraphism

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L02. SUSPECTED CONGENITAL MALFORMATION OF THE SPINE** - MRI: Indicated [B]: MRI is the definitive examination for suspected congenital malformation of the spine, giving the best depiction of the spinal cord, conus and cauda equina. - CT: Moderately indicated [B]: Targeted CT may be required in addition to MRI in order to define bony anatomy, e.g. with complex forms of spinal dysraphism. **L19. SUSPECTED SPINAL DYSRAPHISM, SCREENING IN LOW RISK INFANTS** - US: Moderately indicated [B]: US has very good diagnostic performance, and it does not require sedation. Therefore, it is the preferred screening modality in infants of diabetic mothers and infants with intergluteal dimples. However, the yield in this population is very low. US should be performed before 6 months of age, because visualization becomes progressively more difficult with ossification of the posterior elements. - MRI: Not indicated [B]: MRI has the best diagnostic performance, but it requires sedation. It should therefore not be used as a screening modality. - XR lumbar spine: Not indicated [B]: XR lumbar spine has the poorest diagnostic performance and exposes children to radiation. It should therefore not be used as a screening modality for spinal dysraphism. **L20. SUSPECTED SPINAL DYSRAPHISM, SCREENING IN HIGHER RISK INFANTS** - US: Indicated [B]**:** Infants with lumbosacral dimple, hairy patch, hemangioma or anorectal/cloacal malformation are at higher risk of spinal dysraphism. US should be sufficient to rule out spinal dysraphism in infants presenting with only a lumbosacral dimple. - MRI: Specialized investigation [B]: MRI requires sedation, and the strength of the clinical indication must be weighed against the risk of sedation in consultation with a neurosurgeon. MRI should be considered when the risk of spinal dysraphism is high despite a negative US, or when the child is too old to have US. - XR lumbar spine: Not indicated [B]: XR lumbar spine has the poorest diagnostic performance and exposes children to radiation. It should therefore not be used as a screening modality for spinal dysraphism.
ACR 2019 [18] (Jones et al)	**SCOLIOSIS – CHILD** ▪ Variant 1. Child. Congenital scoliosis. Initial imaging.
RCR 2017 [17]	**P08. CONGENITAL DISORDERS OF THE SPINE IN CHILDREN** - MRI [B] - XR [B] - US [C] - CT [C] **P18. SPINA BIFIDA OCCULTA IN CHILDREN** - US/MRI [C] **P19. SACRAL DIMPLE/PIT OR OTHER CUTANEOUS STIGMATA IN CHILDREN (E.G., HAIRY PATCH)**

Appendix 1. Search Strategies

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound; **XR**: radiograph	
	- US/MRI [B]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD03A. Hydrocephalus: Suspected hydrocephalus

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound	
CAR 2012 [16]	**L03. SUSPECTED HYDROCEPHALUS, NEW DIAGNOSIS** - MRI: Indicated [B]: MRI is the definitive examination for all malformations of the brain, offering superior resolution of brain anatomy, compared to other modalities. - CT: Moderately indicated [B]: CT can identify hydrocephalus rapidly and may therefore be preferred to MRI in a patient who is neurologically unstable. CT can provide some information about the cause of hydrocephalus and associated brain malformations when MRI is not readily available; however, its resolution of brain anatomy is inferior to that of MRI. - US: Moderately indicated [B]: US can identify hydrocephalus rapidly and without the need for ionizing radiation or sedation in young infants with open fontanelles; however, US alone does not permit a complete evaluation of the cause of hydrocephalus or associated brain malformations.

Abbreviations: CAR: Canadian Association of Radiologists

Table PD03B. Hydrocephalus: Treated hydrocephalus, suspected shunt malfunction

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L04. TREATED HYDROCEPHALUS, SUSPECTED SHUNT MALFUNCTION** - XR shunt series: Indicated [B]: XR of the whole shunt system (skull, chest, abdomen/pelvis) is required to identify the site of interruption. - MRI: Indicated [B]: MRI focused on the evaluation of size and configuration of cerebrospinal fluid spaces can be performed rapidly and without sedation in most patients, using single shot fast spin echo sequences. MRI is contraindicated in patients with some biomedical devices. Programmable shunt valves may be a problem. - US head: Moderately indicated [B]: US can identify hydrocephalus rapidly and without the need for ionizing radiation or sedation in young infants with open fontanelles. However, US may not reliably detect subtle changes in size or configuration of cerebrospinal fluid spaces on serial examinations. - CT: Moderately indicated [B]: CT can reliably detect changes in size and configuration of cerebrospinal fluid spaces on serial examinations. However, multiple examinations over time may impose a significant radiation burden on patients with repeated episodes of shunt malfunction. CT may be used when US is not appropriate and MRI is unavailable or contraindicated. **L05. TREATED HYDROCEPHALUS, SUSPECTED SHUNT MALFUNCTION DUE TO CSF LOCULATION AROUND THE DISTAL END OF THE SHUNT** - US abdomen/pelvis: Indicated [C]: US can detect CSF loculation around the distal end of the shunt.
RCR 2017 [17]	**P12. HYDROCEPHALUS: SUSPECTED SHUN MALFUNCTION IN CHILDREN** - MRI [B] - CT [B] - US [B] - XR [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD04. Craniosynostosis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	This scenario was not covered in the 2012 guideline
RCR 2017 [17]	**P09. ABNORMAL HEAD SHAPE IN CHILDREN** - US [B] - MRI [C] - Skull XR [C] - CT [C]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD07. Congenital or acquired hearing loss

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging	
CAR 2012 [16]	This scenario was not covered in the 2012 guideline.
RCR 2017 [17]	**P11. DEAFNESS/HEARING LOSS IN CHILDREN** - CT/MRI [A]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD08A. Febrile seizure

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [16]	**L06. FEBRILE SEIZURE** - Imaging: Not indicated [B]: Abnormalities can be found in children with febrile seizures, especially focal or prolonged febrile seizures. However, there is no evidence that management is altered by imaging. Meningitis must be ruled out clinically, using lumbar puncture if appropriate.
ACR 2021 [19] (Trofimova et al)	**SEIZURE – CHILD** ▪ Variant 2. Children 6 months to 5 years of age. Simple febrile seizures. Initial imaging. ▪ Variant 3. Children 6 months to 5 years of age. Complex febrile seizures. Initial imaging.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD08B. Non-febrile seizure

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **PET-CT**: positron emission tomography-computed tomography; **SPECT**: Single-photon emission computed tomography; **XR**: radiograph	
CAR 2012 [16]	**L07. SUSPECTED EPILEPSY** - MRI: Indicated [B]: MRI is the definitive examination for all malformations of the brain, offering superior resolution of brain anatomy, compared to CT. It is therefore preferred to CT for the detection and characterization of malformations of cortical development and other epileptogenic lesions in children. Imaging is not indicated in any of the following conditions, which are typically not associated with structural epileptogenic lesions: childhood absence epilepsy, juvenile absence epilepsy, juvenile myoclonic epilepsy, benign childhood epilepsy with centrotemporal spikes (BECTS). - CT: Moderately indicated [B]: CT can reveal structural lesions that cause seizures, but has significantly lower resolution than MRI and requires radiation exposure. CT may be helpful to rule out acute or evolving intracranial pathology (e.g. hemorrhage, mass) in a child with non-febrile seizures, if MRI is not readily available or if MRI is contraindicated.
RCR 2017 [17]	**P10. EPILEPSY IN CHILDREN** - MRI [A] - CT [B] - PET-CT/NM (seek specialist advice)/ Regional cerebral blood flow SPECT [B] - Skull XR [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD09. Headache: Acute/subacute

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **CTA**: computed tomography angiography; **MRA**: magnetic resonance angiography; **MRI:** magnetic resonance imaging; **XR**: radiograph	
CAR 2012 [16]	**L10. HEADACHE: ACUTE, SUDDEN, SEVERE, "THUNDERCLAP"** - CT: Indicated [B]: Although rare, aneurysmal hemorrhage can occur in children. In cases of sudden, severe headache ("thunderclap" headache), CT has excellent sensitivity and specificity for the detection of acute blood. CTA is required for the detection and characterization of aneurysms and vascular malformations. - MRI: Indicated [B]: Diffusion weighted imaging (DWI), fluid attenuated inversion recovery (FLAIR) and gradient recalled echo (GRE) sequences should be used to maximize detection of acute blood. MRA of the circle of Willis is required for the detection and characterization of aneurysms and vascular malformations.
ACR 2018 [20] (Hayes et al)	**HEADACHE – CHILD** ▪ Variant 1. Child. Primary headache. Initial imaging. ▪ Variant 2. Child. Secondary headache. Initial imaging. ▪ Variant 3. Child. Sudden severe headache (thunderclap headache). Initial imaging. ▪ Variant 4. Child. Headache attributed to infection. Initial imaging. ▪ Variant 5. Child. Headache attributed to remote trauma. Initial imaging.
RCR 2017 [17]	**P14. HEADACHE IN CHILDREN** - MRI/CT [B] - Skull XR [C]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD10. Headache: Chronic/recurrent

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **XR**: radiograph	
CAR 2012 [16]	**L09. HEADACHE: CHRONIC/RECURRENT** - MRI: Specialized investigation [B]: In chronic/recurrent headache with a normal neurological examination, the yield of imaging is low. MRI may be used to rule out CNS pathology, if there remains concern after an evaluation by a neurologist. MRI is preferred to CT, because of its superior anatomical resolution and lack of radiation. Consideration should be given to magnetic resonance venography (MRV) to rule out venous sinus thrombosis. - CT: Specialized investigation [B]: CT may be used to rule out a space occupying lesion, if there remains concern after an evaluation by a neurologist. CT may be considered where MRI is not available or MRI is contraindicated. Consideration should be given to contrast enhanced CT to rule out venous sinus thrombosis.
ACR 2018 [20] (Hayes et al)	**HEADACHE – CHILD** ▪ Variant 1. Child. Primary headache. Initial imaging. ▪ Variant 2. Child. Secondary headache. Initial imaging. ▪ Variant 4. Child. Headache attributed to infection. Initial imaging.
RCR 2017 [17]	**P14. HEADACHE IN CHILDREN** - MRI/CT [B] - Skull XR [C]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD11A. Neck mass/nodule: Thyroid mass/nodule

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	US: ultrasound
CAR 2012 [16]	This scenario was not covered in the 2012 guideline.
European Thyroid Association 2022 [21] (Lebbink et al)	**PEDIATRIC THYROID NODULES** - Recommendation 3A: Thyroid US (2S) - Recommendation 3B: Complete neck US (4S)

Abbreviations: CAR: Canadian Association of Radiologists

Table PD11B. Neck mass/nodule: Non-thyroid mass/nodule

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [16]	This scenario was not covered in the 2012 guideline.
ACR 2019 [22] (Aulino et al)	**NECK MASS** ▪ Variant 4. Child. Neck mass(es). Not parotid region or thyroid. Initial imaging.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD12A. Sinusitis: Acute sinusitis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **XR**: radiograph	
CAR 2012 [16]	**L11. UNCOMPLICATED ACUTE SINUSITIS** - Imaging: Not indicated [B]: Mucosal thickening is frequently seen in asymptomatic children, limiting the value of imaging for ruling in/out sinusitis. **L12. DIAGNOSIS OF SINUSITIS IN DOUBT** - XR sinuses: Moderately indicated [B]: XR is not reliable for confirming the diagnosis (see above). However, in some circumstances, such as when the diagnosis of sinusitis is in doubt, a negative XR may be helpful in shifting the focus of therapy. - CT sinuses: Not indicated [B]: The anatomical resolution of CT is not required in this scenario. Therefore, the increased radiation dose is not warranted. **L14. COMPLICATED SINUSITIS** - CT sinuses: Indicated [B]: CT with contrast enhancement can be used to assess for periorbital cellulitis, cavernous sinus thrombosis, and epidural/subdural empyema. The threshold for imaging should be lower in immunocompromised children. - MRI sinuses: Indicated [B]: MRI is superior to CT for the assessment of epidural/subdural empyema and brain abscess. MRI is therefore preferred when intracranial extension is strongly suspected. The threshold for MRI should be lower in immunocompromised children. - XR sinuses: Not indicated [B]: The anatomical resolution of XR is not sufficient to assess complicated sinusitis (e.g. periorbital swelling, ptosis, visual changes, cranial nerve palsies, altered mental status).
ACR 2018 [23] (Tekes et al)	**SINUSITIS – CHILD** ▪ Variant 1. Child. Uncomplicated acute sinusitis. Initial imaging.
RCR 2017 [17]	**P15. SUSPECTED SINUSITIS IN CHILDREN** - MRI/CT [B] - XR sinus [C]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD12B. Sinusitis: Chronic sinusitis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **XR**: radiograph	
CAR 2012 [16]	**L13. DEFINITE SINUSITIS, RESISTANT TO MAXIMAL MEDICAL THERAPY** - CT sinuses: Specialized investigation [B]: CT can demonstrate anatomical causes of sinus obstruction that may require surgical intervention. It should therefore be performed in conjunction with ENT evaluation. - XR sinuses: Not indicated [B]: The anatomical resolution of XR is not sufficient to assess for anatomical causes of sinus obstruction.
ACR 2018 [23] (Tekes et al)	**SINUSITIS – CHILD** ▪ Variant 2. Child. Persistent sinusitis (worsening course or severe presentation, or not responding to treatment), or recurrent sinusitis, or chronic sinusitis, or define paranasal sinus anatomy before functional endoscopic sinus surgery. Initial imaging. ▪ Variant 3. Child. Sinusitis with clinical concern of orbital or intracranial complications. Initial imaging. ▪ Variant 4. Child. Suspected invasive fungal sinusitis. Initial imaging.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD13A. Torticollis: Congenital torticollis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L15. CONGENITAL TORTICOLLIS** - US: Indicated [B]: US of the sternocleidomastoid muscles is useful to assess for fibromatosis colli. If US is negative, other imaging is indicated (see L16).
RCR 2017 [17]	**P16. TORTICOLLIS WITHOUT TRAUMA IN CHILDREN** - US [B] - XR [B] - MRI/CT [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD13B. New onset torticollis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L16. NEW ONSET TORTICOLLIS, NO HISTORY OF TRAUMA** - XR: Indicated [B]: Muscular causes are most common, but XR is advised when history and physical examination are atypical. - MRI: Specialized investigation [B]: Persistent torticollis for one week justifies further imaging, following orthopaedic or neurosurgical consultation. MRI is preferred to CT when available, because of its superior definition of soft tissues and its lack of ionizing radiation. - CT: Specialized investigation [B]: Persistent torticollis for one week justifies further imaging, following orthopaedic or neurosurgical consultation. CT may be used if MRI is contraindicated.
RCR 2017 [17]	**P16. TORTICOLLIS WITHOUT TRAUMA IN CHILDREN** - US [B] - XR [B] - MRI/CT [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD15. Back pain

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **XR**: radiograph	
CAR 2012 [16]	**L17. BACK PAIN** - NM: Indicated [C]: NM bone scan with SPECT of the spine can be used to localize the site of abnormality for further imaging. - MRI: Specialized investigation [B]: Persistent back pain in children may have an underlying cause and justifies investigation. Back pain with scoliosis or neurological signs merits imaging. Choice of imaging should be made in consultation with a specialist (e.g. spine surgeon, rheumatologist) to maximize yield. - CT: Specialized investigation [B]: Persistent back pain in children may have an underlying cause and justifies investigation. Back pain with scoliosis or neurological signs merits imaging. Choice of imaging should be made in consultation with a specialist (e.g. spine surgeon, rheumatologist) to maximize yield.
German Society for Pediatric and Adolescent Medicine 2022 [25] (Frosch et al)	**BACK PAIN IN CHILDREN AND ADOLESCENTS** - Recommendation 10 *(A, level of evidence 2, consensus 100%)* - Recommendation 11 (*A, expert consensus 100%)*
RCR 2017 [17]	**P17. BACK PAIN IN CHILDREN WITH ANY OF THE FOLLOWING FEATURES:** - MRI [B] - CT [B] - XR [C] - NM [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD16. Hip pain or limping referable to hip pathology

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
MRI: magnetic resonance imaging; **NM**: nuclear medicine; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L25. HIP PAIN OR LIMPING REFERABLE TO HIP PATHOLOGY, INITIAL EVALUATION** - XR: Indicated [C]: XR is the most appropriate first imaging examination for suspected avascular necrosis and slipped capital femoral epiphysis. AP and frog leg lateral views of the pelvis and both hips should be performed, with gonadal shielding on one of these views. - US: Indicated [B]: US is the most appropriate initial imaging examination for suspected septic arthritis, transient synovitis, juvenile idiopathic arthritis or hemarthrosis. US has high sensitivity for the detection of hip effusion but cannot distinguish reliably among the different causes.
ACR 2018 [26] (Safdar et al)	**ACUTELY LIMPING CHILD UP TO AGE 5** ▪ Variant 2. Child up to age 5. Acute limp. Pain. Localized symptoms. No concern for infection. Initial imaging. ▪ Variant 4. Child up to age 5. Acute limp. Symptoms localized to the hip. Concern for infection. Initial imaging. ▪ Variant 5. Child up to age 5. Acute limp. Symptoms localized to lower extremity (not pelvis or hips). Concern for infection. Initial imaging.
RCR 2017 [17] (see P35, P37, M21)	**P34. HIP PAIN IN CHILDREN: SUSPECTED IRRITABLE HIP** - US [B] - XR [C] - MRI [B] **P35. LIMP (NO TRAUMA) IN CHILDREN** - US [B] - MRI [B] - XR [B] - NM (bone scan) [B]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD17. Limping and unable to localize symptoms

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
IV: intravenous; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L27. LIMPING IN A CHILD TOO YOUNG TO LOCALIZE SYMPTOMS** - XR tibia/fibula: Indicated [C]: In the initial evaluation, XR of the tibia and fibula may identify a toddler's fracture. - US hip: Indicated [B]: US may identify hip pathology. In the initial evaluation, US has high sensitivity for the detection of hip effusion, but cannot distinguish reliably among the different causes. - NM: Moderately indicated [B]: NM is moderately indicated following a negative XR and US. NM bone scan has a higher radiation dose than the above combination of XR and US. Therefore, NM should be considered as a second-line investigation if XR and US fail to localize the pathology and symptoms persist. - MRI: Specialized investigation [C]: MRI may be used instead of NM or as an adjunct to NM at some centres, depending on availability and local expertise.
ACR 2018 [26] (Safdar et al)	**ACUTELY LIMPING CHILD UP TO AGE 5** ▪ Variant 1. Child up to age 5. Acute limp. Nonlocalized symptoms. No concern for infection. Initial imaging. ▪ Variant 3. Child up to age 5. Acute limp. Nonlocalized symptoms. Concern for infection. Initial imaging.
RCR 2017 [17]	**P35. LIMP (NO TRAUMA) IN CHILDREN** - US [B] - MRI [B] - XR [B] - NM (bone scan) [B]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD18. Developmental dysplasia of the hip

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	US: ultrasound; **XR**: radiograph
CAR 2012 [16]	**L30. SUSPECTED DEVELOPMENTAL DYSPLASIA OF THE HIP, NEWBORN WITH RISK FACTORS** - US: Indicated [A]: US is the examination of choice in the newborn with risk factors for DDH (e.g. family history, primiparous mother, female gender, breech presentation, oligohydramnios, club foot, genu recurvatum, torticollis). US should be performed between 4 and 6 weeks of age to reduce the false positive rate resulting from physiological laxity in the newborn period. Treatment of DDH within 6 to 8 weeks after birth is associated with significantly improved outcomes. - XR: Not indicated [C]: US is the examination of choice in the newborn period. XR provides no significant added information and exposes infants to radiation. **L31. CLINICAL EVIDENCE OF DDH, INFANT < 3 MONTHS OF AGE** - US: Indicated [B]: US best depicts the relationship between the unossified femoral head and acetabulum. Alternatively, where clinical suspicion is strong, consideration should be given to direct referral to orthopaedics. - XR: Not indicated [C]: US is the examination of choice in the newborn period. XR provides no added information and exposes infants to radiation. **L32. CLINICAL EVIDENCE OF DDH, INFANT 3-6 MONTHS OF AGE** - US: Indicated [C]: US visualization may be compromised by ossification of the femoral head in some infants. - XR: Moderately indicated [C]: XR can depict ossification of the femoral head, contour of the acetabulum and alignment of the hip. **L33. CLINICAL EVIDENCE OF DDH, INFANT > 6 MONTHS OF AGE** - XR: Indicated [C]: XR can depict ossification of the femoral head, contour of the acetabulum and alignment of the hip. - US moderately indicated [C]: US visualization may be compromised by ossification of the femoral head in many infants.
ACR 2019 [27,28] (Nguyen et al)	**DEVELOPMENTAL DYSPLASIA OF THE HIP – CHILD** ▪ Variant 1. Child, younger than 4 weeks of age. Equivocal physical examination or risk factors for DDH. Initial imaging. ▪ Variant 2. Child, between 4 weeks to 4 months of age. Equivocal physical examination or risk factors for DDH. Initial imaging. ▪ Variant 3. Child, younger than 4 months of age. Physical findings of DDH. Initial imaging. ▪ Variant 4. Child, between 4 to 6 months of age. Concern for DDH. Initial imaging. ▪ Variant 5. Child, older than 6 months of age. Concern for DDH. Initial imaging. *Did not extract: Variant 6. Child, younger than 6 months of age. Known diagnosis of DDH, nonoperative surveillance imaging in harness.*
RCR 2017 [17]	**P37. SUSPECTED DDH IN INFANTS** - US [A]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD19. Suspected Osgood-Schlatter disease

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
MRI: magnetic resonance imaging; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L34. SUSPECTED OSGOOD-SCHLATTER DISEASE** - XR: Not indicated [C]: Osgood-Schlatter disease is a clinical diagnosis. XR findings of Osgood-Schlatter disease overlap with normal findings. XR may be considered if the diagnosis is uncertain, or if more serious bone pathology is being considered.
RCR 2017 [17]	**P38. SUSPECTED OSGOOD-SCHLATTER DISEASE IN CHILDREN** - XR [B] - US/MRI [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD20. Scoliosis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **XR**: radiograph	
CAR 2012 [16]	**L35. IDIOPATHIC ADOLESCENT SCOLIOSIS, INITIAL EVALUATION** - XR full spine: Indicated [C]: The presence of scoliosis should be established by physical examination. The purpose of radiographs is to quantify the scoliosis and to assess for malsegmentation. Frontal view should be performed in PA projection in all cases. Lateral view should be performed for scoliosis greater than 10 degrees. **L36. SUSPECTED NON-IDIOPATHIC SCOLIOSIS** - XR full-spine: Indicated [C]: PA and lateral views may be performed for initial localization and characterization of pathology in patients with suspected non-idiopathic scoliosis (e.g. onset before 11 years of age, rapid progression, curve > 45 degrees, apex left thoracic curve, apex right lumbar curve, short segment scoliosis, associated pain, neurological findings or midline cutaneous anomalies). - NM: Indicated [C]: Should be performed for initial localization if vertebral tumour is suspected. - CT: Indicated [C]: Should be targeted to focal bone pathology identified by XR or NM examinations. - MRI: Indicated [C]: Should include sequences targeted to the pathology, as well as sequences covering the whole spine for adequate assessment of cord, conus and cauda equina.
ACR 2019 [18] (Jones et al)	**SCOLIOSIS – CHILD** ▪ Variant 2. Child (0 to 9 years of age). Early onset idiopathic scoliosis. Initial imaging. ▪ Variant 3. Adolescent (10 to 18 years of age). Adolescent idiopathic scoliosis. No risk factors. Initial imaging. ▪ Variant 4. Adolescent (10 to 18 years of age). Adolescent idiopathic scoliosis. Risk factors. Initial imaging.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD21. Short stature/growth failure

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	XR: radiograph
CAR 2012 [16]	**L39. SHORT STATURE/GROWTH FAILURE, CHILD AGED < 1 YEAR** - XR knee: Indicated [A]: XR knee is more precise than XR of the hand and wrist for assessment of bone age in a child aged < 1 year. **L40. SHORT STATURE/GROWTH FAILURE, CHILD AGED ≥ 1 YEAR** - XR hand and wrist: Indicated [A]: A single PA view of the non-dominant hand and wrist should be obtained and compared to published standards.
RCR 2017 [17]	**P33. SHORT STATURE, GROWTH FAILURE** - XR for bone age [A]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD22A. Uncomplicated pneumonia

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CXR: chest radiograph; **POCUS**: point of care ultrasound; **US**: ultrasound	
CAR 2012 [16]	**L43. CHEST INFECTION, UNCOMPLICATED PRESENTATION** - CXR: Not indicated [A]: Routine CXR does not improve clinical outcome in children with uncomplicated pneumonia in the ambulatory care setting. Follow-up CXR is not indicated for uncomplicated pneumonia that responds to treatment.
ACR 2020 [30] (Chan et al)	**PNEUMONIA IN THE IMMUNOCOMPETENT CHILD** ▪ Variant 1. Child. 3 months of age and older. Immunocompetent. Suspected uncomplicated community-acquired pneumonia in a well-appearing child who does not require hospitalization. Initial imaging ▪ Variant 3. Child. 3 months of age and older. Immunocompetent. Suspected hospital-acquired pneumonia. Initial imaging.
European Society of Paediatric and Neonatal Intensive Care 2020 [31]	**POCUS FOR CRITICALLY ILL NEONATES AND CHILDREN** - POCUS
Polish Guideline 2020 [32] (Jaworska et al.)	**APPLICATION OF LUNG ULTRASOUND IN PNEUMONIA AND BRONCHIOLITIS** - Lung US
RCR 2017 [17]	**P01. ACUTE COMMUNITY-ACQUIRED CHEST INFECTION IN CHILDREN** - CXR [A]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD22B. Pneumonia with complications, including recurrent pneumonia

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **CXR**: radiograph; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **UGI**: upper gastrointestinal series; **US**: ultrasound	
CAR 2012 [16]	**L44. CHEST INFECTION, NON-SPECIFIC CLINICAL FINDINGS OR SEVERE DISEASE** - CXR: Indicated [B]: CXR can confirm pneumonia in children with a non-specific presentation and demonstrate complications of bacterial pneumonia (e.g. lung abscess, empyema) in severely ill children. **L45. CHEST INFECTION, RECURRENT OR PERSISTENT PNEUMONIA** - CXR: Indicated [C]: Evaluation of CXR should include review of any prior films. Spirometry should be considered if asthma is suspected, as this is the most common cause of recurrent pneumonia in North America. - CT: Specialized investigation [C]: High resolution CT of the lung is helpful for the confirmation and evaluation of suspected bronchiectasis. CT may be helpful when CXR raises suspicion of a congenital lung malformation, tracheobronchial structural anomaly or vascular ring. The strength of the clinical indication must be weighted against the risks of radiation exposure. Alternatively, consideration may be given to bronchoscopy at the discretion of a pediatric respirology specialist. - MRI: Specialized investigation [C]: MRI may be helpful when CXR raises suspicion of a vascular ring. The strength of the clinical indication must be weighted against the risks of sedation. - US: Echocardiography specialized investigation [C]: Echocardiography may be an alternative to MRI depending on local expertise when CXR raises suspicion of a vascular ring. - UGI: Moderately indicated [C]: UGI may be helpful if chronic aspiration is suspected, particularly with involvement of multiple lobes. Alternatively, consideration may be given to esophagoscopy or esophageal pH probe. - NM reflux scan: Moderately indicated [C]: Reflux scan may be helpful if chronic aspiration is suspected, particularly with involvement of multiple lobes. Alternatively, consideration may be given to esophagoscopy or esophageal pH probe.
ACR 2020 [30] (Chan et al)	**PNEUMONIA IN THE IMMUNOCOMPETENT CHILD** ▪ Variant 2. Child. 3 months of age and older. Immunocompetent. Community-acquired pneumonia that does not respond to initial outpatient treatment or requires hospital admission. Initial imaging ▪ Variant 4. Child. Immunocompetent. Pneumonia complicated by suspected moderate or large parapneumonic effusion by chest radiograph. Next imaging study ▪ Variant 5. Child. Immunocompetent. Pneumonia complicated by suspected bronchopleural fistula by chest radiograph. Next imaging study. ▪ Variant 6. Child. Immunocompetent. Pneumonia complicated by suspected lung abscess by chest radiograph. Next imaging study ▪ Variant 7. Child. 3 months of age and older. Immunocompetent. Recurrent nonlocalized pneumonia by chest radiograph. Next imaging study ▪ Variant 8. Child. 3 months of age and older. Immunocompetent. Recurrent localized pneumonia by chest radiograph. Next imaging study.
European	**POINT OF CARE US FOR CRITICALLY ILL NEONATES AND CHILDREN**

Appendix 2. Evidence tables

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **CXR**: radiograph; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **UGI**: upper gastrointestinal series; **US**: ultrasound	
Society of Paediatric and Neonatal Intensive Care 2020 [31] (Singh et al)	- Recommendation 13 *(quality of evidence B).*
Polish Guideline 2020 [32] (Jaworska et al.)	**APPLICATION OF LUNG ULTRASOUND IN PNEUMONIA AND BRONCHIOLITIS** - Lung US

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD23. Bronchiolitis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
US: ultrasound	
CAR 2012 [16]	This scenario was not covered in the 2012 guideline.
European Society of Paediatric and Neonatal Intensive Care 2020 [31] (Singh et al)	**POCUS FOR CRITICALLY ILL NEONATES AND CHILDREN** - Recommendation 16 *(quality of evidence C).*
Polish Guideline 2020 [32] (Jaworska et al.)	**APPLICATION OF LUNG ULTRASOUND IN PNEUMONIA AND BRONCHIOLITIS** - Lung US

Abbreviations: CAR: Canadian Association of Radiologists

Table PD24A. Suspected foreign body: Gastrointestinal

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
ABX: abdominal radiograph; **CXR**: radiograph	
CAR 2012 [16]	**L58. SWALLOWED FOREIGN BODY** - XR chest and abdomen: Indicated [C]: For a suspected sharp or potentially poisonous foreign body (e.g. battery), XR should cover the aerodigestive tract from the pharynx to the rectum.
Italian Society of Pediatric Gastroenterology, Hepatology and Nutrition 2020 [33] (Oliva et al)	**FOREIGN BODY AND CAUSTIC INGESTION IN CHILDREN** - Recommendation 2.2 (Moderate recommendation; high quality of evidence)
RCR 2017 [17]	**P22. INGESTED FOREIGN BODY IN CHILDREN** - CXR & lateral neck XR [B] - AXR [C]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD24B. Suspected foreign body: Airway

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **CXR:** chest radiograph; **XR**: radiograph	
CAR 2012 [16]	**L46. SUSPECTED INHALED FOREIGN BODY, INITIAL INVESTIGATION** - CXR (inhalation/exhalation): Indicated [B]: CXR can demonstrate radio-opaque foreign bodies, focal atelectasis and focal air trapping on expiration. Right and left decubitus views may offer higher diagnostic yield than inspiration/expiration views in young, uncooperative children. **L47. SUSPECTED INHALED FOREIGN BODY, CXR NEGATIVE** - XR, airway fluoroscopy: Moderately indicated [B]: Airway fluoroscopy is a dynamic study that can visualize the entire tracheobronchial tree, identify focal air trapping or multiple sites of obstruction, and evaluate relative movement of the hemidiaphragms. Airway fluoroscopy does not replace bronchoscopy, which is mandatory in a child with history, physical findings and CXR consistent with inhaled foreign body.
RCR 2017 [17]	**P03. INHALED FOREIGN BODY IN CHILDREN** - CXR [B] - CT [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD25. Asthma

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **CXR**: radiograph; **HRCT**: high resolution computed tomography	
CAR 2012 [16]	**L48. ASTHMA** - CXR: Not indicated [B]: CXR is normal or shows features of airways inflammation in most children with wheezing. CXR is only helpful if a complication of asthma (e.g. pneumothorax, lobar collapse) is suspected clinically, or if another cause for recurrent wheezing (e.g. aspiration) is suspected clinically.
CHEST 2020 [34] (Chang et al)	**MANAGING CHRONIC COUGH AS A SYMPTOM IN CHILDREN** - Recommendation 6 (Grade 1B) - Recommendation 8 (Grade 1B) - Recommendation 20 (Grade 1B)
European Respiratory Society 2020 [35] (Morice et al)	**CHRONIC COUGH IN ADULTS AND CHILDREN** Question 1: should chest CT scan be routinely performed on chronic cough patients with normal chest radiograph and physician examination? (Conditional, very low).
RCR 2017 [17]	**P02. RECURRENT PRODUCTIVE COUGH IN CHILDREN** - CXR [C] - CT (HRCT) [C] **P04. WHEEZE IN CHILDREN** - CXR [B]
SFMU/ SRLF/ FGPICE 2019 [36] (Le Conte et al)	**MANAGEMENT OF SEVERE ASTHMA EXACERBATION** - R1.2: Expert opinion

Abbreviations: CAR: Canadian Association of Radiologists; CHEST: American College of Chest Physicians; RCR: Royal College of Radiologists; SFMU/SRLF/FGPICE: Société Française de Médecine d'Urgence, the Société de Réanimation de Langue Française and the French Group for Pediatric Intensive Care and Emergencies

Table PD26. Stridor

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **CXR**: chest radiograph; **GI**: gastrointestinal; **MRI:** magnetic resonance imaging; **XR**: radiograph	
CAR 2012 [16]	**L49. ACUTE STRIDOR, UNSTABLE CHILD** - Imaging: Not indicated [C]: Emergency airway management takes precedence over imaging. **L50. ACUTE STRIDOR, STABLE CHILD** - XR neck: Indicated [C]: Frontal and lateral XR of the neck allows evaluation of the epiglottis, glottis and subglottic airway and may be of value to confirm suspected obstructing foreign body or retropharyngeal abscess. **L51. PERSISTENT STRIDOR, INITIAL INVESTIGATION** - CXR: Indicated [C]: CXR may be used as an initial screen for evidence of recurrent aspiration or a vascular ring. - XR airway fluoroscopy: Indicated [B]: Airway fluoroscopy may be considered if CXR is negative, or if a vocal cord abnormality, laryngomalacia, tracheomalacia or airway compression is considered most likely. Airway fluoroscopy is a safe, quick and noninvasive method for evaluating the entire airway dynamically. Endoscopy is an alternative consideration, depending on local expertise. - XR upper gastrointestinal series: Moderately indicated [C]: Upper gastrointestinal series is most appropriate if recurrent aspiration secondary to gastroesophageal reflux or tracheoesophageal fistula is considered most likely. Upper gastrointestinal series can also identify a vascular ring, but CT/MRI is preferred for this diagnosis. **L52. PERSISTENT STRIDOR, FURTHER INVESTIGATION** - CT chest: Specialized investigation [C]: CT chest can evaluate the mediastinum, hila, tracheobronchial tree and lung parenchyma. CT should be considered after pediatric respirology consultation to weigh the clinical indication against the risks of radiation exposure. - MRI chest: Specialized investigation [C]: MRI can evaluate vascular rings and other compressive mediastinal lesions well. MRI may require sedation, which is problematic in a child with stridor. MRI should therefore be considered after pediatric respirology consultation to weigh the clinical indication against the risks of sedation.
RCR 2017 [17]	**P05. ACUTE STRIDOR IN CHILDREN** - Lateral XR soft tissue neck [B] - CXR [B] - MRI/CT/Upper GI contrast studies [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologists

Table PD28A. Bilious vomiting, suspected proximal obstruction or uncertain level of obstruction

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
AXR: abdominal radiograph; **UGI**: upper gastrointestinal series; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L60. BILIOUS VOMITING IN AN INFANT OR YOUNG CHILD, INITIAL INVESTIGATION** - XR abdomen: Indicated [C]: Bilious vomiting in an infant or young child is an emergency. AXR is needed immediately to rule out perforation and to distinguish proximal obstruction from distal obstruction. Normal findings on AXR do not rule out malrotation/volvulus. Further imaging is needed, as outlined below. **L61. BILIOUS VOMITING IN AN INFANT OR YOUNG CHILD, SUSPECTED PROXIMAL OBSTRUCTION** - UGI: Indicated [B]: UGI should be performed emergently to assess for malrotation/volvulus. If UGI is negative or equivocal, further imaging investigations should be considered. This may include small bowel follow-through, contrast enema and/or US. - Contrast enema: Moderately indicated [B]: Contrast enema has lower sensitivity and specificity than UGI for malrotation and is no longer considered the preferred first-line investigation. Contrast enema should be considered as an ancillary investigation, if UGI is negative or equivocal. - US: Moderately indicated [B]: US has a high false positive rate for malrotation, compared to UGI. Therefore, positive findings on US require confirmation by UGI.
ACR 2020 [38] (Alazraki et al)	**VOMITING IN INFANTS** ▪ Variant 1. Vomiting within the first 2 days after birth. Poor feeding or no passage of meconium. Initial imaging. ▪ Variant 2. Vomiting within the first 2 days after birth. Radiographs show classic double bubble or triple bubble with little or no gas distally (suspected proximal bowel obstruction or atresia). Next imaging study. *Did not extract: Variant 5. Bilious vomiting in an infant older than 2 days (suspected malrotation). Initial imaging.*

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD28B. Suspected distal obstruction

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CAR 2012 [16]	**L62. BILIOUS VOMITING IN AN INFANT OR YOUNG CHILD, SUSPECTED DISTAL OBSTRUCTION** - Contrast enema: Indicated [B]. Contrast enema should be performed emergently to determine the site and etiology of distal obstruction.
ACR 2020 [38] (Alazraki et al)	**VOMITING IN INFANTS** ▪ Variant 3. Vomiting within the first 2 days after birth. Radiographs show a distal bowel obstruction. Next imaging study. ▪ Variant 4. Bilious vomiting within the first 2 days after birth. Radiographs show a nonclassic double bubble with gas in the distal small bowel, or few distended bowel loops, or a normal bowel gas pattern. Next imaging study. *Did not extract: Variant 5. Bilious vomiting in an infant older than 2 days (suspected malrotation). Initial imaging.*

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD28C. Suspected hypertrophic pyloric stenosis (HPS)

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
	UGI: upper gastrointestinal series; **US**: ultrasound
CAR 2012 [16]	**L63. NON-BILIOUS VOMITING IN AN INFANT, SUSPECTED HYPERTROPHIC PYLORIC STENOSIS** - US pylorus: Indicated [B]: US is the preferred modality to identify HPS in term infants as well as preterm infants. US screening for associated urinary tract anomalies in children with proven HPS is not worthwhile. - UGI: Moderately indicated [B]: May be used to assess for HPS when US is non-diagnostic, or when US is not available.
ACR 2020 [38] (Alazraki et al)	**VOMITING IN INFANTS** ▪ Variant 7. Infant older than 2 weeks and up to 3 months old. New onset nonbilious vomiting (suspected hypertrophic pyloric stenosis). Initial imaging. *Did not extract: Variant 5. Bilious vomiting in an infant older than 2 days (suspected malrotation). Initial imaging.*
RCR 2017 [17]	**P24. NON-BILIOUS PROJECTILE VOMITING (SUSPECTED PYLORIC STENOSIS)** - US [A]

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD28D. Suspected uncomplicated gastroesophageal reflux (GER)

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
NM: nuclear medicine; **UGI**: upper gastrointestinal series	
CAR 2012 [16]	**L64. NON-BILIOUS VOMITING IN AN INFANT, SUSPECTED GER** - UGI: Not indicated [B]: History and physical examination should be sufficient to diagnose uncomplicated GER and initiate therapy in most infants. However, UGI is appropriate for GER with the following features: failure to resolve with medical management by 18-24 months; associated with poor weight gain; any child > 2 years of age; any child with dysphagia or odynophagia. UGI has lower sensitivity for GER than pH monitoring and lower sensitivity for esophagitis than endoscopy. - NM reflux scan: Moderately indicated [B]: An NM reflux scan may be used in tandem with UGI to document reflux, if pH monitoring is not available.
ACR 2020 [38] (Alazraki et al)	**VOMITING IN INFANTS** ▪ Variant 6. Infant with nonbilious vomiting, and otherwise healthy (suspected uncomplicated esophageal reflux). Initial imaging. *Did not extract: Variant 5. Bilious vomiting in an infant older than 2 days (suspected malrotation). Initial imaging.*
North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition 2018 [39] (Rosen et al)	**PEDIATRIC GASTROESOPHAGEAL REFLUX** - Recommendation 3.1 (Weak recommendation) - Recommendation 3.2 (Weak recommendation) - Recommendation 3.3 (Weak recommendation) - Recommendation 3.4 (Weak recommendation) - Recommendation 3.11 (Opinion)

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD29. Persistent neonatal jaundice

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
MRCP: magnetic resonance cholangiopancreatography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US**: ultrasound	
CAR 2012 [16]	**L65. PERSISTENT NEONATAL JAUNDICE** - US: Indicated [B]: Abdominal US must be performed within the first 10 weeks of life. - NM: Indicated [B]: Hepatobiliary scan with Tc-99m labeled IDA derivatives must be performed within the first 10 weeks of life.
RCR 2017 [17]	**P26. PERSISTENT NEONATAL JAUNDICE** - US [A] - MRI (MRCP) [B] - NM (Tc-99m-HIDA) [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD30. Rectal bleeding

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
AXR: abdominal radiograph; **CT:** computed tomography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L66. SUSPECTED NECROTIZING ENTEROCOLITIS** - XR abdomen: Indicated [C]: AXR must include a decubitus or cross-table lateral view for free air. - US: Moderately indicated [C]: US can detect bowel thickening, intramural air and lack of peristalsis, but small amounts of free air may be missed. **L67. SUSPECTED MECKEL'S DIVERTICULUM OR DUPLICATION CYST** - NM: Indicated [C]: Meckel's scan can identify a Meckel's diverticulum or duplication cyst with gastric mucosa. SPECT or premedication with ranitidine may increase sensitivity. **L68. SUSPECTED JUVENILE POLYP OR POLYPOSIS** - Double contrast enema: Specialized investigation [C]: Contrast enema should be considered in consultation with a gastroenterologist or surgeon, as colonoscopy with snare polypectomy may be the preferred first-line investigation/therapy.
RCR 2017 [17]	**P27. GI BLEEDING (PER RECTUM) IN CHILDREN** - US [C] - Endoscopy (including video capsule endoscopy) [B] - CT [B] - NM (Tc-99m-labelled RBCs/pertechnetate) [C] - MRI [B] - AXR [C] - Angiography (including CT angiography) [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD31. Abdominal pelvic pain

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
AXR: abdominal radiograph; **CT:** computed tomography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US**: ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L54. ACUTE ABDOMINAL PAIN, SUSPECTED APPENDICITIS** - US: Indicated [B]: US has very good sensitivity and specificity for the diagnosis of appendicitis. It is also the preferred investigation if the differential diagnosis includes gynaecological causes of abdominal pain. It imparts no radiation. US should therefore always be the first line investigation for suspected appendicitis in children. - CT: Moderately indicated [B]: CT has higher sensitivity for the diagnosis of appendicitis than US. However, it imparts a significant radiation dose. It is therefore not recommended as the first imaging study, except in obese children. - XR abdomen: Not indicated [C]: Appendicitis can be diagnosed or ruled out in many children by clinical evaluation alone. Good evidence that XR improves the accuracy of clinical diagnosis is lacking. **L55. SUSPECTED APPENDICITIS, US NEGATIVE OR EQUIVOCAL** - CT: Indicated [B]: US followed by CT has been shown to be the most effective strategy, although it is also the most costly strategy. When US is negative and clinical suspicion is low, consideration might be given to observation/follow-up without further imaging. When US is equivocal and clinical suspicion is high, consideration might be given to surgery without further imaging. **L56. SUSPECTED INTUSSUSCEPTION, IMAGING DIAGNOSIS** - US: Indicated [B]: US has very high sensitivity and specificity for the diagnosis of intussusception. US may predict reducibility of an intussusception. Although imperfect, US remains the gold standard for non-invasive diagnosis of pathologic lead points. US is therefore the investigation of choice for suspected intussusception. - CT: Not indicated [C]: US should be sufficient to rule out intussusception. In patients with a negative or equivocal US, a broader differential diagnosis must be considered, and any further imaging should be guided by this differential diagnosis. Patients with a positive US should proceed to image-guided therapy or surgery. - XR abdomen: Not indicated [B]: XR is not indicated for the diagnosis of intussusception, due to poor interobserver agreement and poor overall diagnostic performance. **L67. SUSPECTED MECKEL'S DIVERTICULUM OR DUPLICATION CYST** - NM: Indicated [C]: Meckel's scan can identify a Meckel's diverticulum or duplication cyst with gastric mucosa. SPECT or premedication with ranitidine may increase sensitivity.
ACR 2019 [41] (Koberlein et al)	**SUSPECTED APPENDICITIS – CHILD** ▪ Variant 1. Child. Suspected acute appendicitis, low clinical risk. Initial imaging. ▪ Variant 2. Child. Suspected acute appendicitis, intermediate clinical risk. Initial imaging. ▪ Variant 3. Child. Suspected acute appendicitis, high clinical risk. Initial imaging.

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
AXR: abdominal radiograph; **CT:** computed tomography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US**: ultrasound; **XR**: radiograph	
	▪ Variant 4. Child. Suspected acute appendicitis, equivocal or nondiagnostic right lower quadrant ultrasound. Next imaging study. ▪ Variant 5. Child. Suspected acute appendicitis with clinical suspicion or initial imaging suggestive of complication (eg, abscess, bowel obstruction). Next imaging study.
Canadian Urological Association 2021 [42] (Lee et al)	**MANAGEMENT OF URETERAL CALCULI** - Ultrasound, KUB X-ray, low-dose NCCT (level 3, strong recommendation)
European Crohn's and Colitis Organization and the European Society of Paediatric Gastroenterology, Hepatology and Nutrition 2018 [43] (Turner et al)	**PEDIATRIC ULCERATIVE COLITIS** Radiography and Toxic Megacolon - Recommendation: Abdominal x-ray (AXR) [EL4, adults EL4] - Practical Point: Abdominal CT-scan or MRI
European Pancreatic Club and the Hungarian Pancreatic Study Group 2018 [44] (Parniczky et al)	**PANCREATITIS** - AP-IV.1. Transabdominal ultrasonography (GRADE 1/B) - AP-IV.2. Contrast-enhanced abdominal computed tomography (CT) (Adult evidence level: GRADE 1/C) - AP-IV.3. contrast-enhanced abdominal CT or MRI (Adult evidence level: GRADE 1/B) - AP-IV.4. ERCP (GRADE 1/C) - AP-IV.5. Endoscopic ultrasonography (EUS) (GRADE 2/C) - AP-IV.6. MRCP (GRADE 2/C)
Italian Polispecialistic Society of Young Surgeons 2021 [45] (Guaitoli et al)	**ACUTE APPENDICITIS IN INFANTS** - CT (EL 2C)
North American Society for Pediatric Gastroenterology, Hepatology and Nutrition & Society for Pediatric Radiology 2021 [47] (Trout et al)	**ACUTE PANCREATITIS** - Transabdominal ultrasound (1B) - CT or MRI (1B), (1C) - Ultrasound (2C) - CT or MRI (1C) **ACUTE RECURRENT PANCREATITIS** - MRI (1C) - US, CT (2C)
NASPGHN 2018 [46]	**ACUTE PANCREATITIS IN PEDIATRIC POPULATIONS**

Appendix 2. Evidence tables

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
AXR: abdominal radiograph; **CT:** computed tomography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US**: ultrasound; **XR**: radiograph	
(Abu-El-Haija et al)	- transabdominal ultrasonography, CT, MRI
RCR 2017 [17] (see also G11, G12, G17)	**P21. INTUSSUSCEPTION IN CHILDREN** - US [A] - AXR [B] - US-guided or fluoroscopy-guided hydrostatic/pneumatic reduction [B] **P28. ACUTE ABDOMINAL PAIN IN CHILDREN** - US [B] - CT [B] - AXR [C] - MRI [B]
World Society of Emergency Surgery 2020 [48] (Di Saverio et al)	**ACUTE APPENDICITIS** - Recommendation 1.7 [QoE: Moderate; Strength of recommendation: Strong; 1B]. - Recommendation 1.8 [QoE: Moderate; Strength of recommendation: Weak; 2B]. - Recommendation 1.9 [QoE: Moderate; Strength of recommendation: Weak; 2B]. - Recommendation 1.10 [QoE: Moderate; Strength of recommendation: Strong; 1B]. - Recommendation 1.11 [QoE: High; Strength of recommendation: Strong; 1A]. - Recommendation 1.14.1 [QoE: Moderate; Strength of recommendation: Weak: 2B]. - Recommendation 1.14.2 [QoE: Moderate; Strength of recommendation: Weak; 2B].

Abbreviations: CAR: Canadian Association of Radiologists; NASPGHN: North American Society for Pediatric Gastroenterology, Hepatology and Nutrition; RCR: Royal College of Radiologist

Table PD32. Palpable abdominal or pelvic mass

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US:** ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L70. PALPABLE ABDOMINAL OR PELVIC MASS, INITIAL EVALUATION** - US abdomen and pelvis: Indicated [C]: Recommended as the first investigation to confirm the presence of a mass. If positive, the patient should be referred to a specialist centre. All further imaging for diagnosis and staging should be performed at the specialist centre. - XR abdomen: Moderately indicated [C]: XR may confirm a large mass suspected on physical examination; however, it lacks sensitivity compared to cross sectional imaging. XR may be used to confirm calcification suspected on US. - CT: Specialized investigation [C]: CT may be required for surgical planning and staging. These investigations must be performed in accordance with current pediatric oncology protocols. - MRI: Specialized investigation [C]: MRI may be required for surgical planning and staging. These investigations must be performed in accordance with current pediatric oncology protocols.
RCR 2017 [17]	**P30. PALPABLE ABDOMINAL/PELVIC MASS IN CHILDREN** - US [C]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD33. Constipation

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
AXR: abdominal radiograph; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US:** ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L69. CONSTIPATION** - XR: Abdomen not indicated [A]: The diagnosis of constipation should be made on the basis of history and physical examination. XR interpretation is highly variable, and the correlation between constipation and stool burden on XR is poor. - Contrast enema: Indicated [B]: For children who have failed initial medical management, contrast enema may distinguish those who require referral for rectal manometry and/or biopsy to rule out Hirschsprung disease from those who can continue to be managed medically and referred only if their constipation proves refractory to therapy.
RCR 2017 [17]	**P29. CONSTIPATION IN CHILDREN** - AXR [C] - NM (colonic transit studies) [B] - Contrast enema [B] - US [B] - MRI [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD34. Undescended testes

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **MRI:** magnetic resonance imaging; **US:** ultrasound	
CAR 2012 [16]	**L73. IMPALPABLE TESTES** - US: Indicated [B]: US is the best initial imaging modality. - MRI: Specialized investigation [B]: If US fails to reveal testes in the inguinal canal, MRI can be used to locate intra-abdominal testes. MRI should be considered in consultation with a surgeon, because laparoscopy without further imaging is a reasonable alternative. - CT: Specialized investigation [B]: If US fails to reveal testes in the inguinal canal, CT can be used to locate intra-abdominal testes. CT should be considered in consultation with a surgeon, because laparoscopy without further imaging is a reasonable alternative.
RCR 2017 [17]	**P40. IMPALPABLE TESTES IN CHILDREN** - US [B] - MRI [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD35. Fetal renal pelvic dilatation, initial postnatal evaluation

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
US: ultrasound	
CAR 2012 [16]	**L74. FETAL RENAL PELVIC DILATION, INITIAL POSTNATAL EVALUATION** - US: Indicated [B]: US of kidneys and bladder should be performed no sooner than 72 hours post-partum to avoid a false negative examination, unless there is strong suspicion of bladder outlet obstruction on prenatal ultrasound. Mild pyelectasis should be followed at 4-6 weeks to ensure resolution.
ACR 2020 [49] (Brown et al)	**ANTENATAL HYDRONEPHROSIS – INFANT** ▪ Variant 1. Antenatal diagnosis of hydronephrosis. Initial neonatal imaging. ▪ Variant 2. Antenatal diagnosis of hydronephrosis with normal neonatal ultrasound.

Abbreviations: ACR: American College of Radiology; CAR: Canadian Association of Radiologists

Table PD36A. Urinary incontinence: Enuresis

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **IVP**: intravenous pyelogram; **IVU**: intravenous urography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US:** ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L71. TYPICAL ENURESIS** - Imaging: Not recommended [B]: History, physical examination and urinalysis should take precedence over imaging, especially in children with monosymptomatic night-time enuresis. An anatomical abnormality is unlikely in the absence of unusual clinical features. **L72. ATYPICAL ENURESIS** - US kidneys and bladder: Indicated [C]: In toilet trained girls with continuous dribbling or wetting, US of kidneys and bladder should be used initially to search for a duplex kidney and to assess the urinary bladder in conjunction with video urodynamics. US may also be considered to screen for urinary tract anomalies or bladder trabeculation in children with refractory night-time enuresis, daytime enuresis or symptoms of dysfunctional voiding. Consideration should be given to urological consultation with a view to urodynamic assessment. - NM renal scan: Indicated [B]: DMSA scan is useful to confirm or locate a dysplastic kidney or the upper moiety of a duplex system, suspected on the basis of US findings. - IVP: Specialized investigation [B]: IVP may be considered in consultation with a urologist if it is necessary to confirm an infrasphincteric ectopic ureter in a girl with a duplex system identified on US and/or DMSA. - CT abdomen and pelvis: Specialized investigation [B]: If US and NM renal scan fail to locate a dysplastic kidney or a dysplastic renal moiety, CT with delayed images may demonstrate a suspected infrasphincteric ectopic ureter. - MRI urography: Specialized investigation [B]: If US and NM renal scan fail to locate a dysplastic kidney or a dysplastic renal moiety, MR urography may demonstrate a suspected infrasphincteric ectopic ureter. - MRI spine: Specialized investigation [B]: In children with abnormal neurological or musculoskeletal examination, bladder wall thickening or trabeculation on US or neuropathic vesicoureteral dysfunction on urodynamics, MRI is the imaging examination of choice for spinal dysraphism and tethered cord. - XR lumbosacral spine: Not indicated [C]: XR may show spinal dysraphism; however, MRI is ultimately required to assess cord, conus and cauda equine in addition to the spinal column.
RCR 2017 [17]	**P39. CONTINUOUS WETTING IN CHILDREN (NOCTURNAL ENURESIS)** - US [B] - XR lumbosacral spine [B] - MRI (including MR urography) [B] - IVU [B] - NM (DMSA) [B] - CT [B] - Video-urodynamics [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD36B. Urinary incontinence: Continual incontinence

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
CT: computed tomography; **IVP**: intravenous pyelogram; **IVU**: intravenous urography; **MRI:** magnetic resonance imaging; **NM**: nuclear medicine; **US:** ultrasound; **XR**: radiograph	
CAR 2012 [16]	**L71. TYPICAL ENURESIS** - Imaging: Not recommended [B]: History, physical examination and urinalysis should take precedence over imaging, especially in children with monosymptomatic night-time enuresis. An anatomical abnormality is unlikely in the absence of unusual clinical features. **L72. ATYPICAL ENURESIS** - US kidneys and bladder: Indicated [C]: In toilet trained girls with continuous dribbling or wetting, US of kidneys and bladder should be used initially to search for a duplex kidney and to assess the urinary bladder in conjunction with video urodynamics. US may also be considered to screen for urinary tract anomalies or bladder trabeculation in children with refractory night-time enuresis, daytime enuresis or symptoms of dysfunctional voiding. Consideration should be given to urological consultation with a view to urodynamic assessment. - NM renal scan: Indicated [B]: DMSA scan is useful to confirm or locate a dysplastic kidney or the upper moiety of a duplex system, suspected on the basis of US findings. - IVP: Specialized investigation [B]: IVP may be considered in consultation with a urologist if it is necessary to confirm an infrasphincteric ectopic ureter in a girl with a duplex system identified on US and/or DMSA. - CT abdomen and pelvis: Specialized investigation [B]: If US and NM renal scan fail to locate a dysplastic kidney or a dysplastic renal moiety, CT with delayed images may demonstrate a suspected infrasphincteric ectopic ureter. - MRI urography: Specialized investigation [B]: If US and NM renal scan fail to locate a dysplastic kidney or a dysplastic renal moiety, MR urography may demonstrate a suspected infrasphincteric ectopic ureter. - MRI spine: Specialized investigation [B]: In children with abnormal neurological or musculoskeletal examination, bladder wall thickening or trabeculation on US or neuropathic vesicoureteral dysfunction on urodynamics, MRI is the imaging examination of choice for spinal dysraphism and tethered cord. - XR lumbosacral spine: Not indicated [C]: XR may show spinal dysraphism; however, MRI is ultimately required to assess cord, conus and cauda equine in addition to the spinal column.
RCR 2017 [17]	**P39. CONTINUOUS WETTING IN CHILDREN (NOCTURNAL ENURESIS)** - US [B] - XR lumbosacral spine [B] - MRI (including MR urography) [B] - IVU [B] - NM (DMSA) [B] - CT [B] - Video-urodynamics [B]

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD37A. Urinary tract infection: First episode

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
DMSA: dimercaptosuccinic acid; **NM**: nuclear medicine; **US:** ultrasound; **VCUG**: voiding cystourethrography; **XR**: radiograph	
CAR 2012 [16]	**L76. FEBRILE UTI IN A CHILD < 24 MONTHS – UNCOMPLICATED** - US kidneys and bladder: Indicated [C]: US of kidneys and bladder should be performed to rule out anatomical anomalies and hydronephrosis, to assess renal parenchyma and renal size. The yield of US for significant abnormalities in this setting is low, but non-invasiveness and lack of radiation exposure argue in favour of performing the test. US should not be performed during the acute illness, as transient dilation of the renal collecting system and swelling of the renal parenchyma may be misleading. - DMSA renal scan: Not indicated [A]: Renal DMSA scan does not contribute to management decisions in uncomplicated UTI and should be reserved for cases of complicated or recurrent UTI, where the risk of renal parenchymal scarring is higher. - VCUG: Not indicated [A]: Antibiotic prophylaxis has not been shown to prevent recurrent UTI or pyelonephritis in infants without vesicoureteral reflux (VUR) or with grade I-IV VUR. **L77. FIRST EPISODE OF FEBRILE UTI IN A CHILD < 24 MONTHS – COMPLICATED** - US kidneys and bladder: Indicated [A]: UTI is considered complicated if any of the following apply: very ill child, evidence of sepsis, low urine output, raised serum creatinine, abdominal/pelvic mass, infection with organisms other than E. coli and/or failure to respond to appropriate antibiotics within 48 hours. In such cases, urgent US is indicated to assess for pyonephrosis, renal abscess or perirenal abscess. - DMSA renal scan moderately: Indicated [C]: DMSA renal scan is the most sensitive modality for the detection of pyelonephritis and renal scarring. - VCUG: Moderately indicated [C]: VCUG may be considered to rule out high grade VUR in this setting. VCUG should be performed after the active infection has settled.
Egyptian Clinical Practice Guidelines 2021 [50] (Moustafa et al)	**URINARY TRACT INFECTIONS IN INFANTS AND CHILDREN** - Imaging studies - Renal bladder US - US
Indian Society of Pediatric Nephrology 2023 [51] (Hari et al)	**IMAGING FOLLOWING UTI** - Recommendation: acute-phase DMSA scan (Weak recommendation; +ooo) - Clinical Practice Point: Ultrasound - Clinical Practice Point: micturating cystourethrography - Clinical Practice Point: late-phase DMSA scan
RCR 2017 [17]	**P41. PROVEN UTI IN CHILDREN** - US [C] - NM (DMSA) [A] - Cystography; XR/NM (MAG3)/US [A]/[B]/[C]

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
DMSA: dimercaptosuccinic acid; **NM**: nuclear medicine; **US:** ultrasound; **VCUG**: voiding cystourethrography; **XR**: radiograph	
	- MR urography [C]
Swiss consensus recommendations 2021 [52] (Buettcher et al)	**URINARY TRACT INFECTIONS** **The role and timing of urinary tract imaging in pyelonephritis** - Recommendation 8: US (evidence quality: moderate; recommendation: weak). Micturition cystourethrogram (evidence quality: moderate; recommendation: weak)

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

Table PD37B. Urinary tract infection: Recurrent

Guideline Group	Imaging modality addressed in guideline recommendations and/or clinical scenarios covered (Note: Recommendations are not included, except for the 2012 CAR guideline)
DMSA: dimercaptosuccinic acid; **NM**: nuclear medicine; **US:** ultrasound; **VCUG**: voiding cystourethrography; **XR**: radiograph	
CAR 2012 [16]	**L78. RECURRENT UTI, OR FIRST EPISODE OF UTI WITH ABNORMAL US, IN A CHILD YOUNGER THAN 24 MONTHS** - Nuclear medicine renal scan: Indicated [C]: The type of renal scan (e.g. DMSA, MAG3) should be determined in consultation with a pediatric nephrologist/nephrologist/nuclear medicine physician. - VCUG: Indicated [C]: VCUG is indicated to identify high grade VUR in children with recurrent UTI and in children with US findings of hydronephrosis and/or scarring.
Egyptian Clinical Practice Guidelines 2021 [50] (Moustafa et al)	**URINARY TRACT INFECTIONS IN INFANTS AND CHILDREN** - Imaging studies - Renal Bladder US - US
RCR 2017 [17]	**P41. PROVEN UTI IN CHILDREN** - US [C] - NM (DMSA) [A] - Cystography: XR/NM (MAG3)/US [A]/[B]/[C] - MR urography [C]
Swiss consensus recommendations 2021 [52] (Buettcher et al)	**URINARY TRACT INFECTIONS** **The role and timing of urinary tract imaging in pyelonephritis** - Recommendation 8: US (evidence quality: moderate; recommendation: weak). Micturition cystourethrogram (evidence quality: moderate; recommendation: weak)

Abbreviations: CAR: Canadian Association of Radiologists; RCR: Royal College of Radiologist

APPENDIX 3A. PEDIATRICS SUMMARY OF RECOMMENDATIONS (ENGLISH)

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
	CT: computed tomography; **MRI**: magnetic resonance imaging; **US**: ultrasound; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus	
PD01. DEVELOPMENTAL DELAY/CONGENITAL MALFORMATIONS		
	1. In children with a suspected congenital malformation of the brain, we recommend **MRI** as the initial imaging modality.	↑↑
	↳ **1.1** In infants and neonates, if MRI is unavailable, contraindicated, or if the patient is uncooperative, we suggest **US** as an alternative imaging modality, recognizing the severe limitations for evaluation of cortical malformations.	↑
	↳ **1.2** If a congenital malformation of the skull is suspected, or bony anatomy must be evaluated, we recommend **CT** as the next imaging modality.	↑↑
PD02. SUSPECTED CONGENITAL MALFORMATIONS OF THE SPINE/SPINAL DYSRAPHISM		
	1. In infants with suspected congenital malformation of the spine, we recommend **US** as the initial imaging modality.	↑↑
	↳ **1.1** If additional imaging is required, we recommend **MRI** as the next imaging modality. *The timing of the MRI should be determined by the neurosurgeon.*	↑↑
	2. In infants with suspected spinal dysraphism, we recommend **against XR for screening**.	↓↓
	3. In low-risk infants with non-suspicious dimple, we suggest **against routine US screening**.	↓
	4. In high-risk infants < 6 months of age with risk factors✧, we recommend **US** as the initial imaging modality. ✧ For example, dimple depth (>5 mm), location of lumbosacral dimple (>2.5 cm from the anus), hairy patch, hemangioma, or anorectal/cloacal malformation.	↑↑
	↳ **4.1** If US is abnormal or equivocal, we recommend **MRI** as the next imaging modality. *The timing of the MRI should be determined by the neurosurgeon.*	↑↑
	5. In infants with suspected congenital scoliosis, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **5.1** If further characterization of the spinal cord is required, we recommend **US or MRI** as the next imaging modality, depending on the age of the patient.	↑↑
PD03. HYDROCEPHALUS		
PD03A. Suspected hydrocephalus	**1.** In neurologically stable children with suspected hydrocephalus, we recommend **MRI** as the initial imaging modality.	↑↑
	↳ **1.1** If MRI is unavailable in an appropriate time frame, is contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality.	↑↑

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

Clinical/ Diagnostic Scenario	Recommendation	Strength of Rec.
	CT: computed tomography; **MRI**: magnetic resonance imaging; **US**: ultrasound; **XR**: radiography **Strength of Recommendation:** ↑↑: strong for; ↑: conditional for; ↓↓: strong against; ↓: conditional against; **EPc**: Expert Panel consensus	
	↳ **1.2** In infants < 6 months or open fontanelle, if MRI and CT are unavailable, we suggest **US** as an alternative imaging modality, recognizing its significant limitations.	↑
	2. In neurologically unstable children with suspected hydrocephalus, we recommend **CT** as the initial imaging modality.	↑↑
PD03B. Treated hydrocephalus, shunt malfunction	**1.** In neurologically stable children with hydrocephalus and suspected shunt malfunction, we recommend **MRI and XR (shunt survey)** as the initial imaging modalities. *Depending on local/regional practice, we suggest a rapid or shortened MRI protocol.*	↑↑
	↳ **1.1** If MRI is unavailable in an appropriate time frame, is contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality.	↑↑
	↳ **1.2** In infants < 6 months or open fontanelle, if MRI and CT are unavailable, we suggest **US** as an alternative imaging modality, recognizing its significant limitations.	↑
	2. In neurologically unstable children with hydrocephalus and suspected shunt malfunction, we recommend **CT and XR (shunt survey)** as the initial imaging modalities.	↑↑
PD04. CRANIOSYNOSTOSIS		
	1. In children with suspected craniosynostosis, we recommend **against skull XR**.	↓↓
	2. In children with suspected craniosynostosis, we recommend referral to a clinician expert in the evaluation for craniosynostosis.	↑↑
	↳ **2.1** If this is unavailable, we recommend **US of the cranial sutures or low-dose CT**, depending on local practice and availability.	↑↑
PD05. MASTOIDITIS		
	1. In children with suspected mastoiditis, we recommend **CT with contrast** as the initial imaging modality.	EPc
PD06. ORBITAL CELLILITIS		
	1. In children with suspected orbital cellulitis, we recommend **CT with contrast** as the initial imaging modality (EP consensus). *CT orbits or CT orbits and head may be performed according to local practice preference.*	EPc
PD07. CONGENITAL OR ACQUIRED HEARING LOSS		
	1. In children with hearing loss, we recommend **pediatric otolaryngology consultation** prior to imaging investigation.	↑↑
PD08. SEIZURE		
PD08A. Febrile seizure	Febrile seizure without any evidence of intracranial infection/inflammation and no underlying structural brain abnormalities.	
	1. In children with febrile seizure✧, we recommend **against routine imaging**.	↓↓

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	✧Simple or complex seizure	
PD08B. Non-febrile seizure	**1.** In children with first presentation of non-febrile/unprovoked seizures (excluding absence seizures) in whom imaging is indicated, we recommend **MRI** as the initial imaging modality.	↑↑
	↳ **1.1** If MRI is unavailable, contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality.	↑↑
PD09. HEADACHE: ACUTE/SUBACUTE		
If concern for mastoiditis, see PD05. Mastoiditis. *If concern for orbital cellulitis, see PD06. Orbital cellulitis.*	**1.** In children with primary headache (such as tension or migraine), we suggest **against routine imaging**, recognizing there may be clinical difficulty distinguishing primary from secondary headaches.	↓
	2. In children with suspected acute/subacute secondary headache (such as suspected brain tumour), we recommend **MRI** as the initial imaging modality.	↑↑
	↳ **2.1** If MRI is unavailable, contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality.	↑↑
	3. In children with suspected intracranial hemorrhage (subarachnoid, subdural, or intracerebral), we recommend **CT** as the initial imaging modality.	↑↑
	4. In children with suspected cerebral venous sinus thrombosis we recommend **CT with contrast or MRI** as the initial imaging modality. *CT or MRI may be performed according to local practice preference and/or availability.*	↑↑
PD10. HEADACHE: CHRONIC/RECURRENT		
	1. In children with chronic/recurrent headache and normal neurological examination, we suggest **against routine imaging**, recognizing imaging may be acceptable when there is significant level of patient/parental concern, young age, atypical features, or changes in nature or pattern of headache.	↓
	2. In children with chronic/recurrent headache and abnormal neurological examination or papilledema, we recommend **MRI** as the initial imaging modality.	↑↑
	↳ **2.1** If MRI is unavailable, contraindicated, or if the patient is uncooperative, we recommend **CT** as an alternative imaging modality.	↑↑
PD11. NECK MASS/NODULE		
PD11A. Thyroid mass/nodule	**1.** In children with a thyroid nodule, we recommend **US** as the initial imaging modality.	↑↑
	2. In children with suspected goiter/diffuse enlargement with no concerning features✧, we suggest **against routine imaging**.	↓

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	✧ For example, concerning features would include rapid or asymmetric enlargement, mass effect, dysphagia, dysphonia, or lymphadenopathy	
PD11B. Non-thyroid mass/nodule	**1.** In children with palpable but non-enlarged nodes, we suggest **against routine imaging**.	↓
	2. In children with suspected retropharyngeal abscess, we recommend **lateral neck XR** as the initial imaging modality.	↑↑
	↳ **2.1** If XR is abnormal, we recommend **CT with contrast** as the next imaging modality.	↑↑
	3. In children with non-thyroid neck mass or nodule with suspicion for infection, we recommend **US** as the initial imaging modality.	↑↑
	↳ **3.1** If further imaging is required, we recommend **CT with contrast** as the next imaging modality.	↑↑
	4. In children with non-thyroid neck mass or nodule with suspicion for malignancy, we recommend **US** as the initial imaging modality.	↑↑
	↳ **4.1** If further imaging is required, we recommend **MRI or CT** as the next imaging modality. *Preference for MRI, but regional practice may influence test.*	↑↑
	5. In children with non-thyroid neck mass or nodule with suspicion of congenital anomaly, we recommend **US** as the initial imaging modality.	↑↑
	↳ **5.1** If further imaging is required, we suggest **MRI** as the next imaging modality. *Preference for MRI, but CT may be used based on regional practice.*	↑
PD12. SINUSITIS		
PD12A. Acute sinusitis (including acute complicated)	**1.** In children with uncomplicated acute sinusitis, we recommend **against routine imaging**.	↓↓
	2. In children with complicated sinusitis or in immunocompromised patients, we recommend **CT with contrast** as the initial imaging modality.	↑↑
PD12B. Chronic sinusitis	**1.** In children with chronic or recurrent sinusitis, we recommend **against routine imaging**. *Chronic sinusitis is rare in children. In children with chronic or recurrent sinusitis, otolaryngology consultation may be considered. If imaging is indicated based on a clinical decision rule or guideline* [23]*, CT sinuses is the preferred modality.*	↓↓
PD13. TORTICOLLIS		
PD13A. Congenital torticollis	**1.** In children with suspected congenital torticollis (fibromatosis colli) and unclear clinical diagnosis, we recommend **US** as the initial imaging modality.	↑↑
PD13B. New onset torticollis	**1.** In children with new onset torticollis with non-muscular/atypical history and examination, we recommend **XR** as the initial imaging modality.	↑↑

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	↳ **1.1** Given the wide range of possible pathology, we recommend **orthopedist, neurosurgeon, or neurologist consultation** prior to further imaging.	↑↑
PD14. CNS INFLAMMATION/INFECTION		
	1. In children with suspected central nervous system inflammation/infection, we recommend **MRI** as the initial imaging modality.	EPc
	↳ **1.1** If MRI is unavailable or contraindicated we suggest **CT** as an alternative imaging modality, recognizing the significant limitations of CT in this context. *CT is insensitive for CNS inflammation and infection and a normal CT does not exclude these diagnoses.*	EPc
PD15. BACK PAIN		
	1. Persistent, severe, or recurrent back pain in children is atypical, therefore, when red flags are present✧, we recommend **spine XR** as the initial imaging modality. ✧ Red flags may include the following: Child <5 years; Persistent back pain; Duration > 4 weeks; Worsening pain; Morning stiffness; Night pain; Radicular pain; Vertebral tenderness on palpation; Fever, tachycardia; Abnormal neurological exam; Weight loss, bruising, adenopathy or abdominal mass; Altered spine shape/mobility; Altered gait; Functional disability; Bowel/bladder dysfunction; Past history of cancer/tuberculosis [17,24]	↑↑
	↳ **1.1** If XR is normal and the following diagnoses are suspected, spinal malignancy, infection, fracture, cauda equina syndrome, ankylosing spondylitis or another inflammatory disorder, we recommend **MRI** as the next imaging modality.	↑↑
	↳ **1.2** If XR shows bony pathology and further investigation is required, we recommend **CT or MRI**.	↑↑
PD16. HIP PAIN OR LIMPING REFERABLE TO HIP PATHOLOGY		
	1. In children with hip pain, we recommend **XR** as the initial imaging modality.	↑↑
	↳ **1.1** If further imaging is indicated for the assessment of joint effusion, we recommend **US or MRI**.	↑↑
	↳ **1.2** If further imaging is indicated for any other reason, we recommend **MRI**.	↑↑
PD17. LIMPING AND UNABLE TO LOCALIZE SYMPTOMS		
	1. In limping children too young to localize symptoms, we recommend **XR of the affected extremity** as the initial imaging modality.	↑↑
	↳ **1.1** If XR is negative for fracture or other pathology, the need for and type of further imaging should be based on clinical grounds. *For example, repeat XR in 10-24 days, US of the hip, or MRI of the affected extremity may be considered.*	EPc
PD18. DEVELOPMENTAL DYSPLASIA OF THE HIP		

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	1. In a newborn < 4-6 weeks of age with risk factors for development dysplasia of the hip and a normal examination, we recommend **against routine imaging**.	↓↓
	↳ **1.1** If there are physical findings (e.g., positive Barlow's sign), we recommend **US**.	↑↑
	2. In an infant between 4-6 weeks and 4-6 months of age with risk factors for or physical findings suggestive of developmental dysplasia of the hip, we recommend **US** as the initial imaging modality.	↑↑
	3. In children 4-6 months of age or older, we recommend **XR** as the initial imaging modality.	↑↑
PD19. SUSPECTED OSGOOD-SCHLATTER DISEASE		
	1. In children with a clinical diagnosis of Osgood-Schlatter disease, we recommend **against routine imaging**.	↓↓
	2. In children where clinical diagnosis of Osgood-Schlatter disease is uncertain or if serious bone pathology is being considered, we recommend **XR** as the initial imaging modality.	↑↑
PD20. SCOLIOSIS		
	1. In children with a clinical suspicion of scoliosis, we recommend **standing full spine XR** as the initial imaging modality.	↑↑
	↳ **1.1** If risk factors✧ are identified on XR, we recommend **full spine MRI** as the next imaging modality. *MRI should only be considered after consultation with a pediatric orthopedic surgeon.* ✧For example, age 0 to 9 years old, left thoracic curve, short segment curve (4-6 levels), absence of apical segment lordosis/kyphosis, long thoracolumbar curve, rapid curve progression (more than 1° per month), functionally disruptive pain, focal neurologic findings, male sex, and pes cavus [18].	↑↑
PD21. SHORT STATURE/GROWTH FAILURE		
	1. In children ≥ 2 years of age with short stature/growth failure, we recommend **XR of the left hand and wrist for bone age**✧ as the initial imaging modality. ✧ A bone age should be completed according to appropriate reference standards, for example, Greulich and Pyle [29].	↑↑
PD22. PNEUMONIA		
PD22A. Uncomplicated pneumonia *If suspected bronchiolitis, see PD23.*	**1.** In children with suspected uncomplicated pneumonia, particularly in the presence of tachypnea and/or a low SpO2, we recommend **chest XR**.	↑↑

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PD22B. Pneumonia with complications, including recurrent pneumonia	**1.** In children with complicated pneumonia✧, we recommend **chest XR** as the initial imaging modality. ✧For example, recurrent pneumonia, pleural effusion, empyema	↑↑
	↳ **1.1** If further investigation is required for evaluation of pleural effusion, we recommend **US** as the next imaging modality.	↑↑
	↳ **1.2** If further investigation is required, for example in the case of suspected bronchiectasis, suspicion of a congenital lung malformation, lung abscess, pneumothorax, necrotizing pneumonia, we recommend **CT** as the next imaging modality.	↑↑
PD23. BRONCHIOLITIS		
	1. In children with suspected bronchiolitis, we recommend **against routine chest XR**.	EPc
PD24. SUSPECTED FOREIGN BODY		
PD24A. Suspected foreign body: Gastrointestinal	**1.** In children with suspected swallowed batteries and magnets, we recommend **discussion with general surgery and/or gastroenterology**.	↑↑
	2. In children with suspected swallowed foreign body ingestion (i.e., not battery or magnet), we recommend **XR of the neck, chest, abdomen** as the initial imaging modality. If timing of ingestion is uncertain, the pelvis could be included.	↑↑
	↳ **2.1** If object has not passed and follow-up is required, we recommend **XR abdomen and pelvis**.	↑↑
PD24B. Suspected foreign body: Airway	**1.** In children with suspected inhaled foreign body, we recommend **chest XR (inspiration and expiration views)** as the initial imaging modality. *Right/left decubitus views could be substituted for expiration view if the patient is not cooperative.*	↑↑
	↳ **1.1** If chest XR is negative or equivocal and there is a significant suspicion of foreign body, we recommend **otolaryngology or surgery consultation** for consideration for bronchoscopy.	↑↑
PD25. ASTHMA		
	1. In children with asthma, we recommend **against routine chest XR**.	↓↓
	2. In children with asthma with clinical suspicion of complication of asthma (e.g., pneumothorax) or another cause of recurrent wheezing (e.g., aspiration), we recommend **chest XR** as the initial imaging modality.	↑↑
PD26. STRIDOR		
	1. In stable children with acute stridor where epiglottitis or retropharyngeal abscess is suspected and the child is stable enough to undergo imaging, we recommend **lateral neck XR** as the initial imaging modality.	↑↑
	2. In children presenting with typical croup, we recommend against routine imaging.	↓↓
	3. In children with chronic stridor, we recommend **neck XR** as the initial imaging modality.	↑↑

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	↳ **3.1** If further evaluation or characterization is required, we recommend **CT or MRI** as the next imaging modality.	↑↑
PD27. ACUTE ABDOMINAL TRAUMA		
Note: Recommendation 2 is a modification of the recommendation in the CAR Trauma guideline [37].	**1.** In children who have sustained abdominal trauma, in whom internal injury is suspected, we recommend **CT** as the initial imaging modality.	↑↑
	↳ **1.1** In the specific clinical context where CT in not available, we suggest that **US** be used, while considering its significant limitations. *In the pediatric population, US is not reliable in excluding significant acute injury*.	↑
	2. In children with suspected urinary system injury, we recommend **excretory phase CT**.	↑↑
PD28. VOMITING IN INFANT OR YOUNG CHILDREN		
PD28A. Bilious vomiting, suspected proximal obstruction	**1.** In infants and young children with bilious vomiting and suspected proximal obstruction on abdominal XR, we recommend **urgent upper GI series** as the initial imaging modality.	↑↑
	↳ **1.1** If upper GI series in not immediately available, we suggest **transfer and urgent pediatric surgery consultation**.	↑
	↳ ↳ **1.2** If transfer and upper GI series will not be delayed, we suggest **urgent US** as an alternative, while recognizing its limitations.	↑
PD28B. Suspected distal obstruction	**1.** In infants and young children with suspected distal obstruction, we recommend **abdominal XR** as the initial imaging modality.	↑↑
	↳ **1.1** If XR suggests a distal obstruction, we recommend **contrast enema** as the next imaging modality.	↑↑
PD28C. Suspected hypertrophic pyloric stenosis	**1.** In infants with suspected hypertrophic pyloric stenosis, we recommend **US abdomen** as the initial imaging modality.	↑↑
PD28D. Suspected uncomplicated gastroesophageal reflux (GER)	**1.** In infants and young children with suspected uncomplicated gastroesophageal reflux, we recommend **against routine imaging**.	↓↓
PD29. PERSISTENT NEONATAL JAUNDICE		
	1. In infants with persistent neonatal jaundice and conjugated hyperbilirubinemia, we recommend **urgent US** as the initial imaging modality **and urgent referral to pediatric gastroenterology**.	↑↑
PD30. RECTAL BLEEDING		

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	1. In children with suspected Meckel's diverticulum, we recommend **NM** as the initial imaging modality. **NM**: nuclear medicine	↑↑
	2. In neonates with suspected necrotizing enterocolitis, we recommend **XR** as the initial imaging modality.	↑↑
	3. In children with other causes of rectal bleeding (e.g., intussusception, inflammatory bowel disease, juvenile polyposis, etc.), we recommend **US** as the initial imaging modality.	↑↑
	↳ **3.1** If vascular anomaly or angiodysplasia is suspected, we suggest **CT** as the next imaging modality.	↑
PD31. ACUTE ABDOMINAL/PELVIC PAIN		
Note: Suspected ovarian torsion recommendations from OBGYN guideline [40], with the modification of removal of transvaginal US	**Suspected appendicitis**	
	1. In children with suspected appendicitis, we recommend **US** as the initial imaging modality.	↑↑
	↳ **1.1** If US is equivocal and there is ongoing suspicion of appendicitis, we suggest **repeat US or CT/MRI** as the next imaging modality.	↑
	Suspected intussusception	
	1. In children with suspected intussusception, we recommend **US** as the initial imaging modality.	↑↑
	Suspected ovarian torsion	
	1. In patients with suspected ovarian torsion, we recommend **transabdominal US** as the initial imaging modality.	↑↑
	↳ **1.1** We suggest **Doppler** as an adjunct.	↑
	Inflammatory bowel disease	
	1. In children with suspected inflammatory bowel disease (e.g., Crohn's, ulcerative colitis), we recommend **US** as the initial imaging modality prior to pediatric gastroenterology consultation.	↑↑
	↳ **1.1** If further imaging is required (e.g., for characterization), we recommend **MR enterography** as the next imaging modality. **MR**: magnetic resonance	↑↑
	↳ **1.2** If the patient is not cooperative (e.g., age), we recommend an **upper GI and small bowel follow-through**.	↑↑
	↳ **1.3** In the acute setting where MR enterography is not tolerated, we recommend **CT**.	↑↑
	Suspected pancreatitis	
	1. In children with suspected pancreatitis, we recommend **US** as the initial imaging modality.	↑↑
	↳ **1.1** If complication of pancreatitis is suspected, we recommend **CT or MRI** as the next imaging modality.	↑↑

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	↳ **1.2** If duct anomaly (e.g., pancreas divisum) is suspected, we recommend **MRI with MRCP** as the next imaging modality.	↑↑
	Other causes of abdominal pain	
	1. In children other causes of abdominal pain, such as suspected renal/ureteral calculi or cholecystitis, we recommend **US** as the initial imaging modality.	↑↑
PD32. PALPABLE ABDOMINAL OR PELVIC MASS		
	1. In children with a palpable abdominal or pelvic mass, we recommend **US** as the initial imaging modality.	↑↑
	↳ **1.1** If US is not available, we suggest **XR abdomen** as an alternative.	↑
PD33. CONSTIPATION		
	The diagnosis of constipation should be made based on clinical history and a physical examination.	
	1. If imaging is required, we suggest **XR abdomen/pelvis** as the initial imaging modality.	↑
PD34. UNDESCENDED TESTES		
	1. In children with undescended testes, we recommend **against routine imaging**. Visit Choosing Wisely Canada for additional information.	↓↓
PD35. FETAL RENAL PELVIC DILATATION, INITIAL POSTNATAL EVALUATION		
	1. In infants with fetal renal pelvic dilatation, we recommend **US** as the initial imaging modality, performed no sooner than 3 days post-partum. *If there is severe bilateral pre-natal hydronephrosis or concern for posterior urethral valves, US could be performed sooner.*	↑↑
PD36. URINARY INCONTINENCE		
PD36A. Enuresis	**1.** In children with typical enuresis (i.e., monosymptomatic night-time enuresis), we recommend **against routine imaging**.	↓↓
PD36B. Continual incontinence	**1.** In children with continuous dribbling or wetting, we recommend **kidney and urinary bladder US** as the initial imaging modality.	↑↑
PD37. URINARY TRACT INFECTION		
PD37A. First episode	**1.** In children presenting with a first non-febrile episode of UTI, we recommend **against routine imaging**.	↓↓
	2. In children <2 years of age presenting with a first febrile episode of UTI, we recommend **US** as the initial imaging modality.	↑↑
	3. In children with complicated/atypical first episode of UTI✧, we recommend **US before discharge from hospital** as the initial imaging modality.	↑↑

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	✧For example, very ill child, evidence of sepsis, low urine output, raised serum creatinine, abdominal/pelvic mass, infection with organisms other than E. coli and/or failure to respond to appropriate antibiotics within 48 hours	
PD37B. Recurrent	**1.** In children presenting with recurrent UTI, we recommend **US** as the initial imaging modality.	↑↑
	↳ **1.1** If US is abnormal, we recommend that any decision for further intervention (e.g., VCUG) should be made **in consultation with an experienced pediatrician, nephrologist, or urologist**. *Voiding cystourethrogram (VCUG) is not indicated in children with recurrent cystitis or non-febrile urinary tract infections. VCUG may be indicated in males with bilateral hydroureteronephrosis, infant with hydronephrosis and UTI.*	EPc
	2. In children presenting with complicated recurrent episode of UTI✧, we recommend **US before discharge from hospital** as the initial imaging modality. ✧For example, very ill child, evidence of sepsis, low urine output, raised serum creatinine, abdominal/pelvic mass, infection with organisms other than E. coli and/or failure to respond to appropriate antibiotics within 48 hours	↑↑
PD38. NON-ACCIDENTAL TRAUMA		
Note: Recommendations 1 and 2 are from the CAR Trauma guideline recommendations [37]. Recommendations 3 and 4 are new.	**1.** In children with suspected non-accidental trauma, we recommend **skeletal survey XR** as the initial imaging modality.	↑↑
	2. If there is suspicion of non-accidental head trauma, we suggest **CT head**.	↑
	3. In children with abnormal CT head, abnormal skull or spine XR, or persistent neurological symptoms, we recommend **MRI of the head and spine**.	↑↑
	4. If there is clinical suspicion of acute intra-abdominal injury, we recommend **CT**.	↑↑

The guideline recommendations are to assist the choice of imaging modality in situations where it is felt clinically necessary to obtain imaging. Imaging should not delay definitive management. Whether or not imaging is indicated is outside the scope of this guideline. Additionally, we did not cover serial imaging, and time intervals for follow-up of known disease and/or treatment monitoring. These recommendations are not intended to stand alone. Medical care should be based on evidence, a clinician's expert judgment, the patient's circumstances, values, and preferences, and resource availability. We recognize that not all imaging modalities are available in all locations, particularly in rural or remote areas of Canada. Decisions about whether to recommend that a patient travel for recommended imaging or perform alternate imaging locally can be difficult, and should consider the expected benefits of recommended imaging, risks of travel, patient preference, and other factors. This guideline is based on evidence related to diagnostic imaging tests only, not the clinical management of a patient.

APPENDIX 3B. PEDIATRICS SUMMARY OF RECOMMENDATIONS (FRENCH)

Scénario clinique/diagnostique	Recommandation	Force
	ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts	
PD01. RETARD DE CROISSANCE/ANOMALIES CONGÉNITALES		
	1. Dans le cas d'enfants chez qui l'on soupçonne une anomalie congénitale du cerveau, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Chez le nourrisson ou le nouveau-né, si l'**IRM** n'est pas possible ou est contre-indiquée, ou si le patient ne coopère pas, nous recommandons l'**ÉCHO** comme modalité d'imagerie subsidiaire, en reconnaissant toutefois son utilité très limitée dans le cadre de l'évaluation des anomalies du cortex cérébral.	↑
	↳ **1.2** Si une anomalie congénitale du crâne est présumée, ou si l'anatomie osseuse doit être évaluée, nous recommandons la **TDM** comme modalité d'imagerie subséquente.	↑↑
PD02. ANOMALIES CONGÉNITALES ET MALFORMATIONS DYSRAPHIQUES DE LA COLONNE VERTÉBRALE PRÉSUMÉES		
	1. Dans le cas de nourrissons chez qui l'on soupçonne une anomalie congénitale de la colonne vertébrale, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires, nous recommandons l'**IRM** comme modalité d'imagerie subséquente. *Le moment de l'examen d'IRM sera déterminé par le neurochirurgien.*	↑↑
	2. Dans le cas de nourrissons chez qui l'on soupçonne une malformation dysraphique de la colonne vertébrale, nous **déconseillons** le recours à la **radiographie** à des fins de dépistage.	↓↓
	3. Dans le cas des nourrissons à faible risque présentant une dépression (fossette) sacrée, nous **déconseillons l'ÉCHO de dépistage usuelle**.	↓
	4. Dans le cas des nourrissons à risque élevé âgés de moins de 6 mois et présentant des facteurs de risque✧, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale. ✧ Par exemple, la profondeur de la dépression (plus de 5 mm), le site de la dépression lombosacrée (à plus de 2,5 cm de l'anus), la présence d'une queue faunesque, d'un hémangiome ou d'une malformation ano-rectale/cloacale.	↑↑
	↳ **4.1** Si les résultats de l'ÉCHO sont anormaux ou douteux, nous recommandons l'**IRM** comme modalité d'imagerie subséquente. *Le moment de l'examen d'IRM sera déterminé par le neurochirurgien.*	↑↑
	5. Dans le cas des nourrissons chez qui l'on soupçonne une scoliose congénitale, nous recommandons la **radiographie** comme modalité d'imagerie initiale.	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
	ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts	
	↳ **5.1** S'il est nécessaire de procéder à une caractérisation plus poussée de la moelle spinale, nous recommandons l'**ÉCHO** ou l'**IRM** comme modalité d'imagerie subséquente, selon l'âge du patient.	↑↑
PD03. HYDROCÉPHALIE		
PD03A. Hydrocéphalie présumée	**1.** Dans le cas des enfants <u>stables</u> sur le plan neurologique et chez qui l'on soupçonne une hydrocéphalie, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'**IRM** n'est pas possible dans un délai approprié, est contre-indiquée ou si le patient ne coopère pas, nous recommandons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
	↳ **1.2** Chez les nourrissons âgés de moins de 6 mois ou présentant une fontanelle large, si l'IRM et la TDM ne sont pas possibles, nous suggérons l'**ÉCHO** comme modalité d'imagerie subsidiaire, malgré ses limites importantes.	↑
	2. Dans le cas des enfants <u>instables</u> sur le plan neurologique et chez qui l'on soupçonne une hydrocéphalie, nous recommandons la **TDM** comme modalité d'imagerie initiale.	↑↑
PD03B. Hydrocéphalie traitée, dysfonctionnement du shunt	**1.** Dans le cas des enfants <u>stables</u> sur le plan neurologique présentant une hydrocéphalie et chez qui l'on soupçonne un dysfonctionnement du shunt, nous recommandons l'**IRM** et la **radiographie (évaluation du shunt)** comme modalités d'imagerie initiales. *En fonction des pratiques locale et régionale, nous suggérons un protocole d'IRM rapide ou raccourci.*	↑↑
	↳ **1.1** Si l'**IRM** n'est pas possible dans un délai approprié, est contre-indiquée ou si le patient ne coopère pas, nous recommandons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
	↳ **1.2** Chez les nourrissons âgés de moins de 6 mois ou présentant une fontanelle large, si l'IRM et la TDM ne sont pas possibles, nous suggérons l'**ÉCHO** comme modalité d'imagerie subsidiaire, malgré ses limites importantes.	↑
	2. Dans le cas des enfants <u>instables</u> sur le plan neurologique présentant une hydrocéphalie et chez qui l'on soupçonne un dysfonctionnement du shunt, nous recommandons la **TDM** et la **radiographie (évaluation du shunt)** comme modalités d'imagerie initiales.	↑↑
PD04. CRANIOSTÉNOSE (OU CRANIOSYNOSTOSE)		
	1. Dans le cas des enfants chez qui l'on soupçonne une craniosténose, nous **déconseillons une étude du crâne par radiographie**.	↓↓
	2. Dans le cas des enfants chez qui on soupçonne une craniosténose, nous recommandons l'orientation vers un clinicien expert dans l'évaluation de la craniosténose.	↑↑
	↳ **2.1** Si l'orientation n'est pas possible, nous recommandons une **ÉCHO des sutures crâniennes** ou une **TDM à faible dose**, selon les pratiques et les possibilités locales.	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
PD05. MASTOÏDITE		
	1. Dans le cas des enfants chez qui l'on soupçonne une mastoïdite, nous recommandons une **TDM avec contraste** comme modalité d'imagerie initiale.	CE
PD06. CELLULITE ORBITAIRE		
	1. Dans le cas des enfants chez qui l'on soupçonne une cellulite orbitaire, nous recommandons une **TDM avec contraste** comme modalité d'imagerie initiale (consensus d'experts). *Selon les pratiques locales, une TDM des orbites ou une TDM des orbites et de la tête peut être réalisée.*	CE
PD07. PERTE AUDITIVE CONGÉNITALE OU ACQUISE		
	1. Chez les enfants atteints présentant une perte auditive, nous recommandons une **consultation en oto-rhino-laryngologie pédiatrique** avant l'examen d'imagerie.	↑↑
PD08. CONVULSIONS		
PD08A. Convulsions fébriles	Convulsions fébriles sans signe d'infection/inflammation intracrânienne et sans anomalie cérébrale structurelle sous-jacente.	
	1. Chez les enfants présentant des convulsions fébriles✧, nous **déconseillons le recours à un examen usuel d'imagerie**. ✧Convulsions simples ou complexes	↓↓
PD08B. Convulsions non fébriles	**1.** Chez les enfants présentant une première présentation de crises non fébriles/non provoquées (à l'exclusion des absences) chez qui l'imagerie est indiquée, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'**IRM** n'est pas possible, est contre-indiquée ou si le patient ne coopère pas, nous recommandons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
PD09. CÉPHALÉE : AIGUË/SUBAIGUË		
En cas de suspicion de mastoïdite, voir PD05. Mastoïdite. *En cas de suspicion de cellulite orbitaire, voir PD06. Cellulite orbitaire.*	**1.** Chez les enfants souffrant de céphalées primaires (comme des tensions ou des migraines), nous **déconseillons le recours à un examen usuel d'imagerie**; toutefois, nous admettons qu'il peut être difficile sur le plan clinique de distinguer les céphalées primaires des céphalées secondaires.	↓
	2. Dans le cas des enfants chez qui l'on soupçonne une céphalée secondaire aiguë/subaiguë (telle qu'une tumeur cérébrale présumée), nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si l'**IRM** n'est pas possible, est contre-indiquée ou si le patient ne coopère pas, nous recommandons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
	3. Dans le cas des enfants chez qui l'on soupçonne une hémorragie intracrânienne (sous-arachnoïdienne, sous-durale ou intracérébrale), nous recommandons une **TDM** comme modalité d'imagerie initiale.	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	4. Dans le cas des enfants chez qui l'on soupçonne une thrombose des sinus veineux cérébraux, nous recommandons une **TDM avec contraste** ou une **IRM** comme modalité d'imagerie initiale. *Le choix entre la TDM et l'IRM sera orienté par les pratiques locales et la disponibilité des modalités.*	↑↑
PD10. CÉPHALÉE : CHRONIQUE/RÉCURRENTE		
	1. Chez les enfants souffrant de céphalées chroniques/récurrentes et dont les résultats d'examen neurologique sont normaux, nous **déconseillons le recours à un examen usuel d'imagerie**; toutefois, nous admettons que l'imagerie peut être acceptable lorsque le niveau de préoccupation du patient/des parents est important, lorsque le patient a un jeune âge ou des caractéristiques atypiques, ou lorsqu'il y a des changements dans la nature ou les caractéristiques des céphalées.	↓
	2. Chez les enfants présentant des céphalées chroniques/récurrentes et des résultats d'examen neurologique anormaux ou un œdème papillaire, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si l'**IRM** n'est pas possible, est contre-indiquée ou si le patient ne coopère pas, nous recommandons la **TDM** comme modalité d'imagerie subsidiaire.	↑↑
PD11. MASSE/NODULE CERVICAL		
PD11A. Masse/nodule de la thyroïde	**1.** Chez les enfants présentant un nodule thyroïdien, nous recommandons l'**échographie** comme modalité d'imagerie initiale.	↑↑
	2. Dans le cas des enfants chez qui l'on soupçonne un goitre/une hypertrophie diffuse sans caractéristiques préoccupantes✧, nous **déconseillons le recours à un examen usuel d'imagerie**. ✧ Par exemple, une hypertrophie rapide ou asymétrique, un effet de masse, une dysphagie, une dysphonie ou une lymphadénopathie sont des caractéristiques préoccupantes	↓
PD11B. Masse/nodule non thyroïdien	**1.** Chez les enfants présentant des ganglions palpables, mais non gonflés, nous **déconseillons le recours à un examen usuel d'imagerie**.	↓
	2. Dans le cas des enfants chez qui l'on soupçonne un abcès rétropharyngé, nous recommandons la **radiographie cervicale latérale** comme modalité d'imagerie initiale.	↑↑
	↳ **2.1** Si les résultats de la radiographie sont anormaux, nous recommandons la **TDM avec contraste** comme modalité d'imagerie subséquente.	↑↑
	3. Chez les enfants présentant une masse cervicale non thyroïdienne ou un nodule présumé d'être infecté, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **3.1** Si des examens supplémentaires sont nécessaires, nous recommandons la **TDM avec contraste** comme modalité d'imagerie subséquente.	↑↑

Scénario clinique/diagnostique	Recommandation	Force
	ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts	
	4. Chez les enfants présentant une masse ou un nodule cervical non thyroïdien que l'on présume être de nature maligne, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **4.1** Si des examens supplémentaires sont nécessaires, nous recommandons **l'IRM ou la TDM** comme modalité d'imagerie subséquente. *L'IRM est préférée; les pratiques régionales peuvent influencer le choix de modalité.*	↑↑
	5. Chez les enfants présentant une masse ou un nodule cervical non thyroïdien que l'on présume être une anomalie congénitale, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **5.1** Si un examen d'imagerie supplémentaire est nécessaire, nous suggérons l'**IRM** comme modalité d'imagerie subséquente. *L'IRM est préférée, mais la TDM peut être utilisée en fonction des pratiques régionales.*	↑
PD12. SINUSITE		
PD12A. Sinusite aiguë (y compris la sinusite aiguë compliquée)	**1.** Chez les enfants présentant une sinusite aiguë sans complication, nous **déconseillons le recours à un examen usuel d'imagerie**.	↓↓
	2. Dans le cas des enfants présentant une sinusite aiguë compliquée ou des patients immunovulnérables, nous recommandons une **TDM avec contraste** comme modalité d'imagerie initiale.	↑↑
PD12B. Sinusite chronique	**1.** Chez les enfants présentant une sinusite chronique ou récurrente, nous **déconseillons le recours à un examen usuel d'imagerie**. *La sinusite chronique est rare chez l'enfant. Dans le cas des enfants présentant une sinusite chronique ou récurrente, une consultation en oto-rhino-laryngologie peut être envisagée. Si l'imagerie est indiquée sur la base d'une règle de décision clinique ou d'une ligne directrice*[23]*, la TDM des sinus est la modalité préférée.*	↓↓
PD13. TORTICOLIS		
PD13A. Torticolis congénital	**1.** Dans le cas des enfants chez qui l'on soupçonne un torticolis congénital (fibromatose du cou) et dont le diagnostic clinique est incertain, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
PD13B. Torticolis d'apparition nouvelle	**1.** Chez des enfants présentant une première atteinte de torticolis non musculaire ou dont l'historique et les résultats d'examen sont atypiques, nous recommandons la **radiographie** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Compte tenu du large éventail d'affections possibles, nous recommandons une **consultation avec un orthopédiste, un neurochirurgien ou un neurologue** avant la réalisation d'un autre examen d'imagerie.	↑↑
PD14. INFLAMMATION/INFECTION DU SNC		
	1. Dans le cas d'enfants chez qui l'on soupçonne une inflammation/infection du système nerveux central, nous recommandons l'**IRM** comme modalité d'imagerie initiale.	CE

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
	ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts	
	↳ **1.1** Si l'IRM n'est pas possible ou est contre-indiquée, nous suggérons la **TDM** comme modalité d'imagerie subsidiaire; toutefois, nous admettons les limites importantes de la TDM dans ce contexte. *La TDM ne détecte pas à tout coup l'inflammation et l'infection du SNC, et des résultats de TDM normaux ne permettent pas d'écarter ces diagnostics.*	CE
PD15. DORSALGIE		
	1. La dorsalgie persistante, sévère ou récurrente chez l'enfant est atypique. Par conséquent, en présence de signaux d'alerte✧, nous recommandons la **radiographie de la colonne vertébrale** comme modalité d'imagerie initiale. ✧ Les signaux d'alerte peuvent inclure les éléments suivants : patient âgé de moins de 5 ans; dorsalgie persistante; dorsalgie qui s'étend sur plus de 4 semaines; aggravation de la douleur; raideur matinale; douleur nocturne; douleur radiculaire; sensibilité vertébrale à la palpation; fièvre, tachycardie; examen neurologique anormal; perte de poids, ecchymoses, adénopathie ou masse abdominale; altération de la forme/mobilité de la colonne vertébrale; altération de la démarche; invalidité fonctionnelle; dysfonctionnement de l'intestin/de la vessie; antécédents de cancer/tuberculose [17,24]	↑↑
	↳ **1.1** Si les résultats de la radiographie sont normaux et que l'on soupçonne les diagnostics suivants : tumeur maligne de la colonne vertébrale, infection, fracture, syndrome de la queue de cheval, spondylarthrite ankylosante ou autre trouble inflammatoire, nous recommandons l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si une pathologie osseuse est visible à la radiogrpahie et que des examens supplémentaires sont nécessaires, nous recommandons une **TDM ou une IRM**.	↑↑
PD16. DOULEUR À LA HANCHE OU CLAUDICATION RENVOYANT À UNE AFFECTION DE LA HANCHE		
	1. Chez des enfants présentant une douleur de la hanche, nous recommandons la **radiographie** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si un examen d'imagerie supplémentaire est indiqué pour l'évaluation d'un épanchement articulaire, nous recommandons l'**ÉCHO** ou l'**IRM**.	↑↑
	↳ **1.2** Si des examens supplémentaires sont indiqués pour toute autre raison, nous recommandons l'**IRM**.	↑↑
PD17. CLAUDICATION DONT LES SYMPTÔMES NE PEUVENT ÊTRE LOCALISÉS		
	1. Chez les enfants présentant une claudication et qui sont trop jeunes pour localiser les symptômes, nous recommandons la **radiographie de l'extrémité touchée** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si la radiographie ne montre pas de fracture ou d'autres affections, la nécessité et le type d'imagerie supplémentaire doivent reposer sur des éléments cliniques. *Par exemple, une radiographie répétée dans les 10 à 24 jours, une IRM de la hanche ou une IRM de l'extrémité touchée peut être envisagée.*	CE

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
PD18. DYSPLASIE DÉVELOPPEMENTALE DE LA HANCHE		
	1. Chez les nouveau-nés âgés de moins de 4 à 6 semaines présentant des facteurs de risque de dysplasie développementale de la hanche et dont les résultats d'examen physique sont normaux, nous **déconseillons le recours à un examen d'imagerie usuel**.	↓↓
	↳ **1.1** Si l'examen physique aboutit à une constatation particulière (par ex., résultat positif à la manœuvre de Barlow), nous recommandons l'**ÉCHO**.	↑↑
	2. Chez les nouveau-nés âgés d'entre 4-6 semaines et 4-6 mois présentant des facteurs de risque de dysplasie développementale de la hanche ou dont l'examen physique suggère une telle dysplasie, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	3. Dans les enfants âgés de plus de 4-6 mois, nous recommandons la **radiographie** comme modalité d'imagerie initiale.	↑↑
PD19. MALADIE D'OSGOOD-SCHLATTER PRÉSUMÉE		
	1. Chez les enfants présentant un diagnostic clinique de maladie d'Osgood-Schlatter, nous **déconseillons le recours à un examen d'imagerie usuel**.	↓↓
	2. Dans le cas des enfants chez qui le diagnostic clinique de la maladie d'Osgood-Schlatter est incertain, ou si une affection osseuse grave est envisagée, nous recommandons la **radiographie** comme modalité d'imagerie initiale.	↑↑
PD20. SCOLIOSE		
	1. Dans le cas des enfants chez qui l'on présume une scoliose, nous recommandons la **radiographie de la colonne vertébrale complète en position debout** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si des facteurs de risque✧ sont repérés à la radiographie, nous recommandons l'**IRM de la colonne vertébrale complète** comme modalité d'imagerie subséquente. *L'IRM ne doit être envisagée qu'après consultation avec un chirurgien orthopédiste spécialisé en pédiatrie.* ✧Par exemple, un âge de 0 à 9 ans, une courbe thoracique gauche, une courbe du segment court (4 à 6 niveaux), une absence de lordose/cyphose du segment apical, une courbe thoracolombaire longue, une progression rapide de la courbe (plus de 1° par mois), une douleur perturbatrice fonctionnelle, des symptômes neurologiques focaux, le sexe masculin et le pied creux [18].	↑↑
PD21. PETITE TAILLE/RETARD DE CROISSANCE		
	1. Chez les enfants âgés de plus de 2 ans présentant une petite taille/un retard de croissance, nous recommandons la **radiographie de la main et du poignet gauche pour déterminer la maturation osseuse**✧ comme modalité d'imagerie initiale. ✧ L'examen de la maturation osseuse doit être réalisé selon les normes de référence appropriées, par ex., Greulich et Pyle [29].	↑↑
PD22. PNEUMONIE		

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
PD22A. Pneumonie non compliquée *En cas de bronchiolite présumée, voir PD23.*	**1.** Dans le cas des enfants chez qui l'on soupçonne une pneumonie non compliquée, en particulier en présence d'une tachypnée et/ou d'une faible SpO2, nous recommandons une **radiographie du thorax**.	↑↑
PD22B. Pneumonie compliquée, y compris pneumonie récidivante	**1.** Chez les enfants présentant une pneumonie compliquée✧, nous recommandons une **radiographie du thorax** comme modalité d'imagerie initiale. ✧Par exemple, une pneumonie récidivante, un épanchement pleural, un empyème	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires en vue de l'évaluation d'un épanchement pleural, nous recommandons une **ÉCHO** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si des examens supplémentaires sont nécessaires, par exemple en cas de bronchiectasie présumée, de malformation pulmonaire congénitale présumée, d'abcès pulmonaire, de pneumothorax et de pneumonie nécrosante, nous recommandons une **TDM** comme modalité d'imagerie subséquente.	↑↑
PD23. BRONCHIOLITE		
	1. Dans le cas des enfants chez qui l'on soupçonne une bronchiolite, nous **déconseillons le recours à la radiographie du thorax usuelle**.	CE
PD24. CORPS ÉTRANGER PRÉSUMÉ		
PD24A. Corps étranger présumé : tractus gastro-intestinal	**1.** Dans le cas des enfants chez qui l'on soupçonne l'ingestion de piles et d'aimants, nous recommandons une **discussion avec un chirurgien généraliste et/ou une gastro-entérologue**.	↑↑
	2. Dans le cas des enfants chez qui l'on soupçonne une ingestion de corps étrangers (autres que des piles ou des aimants), nous recommandons la **radiographie du cou, de la poitrine et de l'abdomen** comme modalité d'imagerie initiale. Si le moment de l'ingestion est incertain, le bassin pourrait être inclus.	↑↑
	↳ **2.1** Si l'objet n'a pas été éliminé et qu'un suivi est nécessaire, nous recommandons une **radiographie de l'abdomen et du bassin**.	↑↑
PD24B. Corps étranger présumé : voies respiratoires	**1.** Dans le cas des enfants chez qui l'on soupçonne l'inhalation d'un corps étranger, nous recommandons une **radiographie du thorax (en inspiration et en expiration)** comme modalité d'imagerie initiale. *La radiographie en expiration peut être remplacée par une radiographie en décubitus droit/gauche si le patient ne coopère pas.*	↑↑
	↳ **1.1** Si les résultats de la radiographie du thorax sont négatifs ou équivoques et qu'il y a un soupçon important de corps étranger, nous recommandons une **consultation en oto-rhino-laryngologie ou en chirurgie** pour évaluer la possibilité d'une bronchoscopie.	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
PD25. ASTHME		
	1. Chez les enfants asthmatiques, nous **déconseillons la radiographie du thorax usuelle**.	↓↓
	2. Dans le cas des enfants asthmatiques chez qui l'on soupçonne une complication de l'asthme (p. ex. pneumothorax) ou une autre cause de respiration sifflante récurrente (p. ex. aspiration), nous recommandons **la radiographie du thorax** comme modalité d'imagerie initiale.	↑↑
PD26. STRIDOR		
	1. Dans le cas des enfants stables présentant un stridor aigu et une épiglottite présumée ou un abcès rétropharyngé présumé, qui sont suffisamment stables pour subir une imagerie, nous recommandons la **radiographie latérale du cou** comme modalité d'imagerie initiale.	↑↑
	2. Chez les enfants présentant une laryngite sous-glottique (*croup*) typique, nous **déconseillons le recours à un examen usuel d'imagerie**.	↓↓
	3. Chez les enfants présentant un stridor chronique, nous recommandons la **radiographie du cou** comme modalité d'imagerie initiale.	↑↑
	↳ **3.1** Si des examens ou une caractérisation supplémentaires sont nécessaires, nous recommandons la **TDM** ou l'**IRM** comme modalité d'imagerie subséquente.	↑↑
PD27. TRAUMATISME AIGU DE L'ABDOMEN		
Remarque : La recommandation 2 constitue une modification de la recommandation tirée des lignes directrices de la CAR en matière de traumatismes[37].	**1.** Chez un enfant ayant subi un traumatisme abdominal et chez qui on suspecte une lésion interne, nous recommandons une **TDM** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Dans un contexte clinique particulier où la TDM n'est pas possible, nous suggérons d'avoir recours à l'**ÉCHO**, tout en ayant conscience de ses nombreuses limites. *Dans la population pédiatrique, l'ÉCHO n'est pas fiable pour exclure les lésions aiguës importantes*.	↑
	2. Dans le cas des enfants chez qui l'on soupçonne une lésion du système urinaire, nous recommandons la **TDM de la voie excrétrice (phase excrétrice)**.	↑↑
PD28. VOMISSEMENTS CHEZ LE NOURRISSON OU LE JEUNE ENFANT		
PD28A. Vomissements bilieux, occlusion proximale présumée	**1.** Dans le cas des nourrissons et des jeunes enfants présentant des vomissements bilieux et chez qui l'on soupçonne une occlusion proximale après la radiographie abdominale, nous recommandons **un transit œso-gastro-duodénal (TOGD) d'urgence** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si le TOGD n'est pas possible de façon immédiate, nous suggérons **un transfert et une consultation urgente en chirurgie pédiatrique**.	↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
	↳ **1.2** Dans le cas où un examen d'imagerie n'entraînerait pas le retard d'un transfert et d'un TOGD, nous suggérons une **ÉCHO urgente** comme modalité d'imagerie subsidiaire, tout en reconnaissant ses limites.	↑
PD28B. Occlusion distale présumée	**1.** Dans le cas des nourrissons et des jeunes enfants chez qui l'on soupçonne une occlusion distale, nous recommandons la **radiographie de l'abdomen** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si la radiographie suggère une occlusion distale, nous recommandons un **lavement baryté** comme modalité d'imagerie subséquente.	↑↑
PD28C. Sténose hypertrophique du pylore présumée	**1.** Dans le cas des nourrissons chez qui l'on soupçonne une sténose hypertrophique du pylore, nous recommandons l'**ÉCHO de l'abdomen** comme modalité d'imagerie initiale.	↑↑
PD28D. Reflux gastro-œsophagien (RGO) non compliqué présumé	**1.** Dans le cas des nourrissons et des jeunes enfants chez qui l'on soupçonne un reflux gastro-œsophagien non compliqué, nous **déconseillons le recours à un examen d'imagerie usuel**.	↓↓
PD29. ICTÈRE (JAUNISSE) NÉONATAL PERSISTANT		
	1. Chez les nourrissons présentant un ictère néonatal persistant et une hyperbilirubinémie conjuguée, nous recommandons une **ÉCHO urgente** comme modalité d'imagerie initiale **et une orientation urgente en gastro-entérologie pédiatrique**.	↑↑
PD30. SAIGNEMENT RECTAL		
	1. Dans le cas des enfants chez qui l'on soupçonne un diverticule de Meckel, nous recommandons la **MN** comme modalité d'imagerie initiale. **MN** : médecine nucléaire	↑↑
	2. Dans le cas des nouveau-nés chez qui l'on soupçonne une entéropathie vasculaire du nouveau-né, nous recommandons la **radiographie** comme modalité d'imagerie initiale.	↑↑
	3. Chez les enfants présentant d'autres causes de saignement rectal (par ex, une intussusception, une maladie inflammatoire de l'intestin, une polypose juvénile, etc.), nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **3.1** Si l'on soupçonne une anomalie vasculaire ou une angiodysplasie, nous suggérons la **TDM** comme modalité d'imagerie subséquente.	↑
PD31. DOULEUR ABDOMINALE/PELVIENNE AIGUË		
	Appendicite présumée	

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
	ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts	
Remarque : Torsion d'ovaire présumé Recommandations des lignes directrices d'obstétrique et de gynécologie [40], avec le retrait de l'**ÉCHO** transvaginale	**1.** Dans le cas des enfants chez qui l'on soupçonne une appendicite, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'ÉCHO est équivoque et que l'appendicite est toujours présumée, nous suggérons de **réaliser une nouvelle ÉCHO** ou une **TDM/IRM** comme modalité d'imagerie subséquente.	↑
	Intussusception présumée	
	1. Dans le cas des enfants chez qui l'on soupçonne une intussusception, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	Torsion ovarienne présumée	
	1. Dans le cas des enfants chez qui l'on soupçonne une torsion ovarienne, nous recommandons l'**ÉCHO transabdominale** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Nous suggérons le recours à la **Doppler** à titre d'examen secondaire.	↑
	Maladies inflammatoires de l'intestin	
	1. Dans le cas des enfants chez qui l'on soupçonne une maladie inflammatoire de l'intestin (par exemple, la maladie de Crohn, la colite ulcéreuse), nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale avant la consultation en gastro-entérologie pédiatrique.	↑↑
	↳ **1.1** Si des examens supplémentaires sont nécessaires (par ex. en vue d'une caractérisation), nous recommandons l'**entéro-IRM** comme modalité d'imagerie subséquente. **Entéro-IRM** : entérographie par résonance magnétique	↑↑
	↳ **1.2** Si le patient ne coopère par (par ex. en raison de son âge), nous recommandons un **transit œso-gastro-duodénal et de l'intestin grêle**.	↑↑
	↳ **1.3** Si la situation est grave, et donc que l'entéro-IRM n'est pas tolérée, nous recommandons une **TDM**.	↑↑
	Pancréatite présumée	
	1. Dans le cas des enfants chez qui l'on soupçonne une pancréatite, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'on soupçonne une complication de la pancréatite, nous recommandons la **TDM** ou l'**IRM** comme modalité d'imagerie subséquente.	↑↑
	↳ **1.2** Si l'on soupçonne une anomalie du canal (par ex., un pancréas *divisum*), nous recommandons **une IRM avec CPIRM** comme modalité d'imagerie subséquente.	↑↑

Ces recommandations ne sont pas conçues pour être utilisées seules. Les soins médicaux doivent reposer sur des données probantes, le jugement expert d'un clinicien, la situation, les valeurs et les préférences d'un patient, ainsi que sur la disponibilité des ressources. Nous sommes conscients que certaines modalités d'imagerie ne sont pas disponibles partout, en particulier dans les zones rurales et isolées du Canada. Il peut être difficile de décider s'il vaut mieux recommander à un patient de se déplacer pour obtenir l'imagerie recommandée ou d'effectuer localement un autre type d'imagerie; à cet égard, il faut tenir compte des avantages attendus de l'imagerie recommandée, des risques liés au déplacement, des préférences du patient et d'autres facteurs. La présente ligne directrice repose sur des données probantes liées uniquement aux tests d'imagerie diagnostique et non à la gestion clinique du patient.

Scénario clinique/diagnostique	Recommandation	Force
	ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts	
	Autres causes de douleurs abdominales	
	1. Dans le cas des enfants chez qui l'on soupçonne d'autres causes de douleurs abdominales, telles des calculs rénaux/urétéraux ou une cholécystite, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
PD32. MASSE ABDOMINALE OU PELVIENNE PALPABLE		
	1. Chez les enfants présentant une masse abdominale ou pelvienne palpable, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si l'ÉCHO n'est pas possible, nous recommandons une **radiographie de l'abdomen** comme modalité d'imagerie subsidiaire.	↑
PD33. CONSTIPATION		
	Le diagnostic de constipation doit être établi en fonction des antécédents cliniques et d'un examen physique.	
	1. Si un examen d'imagerie est nécessaire, nous suggérons une **radiographie de l'abdomen/du bassin** comme modalité d'imagerie initiale.	↑
PD34. TESTICULES NON DESCENDUS (CRYPTORCHIDIE)		
	1. Chez les enfants présentant un testicule non descendu, nous **déconseillons le recours à un examen d'imagerie usuel**. Consultez Choisir avec soin pour obtenir de plus amples renseignements.	↓↓
PD35. DILATATION DU BASSINET RÉNAL CHEZ LE FŒTUS, ÉVALUATION POSTNATALE INITIALE		
	1. Chez les nourrissons présentant une dilatation du bassinet rénal du fœtus, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale, réalisée au plus tôt 3 jours après l'accouchement. *S'il y a une hydronéphrose prénatale bilatérale sévère ou une inquiétude liée à des valvules urétrales postérieures, l'ÉCHO peut être réalisée plus tôt.*	↑↑
PD36. INCONTINENCE URINAIRE		
PD36A. Énurésie	**1.** Chez les enfants présentant une énurésie typique (c.-à-d. une énurésie nocturne monosymptomatique), nous **déconseillons le recours à un examen d'imagerie usuel**.	↓↓
PD36B. Incontinence continue	**1.** Chez les enfants présentant une miction goutte à goutte ou une énurésie continue, nous recommandons l'**ÉCHO des reins et de la vessie** comme modalité d'imagerie initiale.	↑↑
PD37. INFECTION DES VOIES URINAIRES		

Scénario clinique/diagnostique	Recommandation	Force
ÉCHO : échographie; **IRM** : imagerie par résonance magnétique; **TDM** : tomodensitométrie **Force de la recommandation :** ↑↑ : fortement recommandé; ↑ : recommandé dans certain cas; ↓↓ : fortement déconseillé; ↓ : déconseillé dans certains cas; **CE** : consensus d'un groupe d'experts		
PD37A. Premier épisode	**1.** Chez les enfants présentant un premier épisode d'infection urinaire non fébrile, nous **déconseillons le recours à un examen d'imagerie usuel**.	↓↓
	2. Chez les enfants de moins de 2 ans présentant un premier épisode fébrile d'infection urinaire, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	3. Chez les enfants présentant un premier épisode d'infection urinaire compliqué/atypique✧, nous recommandons l'**ÉCHO avant la sortie de l'hôpital** comme modalité d'imagerie initiale. ✧Par exemple, un enfant très malade, des signes d'état septicémique, un faible débit urinaire, une créatininémie élevée, une masse abdominale/pelvienne, une infection par des organismes autres qu'*E. coli* et/ou une absence de réponse aux antibiotiques appropriés dans les 48 heures	↑↑
PD37B. Récidivante	**1.** Chez les enfants présentant une infection urinaire récidivante, nous recommandons l'**ÉCHO** comme modalité d'imagerie initiale.	↑↑
	↳ **1.1** Si les résultats de l'ÉCHO sont anormaux, nous recommandons que toute décision d'intervention ultérieure (par ex., une cystographie mictionnelle) soit prise **en consultation avec un pédiatre, un néphrologue ou un urologue expérimenté**. *La cystographie mictionnelle n'est pas indiquée chez les enfants atteints de cystite récidivante ou d'infections des voies urinaires non fébriles. La cystographie mictionnelle peut être indiquée chez les garçons présentant une urétérohydronéphrose bilatérale, chez les nourrissons présentant une hydronéphrose et une infection urinaire.*	CE
	2. Chez les enfants présentant un épisode d'infection urinaire récidivante compliquée✧, nous recommandons l'**ÉCHO avant la sortie de l'hôpital** comme modalité d'imagerie initiale. ✧Par exemple, un enfant très malade, des signes d'état septicémique, un faible débit urinaire, une créatininémie élevée, une masse abdominale/pelvienne, une infection par des organismes autres que *E. coli* et/ou une absence de réponse aux antibiotiques appropriés dans les 48 heures	↑↑
PD38. TRAUMATISME NON ACCIDENTEL		
Remarque : Les recommandations 1 et 2 proviennent des lignes directrices de la CAR en matière de traumatismes[37]. Les recommandations 3 et 4 sont nouvelles.	**1.** Chez un enfant chez qui on suspecte un traumatisme non accidentel, nous recommandons une **série squelettique** comme modalité d'imagerie initiale.	↑↑
	2. Si un traumatisme crânien non accidentel est présumé, en particulier chez les très jeunes enfants, nous suggérons une **TDM de la tête**.	↑
	3. Chez les enfants présentant des résultats anormaux de TDM de la tête, des résultats anormaux de XR du crâne ou de la colonne vertébrale, ou des symptômes neurologiques persistants, nous recommandons une **IRM de la tête et de la colonne vertébrale**.	↑↑
	4. Si une lésion intra-abdominale aiguë est présumée sur le plan clinique, nous recommandons une **TDM**.	↑↑

APPENDIX 4. POTENTIALLY RELEVANT NON-ENGLISH GUIDELINES

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APPENDIX 5. AGREE-II ASSESSMENTS

Guideline	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality
	1	2	3	Score (%)	4	5	6	Score (%)	7	8	9	10	11	12	13	14	Score (%)	15	16	17	Score (%)	18	19	20	21	Score (%)	22	23	Score (%)	
RCR 2017 [17]	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	1	3	1	20 (83)	3	3	3	9 (100)	3	2	3	1	9 (75)	2	2	4 (67)	High
ACR 2019 [18] Scoliosis	2	2	3	7 (78)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
ACR 2021 [19] Seizures	3	2	3	8 (89)	3	2	3	8 (89)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
ACR 2018 [20] Headache	2	2	3	7 (78)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
ETA 2022 [21] Thyroid nodules	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	1	2	1	1	5 (42)	3	3	6 (100)	Moderate
ACR 2019 [22] Neck mass	2	2	3	7 (78)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
ACR 2018 [23] Sinusitis	2	2	3	7 (78)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	2	5 (83)	Moderate
German Gldn 2022 [25] Back pain	3	1	3	7 (78)	3	1	1	5 (56)	3	3	3	3	1	2	3	1	19 (79)	3	3	3	9 (100)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
ACR 2018 [26] Limping	2	2	3	7 (78)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
ACR 2019 [27] Devel. Dysplasia Hip	2	2	3	7 (78)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
ACR 2020 [30] Pneumonia	2	2	3	7 (78)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
ESPNIC 2020 [31] Pneu. & Bronchiolitis	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	2	23 (96)	3	1	3	7 (78)	1	3	3	3	10 (83)	3	3	6 (100)	High
Polish Gdln 2020 [32] Pneu. & Bronchiolitis	3	1	3	7 (78)	3	1	3	7 (78)	3	3	3	3	3	3	3	2	23 (96)	2	3	3	8 (89)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
SIGENP 2020 [33] Ingestion	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	2	3	3	1	21 (88)	3	3	3	9 (100)	1	3	1	3	8 (67)	3	3	6 (100)	Moderate
SFMU/SRLF/FGPICE 2019 [36] Asthma	3	1	3	7 (78)	3	1	3	7 (78)	3	1	3	3	1	3	3	1	18 (75)	3	1	3	7 (78)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate

Appendix 5. AGREE-II assessments

Guideline	Domain 1				Domain 2				Domain 3									Domain 4				Domain 5					Domain 6			Overall quality
	1	2	3	Score (%)	4	5	6	Score (%)	7	8	9	10	11	12	13	14	Score (%)	15	16	17	Score (%)	18	19	20	21	Score (%)	22	23	Score (%)	
CHEST 2020 [34] Chronic cough	3	1	3	7 (78)	3	1	3	7 (78)	3	1	3	3	3	3	3	2	21 (88)	3	3	2	8 (89)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
ERS 2020 [35] Chronic cough	3	3	3	9 (100)	3	3	3	9 (100)	3	3	3	3	3	3	3	1	22 (92)	3	1	3	7 (78)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate
ACR 2020 [38] Vomiting	2	3	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
NASPGHN/ESPGHN 2018 [39] GE reflux	3	3	3	9 (100)	3	1	2	6 (67)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	1	1	1	1	4 (33)	3	3	6 (100)	Moderate
ECCO/ESPGHN 2018 [43] Ulcerative colitis	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	High
ACR 2019 [41] Appendicitis	3	2	3	8 (89)	3	1	3	7 (78)	3	2	3	2	3	3	3	1	20 (83)	3	3	3	9 (100)	1	3	2	1	7 (58)	3	3	6 (100)	Moderate
SPIGC 2021 [45] Appendicitis	3	1	3	7 (78)	3	1	2	6 (67)	3	3	3	3	3	3	3	1	22 (92)	3	3	2	8 (89)	1	1	3	1	6 (50)	1	3	4 (67)	Moderate
WSES 2020 [48] Appendicitis	3	3	3	9 (100)	3	1	1	5 (56)	3	3	3	3	3	3	3	1	22 (92)	3	3	3	9 (100)	1	1	3	1	6 (50)	3	3	6 (100)	Moderate
CUA 2021 [42] Ureteral calculi	3	1	3	7 (78)	3	1	2	6 (67)	3	1	3	2	3	3	3	1	19 (79)	3	3	3	9 (100)	2	2	3	1	8 (67)	1	3	4 (67)	Moderate
EPC/HPSG 2018 [44] Pancreatitis	3	3	3	9 (100)	3	1	3	7 (78)	3	1	3	3	3	3	3	1	20 (83)	3	3	3	9 (100)	1	1	1	1	4 (33)	1	1	2 (33)	Moderate
NASPGHN 2018 [46] Pancreatitis	2	1	3	6 (67)	3	1	3	7 (78)	3	1	3	3	1	3	3	1	18 (75)	3	3	3	9 (100)	1	3	1	1	6 (50)	3	3	6 (100)	Moderate
NASPGHN/SPR 2021 [47] Pancreatitis	3	2	3	8 (89)	3	1	3	7 (78)	3	2	3	3	3	3	3	1	21 (88)	3	3	3	9 (100)	1	3	1	1	6 (50)	1	3	4 (67)	Moderate
ACR 2020 [49] Hydronephrosis	3	1	3	7 (78)	3	1	3	7 (78)	3	2	3	3	3	3	3	1	21 (88)	3	3	3	9 (100)	1	1	2	1	5 (42)	3	3	6 (100)	Moderate
Egyptian Gdln 2021 [50] Urinary tract infection	3	2	3	8 (89)	3	1	2	6 (67)	3	3	3	3	3	3	3	1	22 (92)	2	3	2	7 (78)	1	3	3	1	8 (67)	3	3	6 (100)	Moderate
ISPN 2023 [51] Urinary tract infection	3	3	3	9 (100)	3	1	3	7 (78)	3	3	3	3	3	3	3	2	23 (96)	3	3	3	9 (100)	3	3	3	1	10 (83)	3	3	6 (100)	High
Swiss Gldn 2021 [52] Urinary tract infection	3	1	3	7 (78)	3	1	3	7 (78)	3	3	3	3	1	3	3	1	20 (83)	3	3	3	9 (100)	3	3	1	1	8 (67)	1	3	4 (67)	Moderate

Appendix 5. AGREE-II assessments

Abbreviations: **ACR**: American College of Radiology; **CAR**: Canadian Association of Radiologists; **CUA**: Canadian Urological Association; **ECCO/ESPGHN**: European Crohn's and Colitis Organization and the European Society of Paediatric Gastroenterology, Hepatology and Nutrition; **EPC/HPSG:** European Pancreatic Club and the Hungarian Pancreatic Study Group; **ERS**: European Respiratory Society; **ESPNIC**: European Society of Paediatric and Neonatal Intensive Care; **ETA**: European Thyroid Association; **GE**: gastroesophageal; **NASPGHN**: North American Society for Pediatric Gastroenterology, Hepatology and Nutrition; **ISPN**: Indian Society of Pediatric Nephrology; **NASPGHN/ESPGHN**: North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition; **SFMU/SRLF/FGPICE**: Société Française de Médecine d'Urgence, the Société de Réanimation de Langue Française and the French Group for Pediatric Intensive Care and Emergencies; **SIGENP**: Italian Society of Pediatric Gastroenterology, Hepatology and Nutrition; **SPIGC**: Italian Polispecialistic Society of Young Surgeons; **RCR**: Royal College of Radiologists; **WSES**: World Society of Emergency Surgery